



Urban Policies as a Method for Upgrading Palestinian Refugee Settlements in Amman:
A Case Study of Al-Hussein Refugee Settlement.

This doctoral dissertation is presented in partial fulfilment of the requirements for the Doctor of Liberal Arts (DLA) degree at the Doctoral School of Architecture, Budapest University of Technology and Economics

**Urban Policies as a Method for Upgrading Palestinian Refugee Settlements in
Amman:**

A Case Study of Al-Hussein Refugee Settlement

DLA Dissertation.

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Abstract

Palestinian refugee camps in Jordan were established as a result of the occupation of Palestine in 1948. causing hundreds of thousands of Palestinians to seek refuge in the neighbouring countries. Due to the ongoing situation, what was initially established as a "temporary solution" transformed into an urban sprawl of informal settlements within the city contexts. Considering the political and urban situation, these refugee settlements face various challenges, from physical and environmental, to socio-economic issues. This dissertation investigates the built environment of such settlements and the correlation between urban housing policies and upgrading of Palestinian refugee camps in Amman. The dissertation adopts a case study method, choosing Al-Hussein refugee camp in Amman as the case study. Through interviews with designated organizations, observational field study, and upon the analysis of statistical data, the study seeks to establish an assessment model of the current situation. The goal is to develop a framework for upgrading strategies, based on a combination of theoretical insights and field studies. Afterwards, the study designs a housing units' module that outlines the application of low-cost and shared living solutions to rehabilitate housing units within the camp and to inform stakeholders about the most effective strategies for upgrading refugee settlements into a housing community development for future use.

Keywords: Palestinian Refugee Camps, Informal Settlements, Upgrading Strategies, Urban Heritage, Urban Morphology, Shared living spaces, Housing design modules

Declaration

I, Rania Matrouk, hereby declare that I have written this doctoral dissertation myself and have only used the sources indicated therein. Any sections that I have taken literally or with identical content but rephrased from other sources are clearly marked with the source indicated.

I consent to the publication of my doctoral dissertation on the Internet without restriction, but with my case-by-case consent. The digital and printed content of the doctoral dissertation and thesis booklets are identical.

I am not subject to any proceedings for the revocation of my doctoral degree, nor have my doctoral degree been revoked within the last 5 years. My application for a doctoral degree in the same field of science or my application for a degree program has not been rejected within the last two years, nor has my doctoral defense been unsuccessful within the last two years.

Declared by the author:
Budapest, August 31, 2025

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About the Author

As an architect and researcher, my personal history and identity have always influenced the way I approach my work. I am from Jordan and of Palestinian descent, and I came to Hungary to pursue my doctoral studies in architecture through the *Stipendium Hungaricum* programme¹. My dissertation topic emerged from the intersection of my heritage and my lived experiences, particularly through my deep connection to the city of Amman. Amman has not only shaped my academic and professional outlook but also serves as a constant source of inspiration in addressing broader cultural and social questions. This connection, alongside my awareness of the Palestinian cause, guided my choice of research and the direction of my dissertation.

¹ My studies were supported by the *Stipendium Hungaricum Scholarship Programme* of the Government of Hungary.

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1. Introduction

The issue of Palestinian refugee settlements in Amman, Jordan, presents a significant and complex urban challenge. Originally established as temporary shelters for Palestinians displaced by the 1948 and 1967 wars, these camps have since transformed into long-term informal settlements. Over the past seven decades, these settlements have become deeply embedded in Amman's urban context, yet they face a multitude of challenges, including poor housing conditions, inadequate infrastructure, environmental concerns, and social and health-related issues. Despite efforts to rehabilitate such settlements, the situation remains unresolved, highlighting the need for comprehensive urban strategies to improve housing conditions and integrate these settlements into the city.

This study aims to explore the relationship between urban housing policies and the upgrading of Palestinian refugee settlements in Amman, with a focus on Al-Hussein refugee settlements. Specifically, it seeks to address how policies related to low-cost housing and shared living spaces can be utilized to rehabilitate these settlements and improve the quality of life for their residents. By examining the strategies and definitions associated with affordable housing and shared spaces, this research will provide valuable insights into the most effective strategies for upgrading refugee settlements.

1.1. Research Problem and Significance

The transformation of Palestinian refugee camps into long-term informal settlements has created a complex urban reality in Amman. While these settlements are now part of the city's fabric, they are often seen as separate entity from the urban development, sustaining a sense of marginalization for the residents. The identity of these settlements is tied to the identity of the city itself, yet their integration into the urban context remains incomplete.

This research will provide a comprehensive understanding of the challenges facing Palestinian refugee settlements in Amman and offer practical solutions for their upgrading. The development of a framework for affordable housing and shared spaces will not only improve the physical condition of housing units but also enhance the social and economic integration of these settlements into the broader urban context. Additionally, this study will contribute to the discourse of urban policy and refugee settlements development, filling a critical gap in the current literature. By offering an insights and strategies, this research aims to create a framework for the rehabilitation of refugee settlements that will serve as a guideline which can be applied not only in Amman but also in other refugee settlements facing similar challenges across Jordan.

1.2. Research Objectives

The primary objective of this research is to explore how urban housing policies can facilitate the upgrading and rehabilitation of Palestinian refugee settlements in Amman. The study aims to assess the current housing conditions, with a particular focus on Al-Hussein refugee settlements, and identify the challenges these settlements face regarding housing, infrastructure, and social integration, while also proposing urban strategies that support the long-term integration of these settlements into Amman's urban fabric. The main research question is *"How can urban housing policies facilitate the upgrading of Palestinian refugee settlements in Amman?"*

1.3. Research Methodology

This study adopts a qualitative research methodology, focusing on the case of Al-Hussein refugee settlements in Amman. The methodology involves several key components. First, a literature review examines existing research on refugee and informal settlements. This is followed by a theoretical analysis exploring definitions and precedents of urban policies, particularly focusing on low-cost housing and shared living spaces.

Second is the data collection process, which focuses on gathering information on Palestinian refugee camps in Jordan through observational studies and field research. Field observations at Al-Hussein settlement, further interviews with stakeholders were conducted, such as representatives from relevant organizations, planners, and the settlement residents, in addition to collecting statistical and historical information.

Third is an in-depth case study analysis, which includes urban and architectural analysis of Al-Hussein settlement, which was chosen due to its location in addition to its historical and social significance to the city. The analysis aims to assess the current conditions of the housing units and lay the groundwork for designing the module. Moreover, it identifies the key challenges and opportunities for upgrading.

Fourth, a framework for upgrading housing units was developed, utilizing affordable housing focusing on low-cost solutions, and shared living spaces focusing on open shared spaces, in designing a housing module as a solution for the current living conditions and providing stakeholders with policy recommendations for implementation that can be used to improve the conditions of refugee settlements across the country.

1.4. Historical overview

The issue of Palestinian refugees' traces back to the establishment of the state of Israel on Palestinian land, initiating a protracted, unresolved conflict spanning over seventy-five years and resulting in continuous mass displacement. The 1948 war in Palestine, known as "Al-Nakbeh" or Catastrophe, compelled 700,000-750,000 Palestinians to abandon their homes, seeking refuge in Jordan, Syria, and Lebanon². In response, the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) established refugee settlements in host countries in 1950 to address the housing crisis on a temporary basis. The second wave of refugees which was around 300,000 resulted from the 1967 war "Al-Nakseh" made Palestinians to seek asylum in the three main host countries and in the West Bank territories. Emergency camps were subsequently set up to accommodate the needs of these refugees³.

The aftermath of both wars resulted in the creation of a number of unrecognized camps. Currently, there are over 5.9 million refugees, nearly one-third of registered Palestinian refugees reside in 58 recognized Palestine refugee camps across Jordan, Lebanon, the Syria, Gaza Strip, and the West Bank, including East Jerusalem³. Jordan stands as the primary host government for Palestinian refugees, with approximately 2.4 million refugees documented in UNRWA records. Jordan currently has ten recognized refugee camps throughout the country, along with other informal camps managed by various administrations. Despite being a party to international human rights instruments related to refugees, such as the 1948 Universal Declaration of Human Rights, Jordan has not passed the 1951 Convention relating to the Status of Refugees and its 1967 Protocol. Notably, Jordan is the only political entity to grant full Jordanian citizenship upon Palestinian refugees⁴.

During the urban expansion of Amman as a modern city, informal settlements and upgraded quarters have grown in the city's core and its surrounding urban centre. This growth has given rise to significant urban challenges, including housing issues and heightened pressure on services and social matters. The primary forces driving the emergence of informal settlements in Amman are economic, social, and political in nature. These settlements can be broadly categorized into two main types. The first type consists of Palestinian refugee settlements, which are considered informal not in terms of their legal status but due to their spatial organization within the urban context. The second type comprises slums that have developed informally and often illegally. Both types share commonalities in terms of their physical conditions and environment. However, what distinguishes one from the other is the way these quarters evolved. The former resulted from the transformation of temporary refugee camps

² Ababsa, Myriam. 2013. "Social Disparities and Public Policies in Amman." In *Villes, pratiques urbaines et construction nationale en Jordanie*, by Rami Farouk Daher, 205-231. Beyrouth: Presses de l'Ifpo.

³ UNRWA. n.d. United nation relief and works agency for Palestine refugees in the near east. <https://www.unrwa.org/palestine-refugees>.

⁴ Alnsour, Jamal, and Julia Meaton. 2014. "Housing conditions in Palestinian refugee camps, Jordan." *Cities* 65-73.

into permanent settlements due to the political dynamics in the region, while the latter can be linked to the economic challenges of high property costs for low-income households. Because of these situations, Amman has witnessed the development of various settlements, characterized primarily by their high population density, which can exceed 20,000 inhabitants per square kilometre⁵. It is argued that these settlements in Amman are increasingly marginalized. This marginalization is attributed to the escalating demand for housing, limited access to decent housing units, inadequate services and infrastructure, and a lack of investment in the architecture and planning sector⁵.

1.5. Literature Review

A study by Rueff, and Viaro (2009), titled “Palestinian Refugee Camps: From Shelter to Habitat” analyses the housing condition of Palestinian refugee camps in host countries. The study collected data from recent surveys to provide insight on where intervention is needed in UNRWA’s fields, it narrowed the main sources of housing discomfort to overcrowding, lack of public spaces, humidity, and structural defects. The paper argued that the main obstacle to the refugees’ housing development is the incapacity and unwillingness of host countries as well as their restrictions to incorporate refugee camps into their master plans. As a solution for substantial housing improvement, the authors advocate rehabilitation and self-help housing programs. Such programs' success depends on the host governments’ will to provide UNRWA with authorizations, financial support, and land, as well as on the capacity of involving the refugee communities in projects’ planning and implementation.

A paper by Alnsour, and Meaton (2014), entitled “Housing conditions in Palestinian refugee camps, Jordan”, evaluates the quality of Palestinian refugee camps in Jordan through a survey of the Baqa’a camp which is the largest refugee camp in Jordan. The study findings are based on a questionnaire that was distributed to 186 households’ units in Al-Baqa’a camp. It identifies the main problems facing the camp through quantitative survey and field visit, findings indicated that poor structure and maintenance were the key problems. The paper further discusses political and practical challenges that stand in the way of improvements and provide new models of responsibility that need to be taken into consideration by the stakeholders in order to improve the current statutes.

A chapter entitled “Public Policies Toward Informal Settlements in Jordan” by Ababsa (2012) in the book “Popular Housing and Urban Land Tenure in the Middle East”, discusses and define the informal settlement in Jordan in general varying from refugee inhabited settlements to low-income inhabited settlements. The chapter also mention the urban policies adopted by the

⁵ Abed, A., Tomah, A., & Dumour, D. (2015). Assessment of slums' upgrading interventions: Case study Jabal Al-Natheef, Amman, Jordan. *Innovative Systems Design and Engineering*, 6(6), 1–8.

Jordanian government in different phases throughout the years, which were mentioned regarding the political situation and the implementation accordingly.

A study entitled “Assessment of Slums' Upgrading Interventions: Case Study Jabal Al-Natheef, Amman, Jordan” by Abed, Tomah and Dumour (2015) aimed to assess upgrading strategies and their effect on satisfying residents' needs in Jabal Al-Natheef community which is one of the unrecognized camps that was established organically by the people. Collected data was analysed and compared in the form of frequency measures and central tendency. As a result, data analysis has shown poor to fair residents' satisfaction with the impact of upgrading strategies at several levels. Such an assessment is related to the absence of comprehensive plan and organization between stakeholders. Therefore, serious actions are required to improve the physical environment for residents' benefit and empower community socially and financially. These actions can affect positively on residents' cooperation level with intervention programs and strategies along with effective community participation. Such an achievement can be accomplished through partnerships among slum residents, community groups, Non- Governmental Organizations (NGOs), and local governments.

A paper titled “Affordable housing as a method for informal settlements sustainable upgrading” by Menshawy, Shafik and Khedr (2016), explore the relationship between affordable housing and upgrading informal settlements upgrading. To achieve this the paper defines affordable housing definition and sets a list of urban policies that can be implemented in the upgrading process. The study analyses two case studies; one in Egypt and one in India, through a comprehensive analysis of affordable housing policies applied in upgrading examples.

2. Urban Policies

2.1. Urban morphology

The city's urban fabric, pattern and morphology have been the centre of modern urban planning studies. The integration of streets, public spaces and the city's pattern has been the framework of communal life, collective memory and culture. A city or urban settlement's structure is a response to different aspects of its growth, such as social, economic, population, and history. However, it is changeable and adaptable yet repeatedly returning to timeless patterns that foster interaction, belonging, and identity. The urban structure is a representation of its inhabitants' collective memory.

Some of the Key researchers who highlight the importance of urban patterns are Christopher Alexander, Camillo Sitte, and Lewis Mumford.

The strength of A Pattern Language in urban morphology lies in its focus on the socio-spatial aspects of design, aiming to create environments that are not just aesthetically pleasing but also socially functional and psychologically comfortable. However, the work has also faced criticism for being perceived as romanticised, and at times, impractical within the constraints of modern economics and construction. Despite these critiques, Alexander's emphasis on user participation and the generation of form through a shared language continues to be influential. Ultimately, A Pattern Language provides a rich vocabulary and a philosophical foundation for understanding and shaping the morphological patterns that define the character and quality of urban life.⁶

Camillo Sitte, in his analyses of historic European cities, emphasised the artistic and communal nature of successful urban spaces. Sitte critiqued the technical, grid-based city plans of the industrial era, instead championing the irregular, incremental growth that generates lively plazas and harmonious street networks. For Sitte, the city's pattern was an "artistic principle" that modelled how public spaces foster connection, meaning, and beauty, rooted in a collective aesthetic sensibility forged over centuries.⁷

⁶ In general see: Christopher Alexander, Sara Ishikawa, Murray Silverstein et al. 1977. A Pattern Language: Towns, Buildings, Construction. New York: Oxford University Press.

⁷ Gardella, Joseph. 2024. Camillo Sitte & Vienna: an analysis of Sitte's Ringstraße proposal. march. Accessed july 2025.
<https://josephgardella.com/2024/03/07/camillo-sitte-vienna/>.

Lewis Mumford explored the city not just as physical infrastructure but as a “theatre of social action.” He highlighted the city’s ability to facilitate social interaction, cultural creation, and a balance with nature, advocating for designs that prioritise human needs, environmental sustainability, and neighbourhood cohesion over mere technical efficiency or expansion. Mumford’s insights stressed how the forms of cities frame—and inspire—the lives conducted within them, and how city structure remains a living, evolving response to the requirements of community throughout history.⁸

Together, these thinkers highlight the city's urban fabric as a dynamic and timeless phenomenon. Its enduring relevance lies in its ability to embody both tradition and adaptation, providing the spatial grammar through which urban life—both old and new—unfolds. Urban patterns and morphology studies are important to understand the history and the heritage of the area. And to understand how people shaped their cities. Urban theories such as the ones mentioned above are the result of such studies that can help to understand the important aspects and how urban patterns were developed.

As Taubenböck, Kraff and Wurm (2018)⁹ stated in their study, there is no single, globally uniform morphology for Arrival Cities; cities that welcome displaced individuals. As the built environments of the urban poor vary greatly in density, structure, and form, even within the same city or country. The figure presented the ground figure plans of the 44 selected Arrival Cities, showing the diverse morphology (Figure 1).

⁸ Mumford, Lewis. 1961. *The City in History*. New York: Harcourt, Brace & World.

⁹ Taubenböck, H., N.J. Kraff, and M. Wurm. 2018. “The morphology of the Arrival City - A global categorization based on literature surveys and remotely sensed data.” *Applied Geography* 150-167.

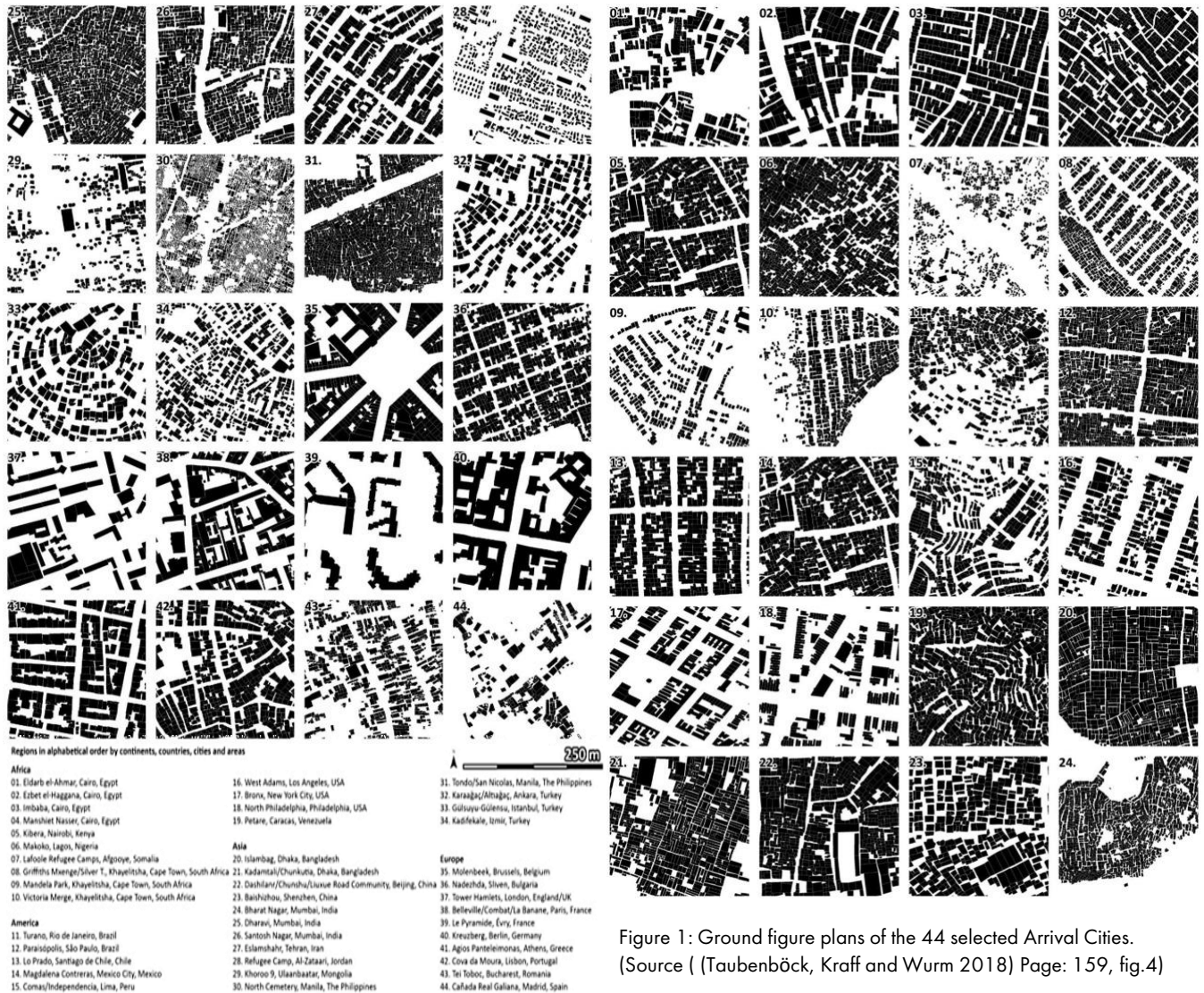


Figure 1: Ground figure plans of the 44 selected Arrival Cities.
(Source ((Taubenböck, Kraff and Wurm 2018) Page: 159, fig.4)

2.2. Informal settlements

The urban fabric serves as the foundational infrastructure that shapes how cities concentrate populations and structures, facilitating the blending of diverse people and practices, and enabling accessibility¹⁰. Informal urbanism, spanning from informal settlements to informal transportation, has emerged as a crucial global urban concern. Numerous developing countries struggles with the widespread expansion of informal settlements, a phenomenon that has become integral to the urban structure by providing housing for a proportional part of the population (Figure 2). The development of informal settlements is tied to economic and political factors, compelling their growth within the urban landscape. At present, it is estimated that one in eight people in the world live in slums or experience slum-like conditions around their housing environments¹¹. The visibility of these informal settlements within the formal cityscape significantly impacts both the image and structure of the city.

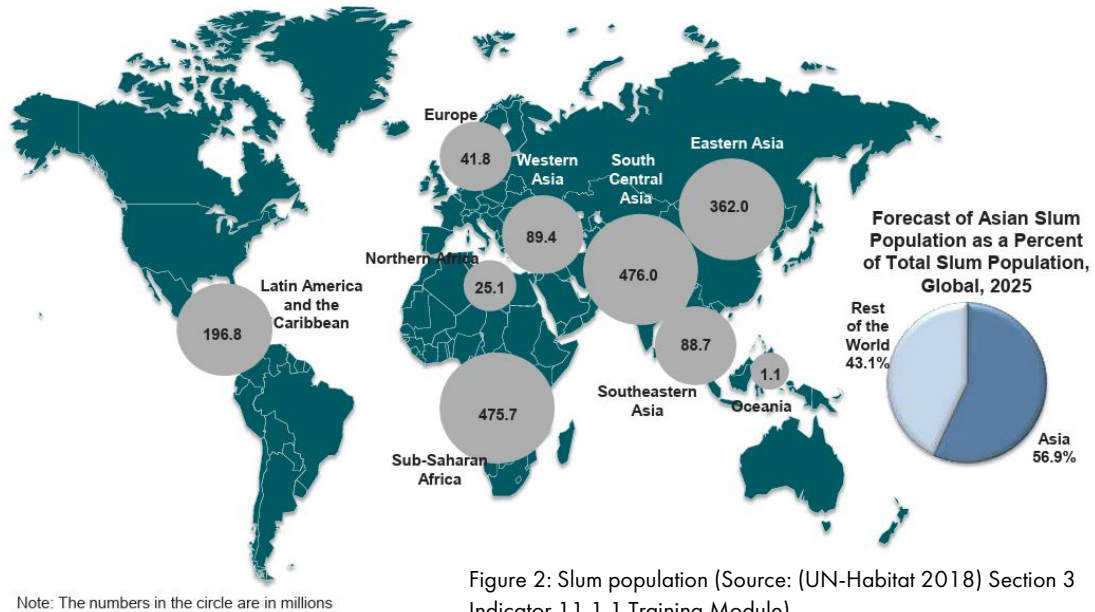


Figure 2: Slum population (Source: (UN-Habitat 2018) Section 3 Indicator 11.1.1 Training Module)

¹⁰ Dovey, Kim, and Elek Pafka. 2020. "What is walkability? The urban DMA." *Urban Studies* 93-108.

¹¹ UN-Habitat. 2018. SDG Indicator 11.1.1 Training Module: Adequate Housing and Slum Upgrading. United Nations Human Settlement Programme. Nairobi: UN-Habitat.

In the conventional process of formal city development, a structured approach involves establishing street layouts first, followed by the division of the city into blocks and subsequent subdivision into plots for buildings constructed in adherence to established codes. On the other hand, the informal settlement develops in a more organic manner, with buildings constructed first. Streets, plots, and blocks evolve gradually over time, lacking regulations, or codes as guiding references¹².

Three primary modes or processes characterize informal settlements. The first involves settling on unclaimed and often unbounded land, resulting in the development of indigenous villages and towns over extended periods. The second mode entails the insertion of settlements into uninhabited, abandoned, or leftover fragments of urban space. The third mode involves attaching informal creations or excrescences that grow out of or attach onto the structures of the formal city. These modes underscore the diverse ways in which informal settlements manifest and adapt within urban environments.

The key criterion that distinguishes and defines a formal order in urban design lies in the extent to which the city's street network and plots exhibit order and hierarchy, indicating development under a set of formal rules. On the contrary, informal urban design morphologies exhibit signs of self-organization, inconsistency, randomness, and chaos. The main street networks in informal designs are characterized by varying widths and a lack of order. Informal settlements, in general, have a high land coverage with minimal open public and private spaces, often forming narrow networks that are barely visible from an aerial photograph (Figure 3). What characterizes 'informal settlements' is their morphological consistencies, involving small building increments typically self-built and irregular narrow networks. These settlements can be defined as the incremental, unauthorized, and self-organized production of new urban neighbourhoods¹³. While informal settlements are commonly associated with illegally claimed land and unplanned sprawl of urban structures, informality can also be applied to settlements with different spatial organizations within their urban context.

¹² Dovey, Kim, and Hesam Kamalipour. 2017. "Informal/Formal Morphologies." In *Mapping Urbanities Morphologies, Flows, Possibilities*, by K (Ed.). Pafka, E (Ed.). Ristic, M (Ed.). Dovey, 223-248. Routledge.

¹³ Dovey, K., van Oostrum, M., Chatterjee, I., & Shafique, T. (2020). Towards a morphogenesis of informal settlements. *Habitat International*, 98, 102240. <https://doi.org/10.1016/j.habitatint.2020.102240>.



Figure 3: Informal morphologies (200 × 200 m scale) - locations include Buenos Aires, Caracas, Cairo, Jakarta, Johannesburg, Karachi, Lima, Manila, Mumbai, Nairobi, Rio de Janeiro and Skyros (Source: (Dovey, Oostrum, et al. 2020) Page:2, fig.1).

The terms 'slum,' 'squatter,' and 'informal' are not interchangeable; their distinctions are based on specific criteria. A slum is characterized by poor sanitation and low-income residents, squatting is determined by the legality of tenure, and informality is associated with practices beyond state control¹⁴. The concept of informality initially emerged from critiques of the informal economy, encompassing both people (floating populations) and places (informal settlements). Informality serves as a framework to understand the integration of informal activities and settlements within formally planned cities¹⁵.

Various informal settlements exist, showcasing diverse degrees and types of formality¹⁶. While informality is often associated with settled outcomes, it fundamentally represents a dynamic process rather than a fixed form, challenging the idea of a clear division between the formal and informal city. Morphological informality can coexist without slums, and many settlements evolve into extensive mixed-use districts, incorporating retail and community functions (Figure 3). Despite their crucial role in providing housing for the city's low-income workforce, the illegality and lack of planning in informal settlements lead to challenges such as inadequate infrastructure, high uncontrolled and unhealthy population density, deteriorated physical conditions of dwellings, and a lack of effective government and management. Consequently, these areas pose significant risks in terms of the environment, health, and crime. However, informal settlements are also characterized by considerable personal investment in dwellings, a robust social infrastructure, effective community leadership, and strong connections with more formally housed communities. These attributes, coupled with the constraints of land and financial resources, position informal settlements as areas with potential for development rather than overlooked spaces.

Furthermore, the spatial morphology of informal settlements reflects the socio-economic dynamics and cultural practices of their inhabitants. Building typologies in informal settlements are characterized by incremental construction, with dwellings expanding vertically or horizontally over time in response to changing household needs and economic opportunities. This organic growth results in a diverse urban fabric that accommodates a range of activities, from residential to commercial and communal functions. The adaptive nature of informal settlements challenges conventional notions of urban design and planning, calling for more inclusive and participatory approaches that recognize the agency of residents in shaping their built environment.

¹⁴ UN-Habitat, 2007. The Millennium development goals and urban sustainability: 30 years of shaping the Habitat Agenda. Edited by UN-Habitat. London: Earthscan.

¹⁵ Alsayyad, Nezar. 2004. "Urban informality as a "new" way of life." *Urban Informality: Transnational Perspectives from the Middle East, Latin America, and South Asia* 7-30.

¹⁶ Dovey, Kim, and Ross King. 2011. "Forms of Informality: Morphology and Visibility of Informal Settlements." *Built Environment* (1978-) (Alexandria Press) 37: 11-29.

In conclusion, the problem of informal settlements addresses the resilience and complexity of urban growth worldwide. These settlements represent a process of self-organization and adaptation to socio-economic realities, despite being viewed as chaotic and illegal. To address the challenges of informal urban sprawl such as environmental and infrastructure risks, with effective strategies, we must recognize the diverse form and functions of these settlements. Understanding the urban informality within the context can lead to more inclusive and responsive urban policies and interventions that aim to integrate such settlements to the urban fabric. With community participation, cities can have sustainable developments that relies on integrating both formal and informal urban elements, which can contribute to a more resilient urban growth.

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The physical appearance of any given urban fabric is an organic part of its inhabitants' collective memory, and therefore it is a fundamental element of a city's identity. The decline or demise of this fabric through a development that disregards historical and social patterns can result in the loss of not just a meaningful urban heritage but also in the collective identity of its inhabitants.

This framework proposes an urban design strategy for upgrading Palestinian refugee camps in Amman based on the clustered urban morphology. This approach aims to promote a sense of belonging and cultural continuity, which involves preserving the image of clustered units which reflect the traditional way of living and preserving the social structure to create a unique identity.

2.3. Urban Intervention Policies

Urban intervention policies are typically designed to address broader housing market issues, often intersecting with efforts to increase the overall housing supply. However, they can also result in housing displacement, either through direct resettlement programs or indirectly due to rent increases. Policies focused on informal settlements should not be viewed in isolation but rather as integral components of wider urban housing market reforms across the city¹⁷.

¹⁷ Collier, Paul, Edward Glaeser, Tony Venables, Michael Blake, and Priya Manwaring. 2019. Policy options for informal settlements. International Growth Centre.

Governments play a vital role not only in providing the physical infrastructure. In the case of established informal settlements, policy interventions become more complex. In cities across both the Global North and Global South, three main policy approaches are typically employed: slum upgrading, resettlement, and land readjustment ¹⁷.

In-situ Slum Upgrading: When policymakers aim to retain land for residential use, participatory in-situ slum upgrading becomes a cost-effective solution. It enables informal settlements to incrementally transform into poor but highly liveable neighbourhoods, integrating the city's low-income workforce into the urban fabric.

Resettlement: If informal settlements are situated on unsafe land or needed for vital urban infrastructure, resettlement may become necessary. The decision to use resettlement as a tool for urban renewal or business cluster creation must carefully weigh the value gain for the city against the high costs to residents in terms of socio-economic dislocation and to governments in financing the rehousing of displaced residents in well-connected locations.

Land Readjustment: In cases where strong land administration systems are feasible, land readjustment policies offer a promising way to facilitate large-scale infrastructure provision while simultaneously resolving tenure disputes. Implementation can be funded by landowners giving up parts of their land, as improved infrastructure, planning, and clarified ownership raise the value of the remaining land. Such policies have been widely practiced in East Asian economies.

In conclusion, addressing the challenges posed by informal settlements requires a multifaceted approach that encompasses both short-term interventions and long-term strategies. By recognizing the dynamic nature of urban informality and its integral role in urban development, policymakers can adopt policies that promote inclusive and sustainable solutions. Whether through in-situ upgrading, resettlement, or land readjustment, efforts to improve housing and infrastructure in informal settlements must prioritize the needs of residents while balancing the broader goals of urban development. Moreover, creating an enabling regulatory environment and fostering community participation are essential elements in achieving lasting impact. Ultimately, by embracing informality, cities can transform informal settlements into vibrant and resilient urban neighbourhoods that contribute to the collective well-being of urban populations.

2.4. Informal settlements upgrading

Upgrading programs focus on utilizing existing resources in informal settlements which include, enhancing access to infrastructure, improve housing conditions, and establish secure tenure on the same land where residents are currently situated (in situ). Despite the challenging living conditions, dense informal settlements play a crucial role in providing essential mass housing

for low-income residents, contributing significantly to the urban economy. In this manner upgrading is a cost-effective option which accommodate housing that is both densely populated and has a liveable environment.

Facilitating density and liveability: Karachi's upgrading initiatives, geared towards establishing secure housing foundations for small plots, have empowered owners to progressively invest in the improvement of housing, resulting in the development of small yet habitable 3-4 story buildings at densities of 2,800 people per hectare¹⁸. This density is nearly double the peak population density experienced by Manhattan throughout its urban evolution. Furthermore, community-led sewerage system construction in Karachi has significantly enhanced the liveability of informal settlements.

Upgrading and enhancing the living and working conditions of communities in situ prove to be cost-effective strategies for governments. This approach involves developing existing rather than demolishing and rebuilding elsewhere. It encompasses physical capital, represented by significant existing housing investments, as well as "social capital," which includes community ties, local employment opportunities, and support networks. The primary indicators outlined by UN-Habitat for assessing and upgrading informal settlements. These indicators are detailed in the "Indicator 11.1.1 Training Module: Adequate Housing and Slum Upgrading" published by UN-Habitat. to be addressed in informal settlement upgrading include:

- Access to Improved Water
- Access to Improved Sanitation
- Sufficient Living Area
- Structural Quality/Durability of Dwellings
- Security of Tenure

2.5. Affordable housing as an upgrading policy

The concept of affordable housing is subjective, varying among individuals. While some people consider all housing affordable, others may find none within their means¹⁹. The issue of affordability in housing markets poses a significant challenge for low-income families, primarily due to the continuous rise in construction costs. Typically, affordability is gauged by assessing the relationship between household income and housing expenses. To comprehend this relationship, an understanding of household income classifications is essential. Social problems associated with unaffordable housing: residents live with

¹⁸ Collier, P., Glaeser, E. L., Venables, T., Blake, M., & Manwaring, P. (2019). Policy options for informal settlements. International Growth Centre.

¹⁹ Abed, A., Tomah, A., & Dumour, D. (2015). Assessment of slums' upgrading interventions: Case study Jabal Al-Natheef, Amman, Jordan. Innovative Systems Design and Engineering, 6(6), 1–8.

financial stress; households spend big parts of their budget on housing leaving low-income households with insufficient money to purchase essential needs²⁰.

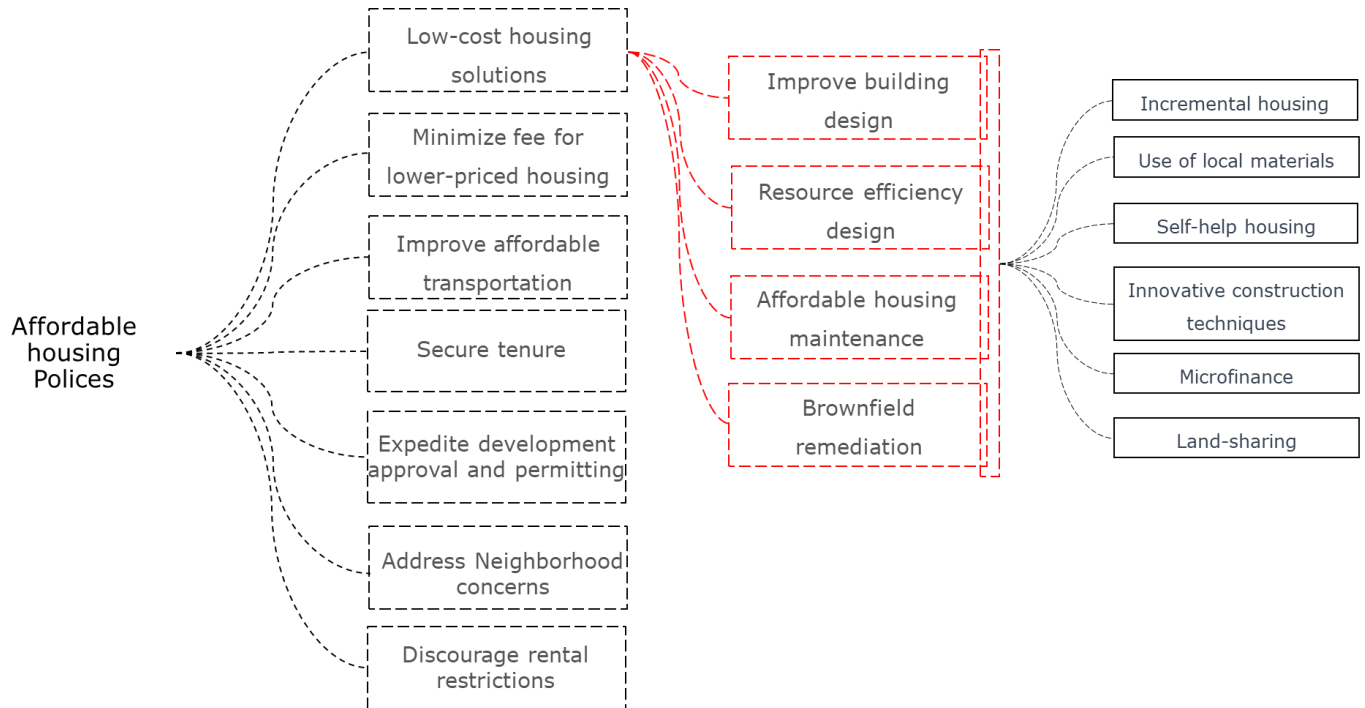
The presence of unaffordable housing had the same negative impact as informal settlement urban sprawl. Informal settlements households suffer from lack of basic infrastructure and financial stress, which means that affordable housing supply may prove to be a good solution to stop informal urban sprawl. There are many benefits for providing households with a sufficient affordable-accessible housing to meet their demands such as: improved housing options, household financial saving, reduce homeless and social problems such as crimes, diverse neighbourhood. Concerning vehicle mobility, more efficient public transport services, reduce roads and parking infrastructure cost. Urban sprawl, reduce cost of providing public services, improve accessibility and economic opportunity for low-income residents, pollution reduction, and more local economic development. Affordable housing development is appropriate in cities with rapid urban population and economic growth, geographic constraints, and limited low-priced housing²¹.

Numerous policies target the enhancement of housing affordability in developing countries, with varying degrees of effectiveness. According to Litman (2015) these policies can be categorized into three groups: ineffective and potentially harmful, effective but costly, and most effective and beneficial. The latter category comprises policies that encompass legal, social, and design aspects. The primary affordable housing policies and their application in upgrading programs are outlined in the chart below (Chart:1).

²⁰ Menshawy, Adel El, Sherine Shafik, and Fadwa Khedr. 2016. "Affordable Housing as a Method for Informal Settlements Sustainable Upgrading." *Procedia - Social and Behavioral Sciences* 223: 126-133. <https://doi.org/10.1016/j.sbspro.2016.05.330>.

²¹ Menshawy, Adel El, Sherine Shafik, and Fadwa Khedr. 2016. "Affordable Housing as a Method for Informal Settlements Sustainable Upgrading." *Procedia - Social and Behavioral Sciences* 223: 126-133. <https://doi.org/10.1016/j.sbspro.2016.05.330>.

Chart (1) Affordable Housing Policies (Source: The Author (2022))



Low-cost housing can be an effective method to upgrade informal settlements. As it was indicated in the chart, the study presents these policies as low cost housing solution which is the foundation of the theoretical framework:

- Incremental housing: This approach involves building or upgrading housing gradually over time, starting with the most basic structures and adding improvements as resources become available. This can enable informal settlement residents to build their own homes incrementally and can reduce the upfront costs of housing upgrades.
- Use of local materials: The use of locally available materials, or recycled materials, can reduce the cost of housing upgrades and promote sustainable building practices.
- Self-help housing: This involves providing technical assistance and support to informal settlement residents to build or upgrade their own homes. This can reduce the cost of housing upgrades and promote community participation and empowerment.
- Innovative construction techniques: The use of innovative construction techniques, such as prefabricated modular units, can reduce construction time and costs, while ensuring quality and safety standards.
- Microfinance: Providing access to microfinance can enable informal settlement residents to access affordable loans for housing upgrades and can promote entrepreneurship and economic development.
- Land-sharing: This involves sharing land and open spaces between informal settlement residents to create more efficient and sustainable land use patterns. This can reduce the cost of housing upgrades and create more liveable and cohesive communities.

Low-cost housing can be combined with other interventions policies, such as basic services provision, tenure regularization, and participatory planning and design, to create comprehensive and sustainable housing upgrades for informal settlements. The success of low-cost housing as a method to upgrade informal settlements depends on effective community participation and engagement, as well as strong partnership between government, civil society, and the private sector. It is important to ensure that any low-cost housing interventions are appropriate for the local context and meet the needs and aspirations of informal settlement residents.

Furthermore, low-cost housing interventions policies can be customized to upgrade informal settlements, which often lack access to basic services and adequate housing conditions. Incremental housing approach which promotes self-help housing

initiatives empowers communities to take ownership of their housing upgrades and fosters a sense of pride and belonging. As in the case of Chabahar city in Iran, when incremental housing upgrading strategy was successfully implemented through participatory approach where it allowed the residence to gradually improve their housing conditions while maintaining the integrity of the settlement, while architects and planners played a facilitating role in designing external spaces²².

In conclusion, low-cost housing solutions represent essential tools in addressing the challenges that informal settlements impose within urban environments. By implementing a combination of architecture solutions, regulations, and innovative urban strategies, governments can work towards ensuring that housing remains accessible to all income groups, fostering social equity and inclusive urban development. Furthermore, utilizing low-cost housing strategies to upgrade informal settlements offer opportunities to improve living conditions, built stronger communities, and urban integration. However, the success of these policies relies on effective implementation, strong community engagement, and partnerships between government, civil society, and the private sector. Moving forward, a comprehensive approach that integrates housing policies with urban development strategies is essential to creating cities that are resilient and responsive to the diverse needs of their residents.

2.6. Shared living spaces as an urban strategy

As previously stated, upgrading strategy is an urban planning challenge that aims to improve housing, infrastructure, and living conditions. In addition to the proceeding polices, shared living spaces could be an effective strategy to incorporate in settlements upgrading. The most remarkable benefit of this approach includes cost efficiency, social cohesion and land-use optimization. One of the developed examples of shared living spaces is co-housing and incremental housing.

Shared living spaces aims to address the various challenges faced by cities in general and the housing sector in particular. The implantation of such strategy can be cared through various urban approaches, such as shared infrastructure, optimal land-use strategies, community spaces, shared open spaces and adaptive space utilizations.

Shared living spaces consists of two main aspects: the physical and the social. The former refers to the architectural and planning aspects, while the latter focuses on the community and the participation of its members. The architecture-physical one can be classified into indoor spaces within the building and outdoor spaces within the property. The social aspect can be identified within three areas of communal sharing based on collaborative housing characteristics: the shared creation, the

²² Nazarnia, Alireza, Leila Zare, and Fariborz Dolatabadi. 2021. "The incremental housing as a strategy in upgrading housing in informal settlements; Case study: Chabahar city." *Motaleate Shahri* 10 (38). doi:10.34785/J011.2021.809.

shared activities, and the shared tenure²³. The goal of this strategy focuses on facilitating social interaction. One main concept is the collaborative housing, to fully grasp this approach, it's essential to understand its foundation that relies on a collective effort where residents actively participate in shaping and managing their surroundings, with a strong emphasis on community involvement. A fundamental design principle is the integration of private individual living spaces with communal public areas.

Nevertheless, the field of collaborative housing stays thematically fragmented, with different forms, which spread across disciplines without clarified conceptual background. Alongside this fragmentation, one concept prevails as a common aspect of this field, which is the sharing areas, which became the key characteristics that urban actors use concepts related to it without clear guidelines. As previously mentioned, shared living spaces consists of both physical-architectural and social dimensions, which are interrelated and interdependent in their sharing methods. The features of the shared characteristics can be seen, in outdoor and indoor spaces, decision-making, activities and tenure. There are two types, either different people living together in one building in the same unit, or several separate units.

There are multiple aspects in the application of shared living spaces, each one has its benefits and effect on the development which are, Cost efficiency and affordability; creating centralized services can significantly reduce the cost of living specially in informal settlements where access to basic infrastructure is limited. Smaller housing units and the design of communal spaces can reduce the construction cost of the development. These strategies are promising experiments in building local social networks, which also utilize low-cost housing in the long term²⁴. Optimal land use: Shared spaces can be an adequate solution in dealing with high density areas; by optimizing land use through communal solutions, more individuals can use the same area. Vertical expansion approach also helps with high density by constructing multi-story buildings which can reduce the area accommodated by buildings and free up some space for open shared amenities. Environmental sustainability: focusing on shared spaces, material and construction methods can produce an eco-friendlier construction process with a more sustainable outcome. Shared resources and a community-based approach also plays a vital role in insuring the sustainable development. Flexible housing solutions such as, designing an adaptive space that accommodate the needs of the inhabitants with minimal space usage offer flexibility to the users, incremental upgrade can be utilized in creating these spaces that ensure that the residence won't be displaced and provide the sufficient spaces accordingly.

²³ Babos, A., Szabó, J., Orbán, A., & Benkő, M. (2020). Sharing-Based Co-Housing Categorization. A Structural Overview of the Terms and Characteristics Used in Urban Co-Housing. *Építés – Építészettudomány*, 331–355. doi:10.1556/096.2020.009

²⁴ Hacke, Ulrike, Kornelia Müller, and Elisabeth Dütschke. 2019. "Cohousing - social impacts and major implementation challenges." *GAIA - Ecological Perspectives for Science and Society* 233-239.

The concept of shared living offers a promising urban strategy to address housing challenges and accommodates inhabitants demands. Inspired by traditional village structures, it emphasizes collaboration, participatory decision-making, and the creation of shared spaces that promote social interaction and mutual support among residents. Moreover, the modest size of individual living units optimizes the use of communal facilities and encourages resource-sharing.

Two main challenges and consideration should be considered regarding these developments. First is the cultural acceptance and second the maintaining these spaces. In certain contexts, conspiring privacy of the families having a shared space can be problematic, design a suitable shared spaces that can provide the needed privacy is essential in these cases, in addition to community engagement in the decision-making process. To keep communal space in good shape regular maintenance is required, this relies on the residences in addition to the help of the government and NGOs regarding informal settlements development. Shared living spaces offer a promising approach to upgrading informal settlements by making housing more affordable, improving social cohesion, and optimizing land use. One of the solution this strategies offer is the integration of open shared spaces, which can provide recreational and social interaction spaces within the dense environment of the camp. However, successful implementation will depend on careful planning, community involvement, and supportive policies. When integrated into housing and urban development strategies, shared living spaces can significantly improve the quality of life in informal settlements while addressing the underlying issues of poverty, overcrowding, and inadequate infrastructure.

2nd | Theses

Upgrading refugee settlements through implementing urban policies is essential to integrate such settlements into the city's urban fabric and enhance their organic development as part of the city.

The dissertation introduces a framework combining incremental housing techniques, local materials, land-sharing, and innovative design strategies. This framework establishes the foundation for a housing upgrade design plan to rehabilitate and incorporate these settlements into Amman's urban fabric.

3. Housing in Jordan

3.1. Introduction

Since gaining independence in 1946, Jordan's population has increased eleven-fold, in 2025 it reached 11.5 million²⁵. This growth is influenced by both high rates of natural growth (exceeding 4% in the 1950s-1960s and 2.2% in 2009) and ongoing migration patterns²⁶. However, the underlying cause of this rapid growth is political, marked by four significant waves of immigration: two resulting from the Arab Israeli wars in 1948 and 1967, the third triggered by the Gulf War, and the latest is the Syrian civil war and another wave of refugees. This population surge has placed substantial demands on residential land and infrastructure services in urban areas (Figure 4).

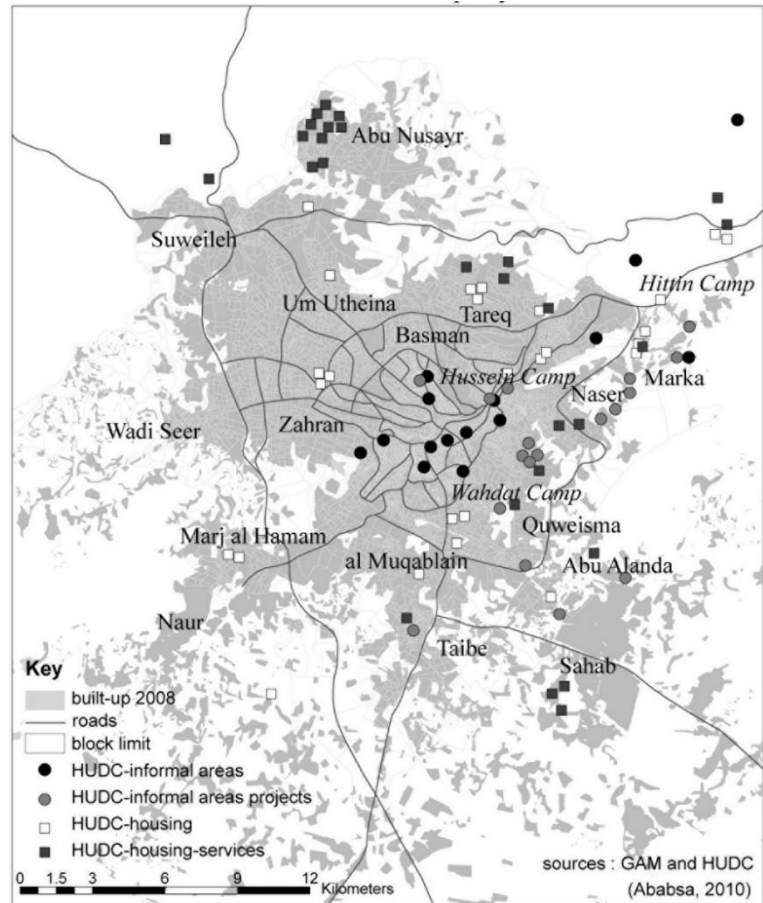


Figure 4: Housing and Urban Development Corporation Projects in Greater Amman Municipality since 1965 (Source: (Ababsa, 2013) Page:227, fig10)

²⁵ Worldometer. Accessed august 25, 2025. <https://www.worldometers.info/world-population/jordan-population/>.

²⁶ Ababsa, M. (2010, July). The evolution of upgrading policies in Amman. In Sustainable Architecture and Urban Development (CSAAR 2010, Amman, Jordan). HAL Archives. <https://halshs.archives-ouvertes.fr/halshs-00467593>.

National surveys in 2023 indicate that 92.02% of the Jordanian population now resides in urban areas²⁷. Given its limited resources such water, energy and agriculture constrain, Jordan has faced the challenge of providing adequate shelter, infrastructure services, and community facilities to meet the escalating needs of its population growth. With demands surpassing government capabilities, thousands of households have resorted to building shelter and houses illegally on others' land, effectively becoming squatters. This phenomenon has led to the formation of extensive pockets of squatter settlements on the peripheries of urban centres.

Many of these settlements were constructed on steeply sloping ground, often located at the edges of hills known as 'Jabal.' Others were situated in valley bottoms, making them susceptible to flooding during wet weather. The steep slopes are sometimes so pronounced that the ground floors of upper-level houses are on the same level and nearly touching the roofs of the houses below. The characteristics of informal settlements in Amman according to Daly (1999) are²⁸:

- The majority of streets and footpaths are narrow and unpaved.
- The average plot size is approximately 150 m².
- Three-fourths of the houses feature rather permanent wall construction with hollow bricks, and almost 70 percent of these have concrete roofs, while the remaining have zinc or wood roofs.
- Only 49 percent of dwelling units are connected to the main water network, and sanitation facilities are almost non-existent in all the settlements; many households depend on pit latrines.
- The average persons per room is 4.2, with 15 percent of households having 7 persons per room.
- 76 percent of households have an income below the 40th percentile compared to the national income profile.
- The average number of working persons in a household is 1.2, with 10 percent of households having no working persons.
- 11 percent of households are headed by women.
- The total fertility rate is 7.4 children.
- The proportion of children dying between birth and age 3 is 86 children per thousand births.

²⁷ Economics, Trading. 2023. *"Jordan - Urban Population (% of Total)."* Accessed march 3, 2025. <https://tradingeconomics.com/jordan/urban-population-percent-of-total-wb-data.html>.

²⁸ Daly, Jamal I. Al. 1999. "Informal Settlements in Jordan Upgrading Approaches Adopted and Lessons Learned." Amman: Regional Symposium on Sustainable Development of Low-Income Settlements: The Role of the Housing Sector. 10.1-10.11.

3.2. Amman urban growth and informality

Amman, the capital of the Hashemite Kingdom of Jordan, is considered a relatively modern city rather than an ancient metropolis. Presently, Amman stands as a metropolitan urban centre with a population exceeding two million. However, back in 1924 when the city of Amman started to be formed in the Emirate of Transjordan, the urban landscape of Amman was characterized by a collection of dwellings housing approximately 2000-3000 inhabitants²⁹. The city's contemporary landscape is marked by its expansion over seven hills, contributing to its distinctive topography. This expansion, however, has also led to socio-spatial polarization, evident in the contrast between upscale neighbourhoods and less affluent quarters. Amman, at a macro level projects an urbanized image, yet at the micro-level, it retains distinct traditional and informal characteristics. Architecturally, the city's skyline is dominated by four to six-story limestone residential buildings. These structures not only reflect the city's modernization but also adapt to the challenging terrain, often built on steep slopes. The urban fabric of Amman thus encloses a blend of historical roots and contemporary development, creating a dynamic and diverse cityscape.

The rise in Amman's population mirrors the broader population trends in the country. Rather than experiencing incremental growth, the city has witnessed drastic surges over the years, primarily fuelled by continuous migration due to political conflicts and a general shift from rural to urban areas in pursuit of improved living conditions and poverty alleviation (Figure 5). These factors have significantly impacted the spatial organization and development of Amman. Consequently, the city's urban landscape is often characterized as chaotic, prompting questions about whether Amman lacks its own spatial memory, historical depth, or identity. This raises concerns about the authenticity and legitimacy of the city's development in meeting its evolving needs.

²⁹ Potter, Robert B., Khadija Darmame, Nasim Barham, and Stephen Nortcliff. 2009. "'Ever-growing Amman', Jordan: Urban expansion, social polarisation and contemporary urban planning issues." *Habitat International* 81-92.

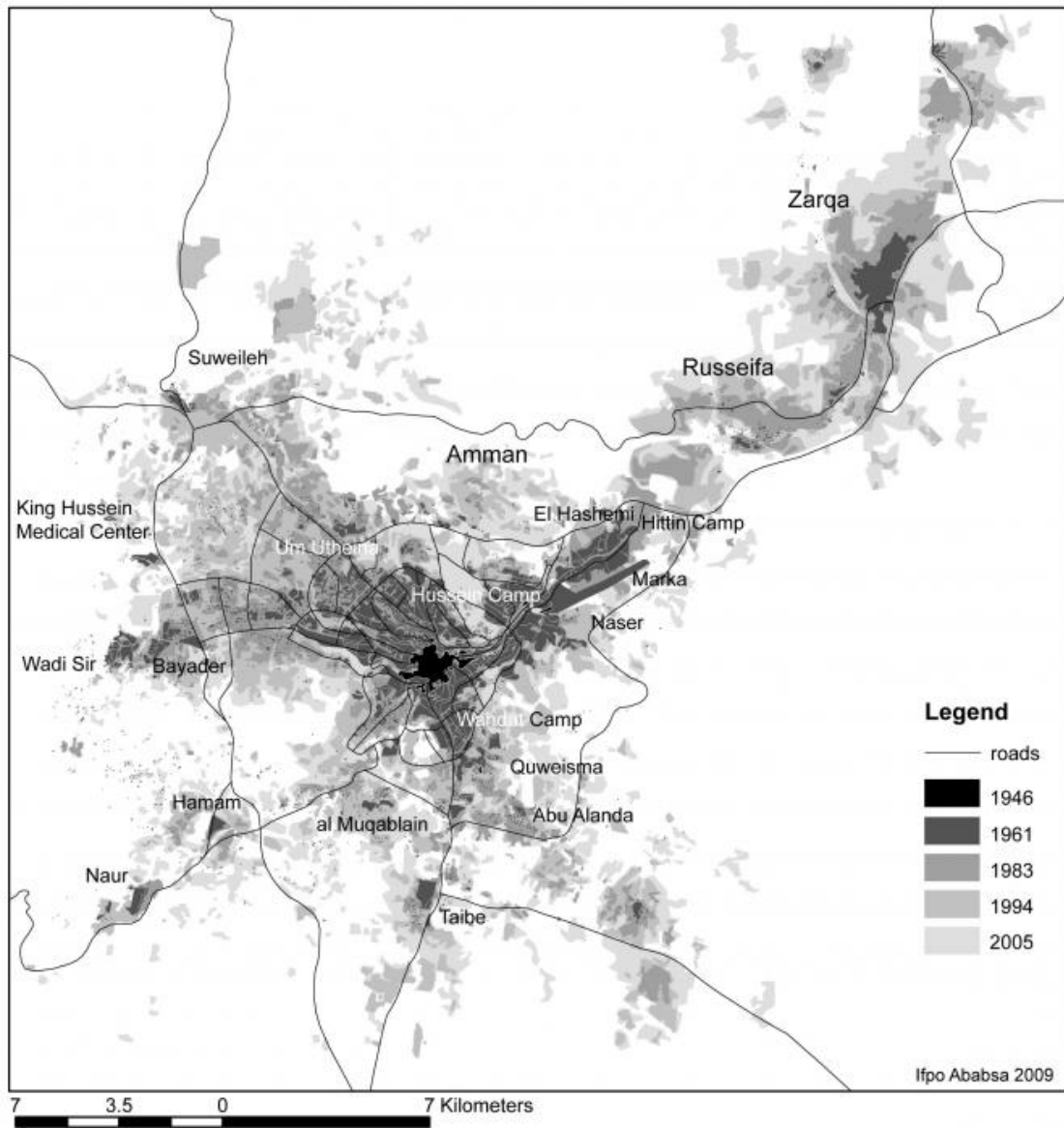


Figure 5: Map of Amman (Source: (Ababsa, 2013) Page:209, fig1)

The repercussion of displacement waves and migrations has significantly influenced the urban growth of Amman. In addition to the organized refugee camps, the escalating demand for residential and services sectors has led to the emergence of unregulated settlements, primarily occupied by refugees, further contributing to the formation of informal settlements.

In Jordan, particularly in Amman, the definition of informality takes on a unique aspect, primarily associated with areas inhabited by Palestinian refugees. The term informality "Skan Ashwa'i" is often almost exclusively used in the context of Palestinian refugee settlements, while the label "poor areas" is applied to informal habitats with rural or Bedouin populations. Despite these distinctions, there remains some vagueness in defining informality. It can be categorized either by its physical forms, with two morphological criteria based on road structure and accessibility, as well as the type of construction, or by its legal status, particularly pertaining to ownership. It is noteworthy that the legal status of a property alone can render it informal, as the absence of inalienable and exclusive rights of transfer defines a property as such³⁰.

In 1986, the Urban Development Department identified 16 sites within Greater Amman occupied by slum and squatter settlements³⁰. The primary distinction between established refugee camps, slums, and squatter settlements lies in the administration, with the former falling under the administration of the United Nations, while the latter emerged in an unorganized manner, primarily to accommodate low-income populations, including refugees. Slum areas are characterized by housing units, in the form of apartments or traditional units, often perceived as older, poorly maintained, with inadequate infrastructure and services. Squatter areas, on the other hand, have emerged more recently and are defined by their non-compliance with legal regulations, uncertain tenure, or differing ownership of land and buildings.

³⁰ Ababsa, M. (2010, July). The evolution of upgrading policies in Amman. In Sustainable Architecture and Urban Development (CSAAR 2010, Amman, Jordan). HAL Archives. <https://halshs.archives-ouvertes.fr/halshs-00467593>.

One of the multifaceted reasons contributing to the uncontrolled growth of slums in Jordan is the high cost of properties, the poor distribution of residential plot sizes that are notably large for low-income groups to afford, and the limited financial support for low-income households. This housing demand reflects the regional political and financial crises, directly impacting Jordan's urban landscape. Consequently, Amman has witnessed the development of numerous crowded informal settlements characterized by high population density, exceeding 20,000 inhabitants per square kilometre ³¹ . According to the United Nation, Sustainable Development Goals Report, 2024, in 2022 approximately 24.8% of proportion of urban population living in slums or informal settlements³² (Figure 6).

Additionally, the decentralized nature of Jordanian cities has led to the relocation of several residents from the countryside to the capital in search of job opportunities. This migration has further strained city infrastructure and exacerbated housing challenges. Political, economic, and social forces are jointly fuelling the rapid spread of slums. In response, governmental and non-governmental organizations (NGOs) are actively engaged in projects and initiatives aimed at improving and rehabilitating these neighbourhoods.

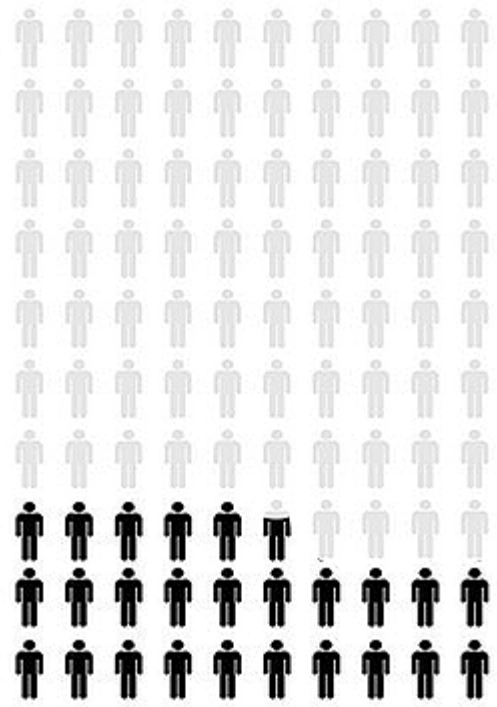


Figure 6:Diagram of proportion of urban population living in informal settlements (Source: The Author(2022))

³¹ Abed, A., Tomah, A., & Dumour, D. (2015). Assessment of slums' upgrading interventions: Case study Jabal Al-Natheef, Amman, Jordan. *Innovative Systems Design and Engineering*, 6(6), 1–8.

³² Nations, United. 2024. *The Sustainable Development Goals Report 2024: Goal 11 – Sustainable cities and communities, Indicator 11.1.1*. New York: United Nations.

3.3. Rehabilitation of informal settlements in Jordan

Jordan is a pioneer country in the upgrading informal settlement in the Middle East, through the Housing and Urban Development Corporation (HUDC). Three types of policies were implemented in Jordan regarding the issue of informal settlement: first was the upgrading of such areas, this was implemented in the 1980s, with participation of residents. The East Wehdat camp is one of the references in the upgrading in participatory approach. Second in the 1990s was the provision of services alone, due to the rising costs of land. The Third policy depended on eviction and selective rehousing from the neoliberal wave of the mid-2000s³³. In the 1980s, the projects concern mostly the neighbourhoods built on the outskirts of UNRWA camps, which were mainly populated by Palestinian refugees, the ownership and the legal issues were considered as priorities. Since 1994, and the peace agreement of Wadi Araba, the policy changed, and the focus shifted to develop the infrastructures issues, which were considered to improve the quality of life.

Since 2008, especially in Amman, the urban policies of dealing with informal settlements changed into displacing and rehousing some settlements. Due to the urban expansion and development projects such as Al-Abdali business district and the gated communities', two informal settlements were displaced: the district of Qaysiya in Wadi Abdoun and the informal camp of Shalaleh. These two areas were upgraded during the 1990s and 2000s but later removed in 2009 and the houses were partially destroyed³⁴.

Regarding what Jordan achieved for Palestinian refugee camps. The Department of Palestinian affair (DPA) initiated a campaign called "emergency rooms" ³⁵. The main objective was to deal with hardship cases in the camps, within the framework of the strategy to combat poverty and unemployment adopted by the government, in 1999 the implementation of the social safety package project began, through which it seeks to improve the living and housing conditions of poor areas through:

- Improving physical and social infrastructure
- Create job opportunities for the residents of these areas.
- Improving the level of education and skills and establishing social and training centres.
- Improving environmental and health conditions

³³ UN-Habitat. 2020. *Informal Settlements in the Arab Region: Towards Arab Cities without Informal Areas*. Giza, Egypt: United Nations Human Settlements Programme

³⁴ Ababsa, Myriam, Baudouin Dupret, and Eric Dennis. 2012. "Public Policies Toward Informal Settlements in Jordan (1965–2010)." In *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey*. Cairo: The American University in Cairo Press. doi:10.5743/cairo/9789774165405.003.0011.

³⁵ DPA. n.d. www.dpa.gov.jo.

The competent authorities decided to focus on the physical infrastructure of the camps in the first phase of the project, while leaving room for the implementation of the rest of the elements in light of the availability of the necessary funding for this. The physical infrastructure is divided into two main parts:

- Physical infrastructure (inside the camps), its cost is estimated at 25 million dinars (32,250,000 euros).
- Physical infrastructure (outside the camps), its cost is estimated at 22 million dinars (28,380,000 euros) , and it is concentrated in establishing four purification stations to serve the camps of Al-Talibiya Al-Sukhna Jerash and Al-Shahid Azmi Al-Mufti and other areas adjacent to these camps.

The required general lighting works that need maintenance and the works that need to be addressed to preserve public safety, in coordination with the electricity companies that have concessions for each camp.

- Retaining wall works required in areas of danger to public safety.
- Maintenance of asphalt streets and concrete inserts

As for the Housing project for the poor in the camps Approximately 400,000 people live in the thirteen camps in the Kingdom, the vast majority of whom are Jordanian citizens, refugees, and displaced persons. The total number of housing units in these camps is estimated at 26,000 housing units that were established in the fifties and sixties. A percentage of 10-15% of the houses remained in need of intervention that would help ensure the safety of the house and the family that lives in it, preserve their dignity, and improve their standard of living to the best ³⁶. The project to restore the homes of poor families in the camps had a positive impact on the residents of these camps, the most important of which are:

- Ensuring a minimum level of public safety to provide safe shelter for the poor in the camps.
- Improving the living conditions, especially the housing conditions, for the poor groups in the camps.
- Contribute to the fight against unemployment and poverty by employing several skilled and unskilled workers from among the residents of the camp in which the implementation is taking place in the implementation of the project.
- Improving the health situation and environmental health in the camps.

³⁶ Affairs, Department of Palestinian. n.d. <https://www.dpa.gov.jo/>. Accessed 2025. https://www.dpa.gov.jo/Ar/Pages/مشروع_حزمة_الامان_الاجتماعي
Translated from Arabic by the author

Intervention types according to the engineering department in DPA³⁷ (Figure 7).

- Re-creation of a room made of bricks and concrete with a net area not exceeding 16 square meters.
- Building a room + bathroom with an area of about 18 square meters.
- Building a room + kitchen with an area of about 24 square meters.
- Building a room + bathroom + kitchen with an area of about 30 square meters.

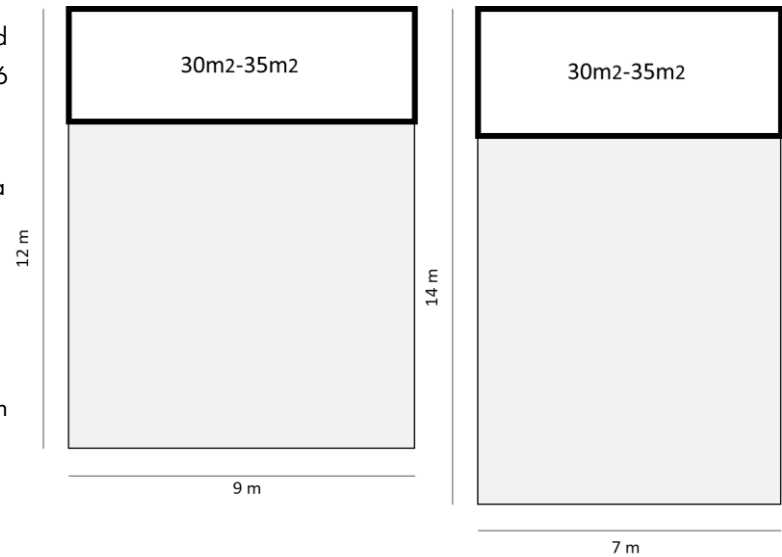


Figure 7: Emergency Rooms Initiatives diagram (Source: The Author (2023))

³⁷ Information acquired from interviewing Eng. Shadi Alyan, the head of the planning and projects department in DPA on the ongoing projects

4. Palestinian refugee camps

4.1. Historical overview

After the first displacement of Palestinians, hundreds of thousands of Palestinian refugees sought refuge in Jordan. In response to the ensuing housing and humanitarian crisis, four camps were established near the major cities of Zarqa, Irbid, and Amman. These camps were created as a solution to provide shelter and assistance to those displaced. Since 1950, these camps have been administered by the United Nations Relief and Works Agency for Palestinian Refugees (UNRWA). The second wave of Palestinian refugees brought more displaced refugee, leading to the establishment of additional refugee camps which were called emergency camps. This influx also resulted in the creation of several unrecognized camps—areas not officially recognized as camps but still provided with a basic package of UNRWA services to address the ongoing humanitarian needs of the displaced population.

The distinctive aspect of the Palestinian refugee situation lies in the protracted nature of the conflict that led to their displacement, extending for more than seventy-five years with no resolution to date. Unlike many other refugee situations, the land from which Palestinian refugees were forced to leave no longer exists as an administrative and political entity. This reality means that the option for these refugees to return to their original homes is not feasible³⁸. Understanding these factors is crucial to grasp the unique challenges faced by Palestinian refugees, as their stay in the refugee camps is considered more permanent than temporary.

The unresolved conflict and the absence of a viable return option contribute to the enduring nature of their displacement. As of now, Jordan hosts a total of twenty-one Palestinian refugee camps. Among these, only ten are officially recognized by the United Nations Relief and Works Agency (UNRWA), three are recognized by the Jordanian Department of Palestinian Affairs (DPA), and eight are not acknowledged by any organization³⁹.

³⁸ Albanese, Francesca P, and Lex Takkenberg. 2021. "Rethinking solutions for Palestinian refugees A much-needed paradigm shift and an opportunity towards its realization." *RSC Working Paper Series* (Oxford Department of International Development) 135.

³⁹ UNRWA. n.d. United nation relief and works agency for Palestinian refugees in the near east. <https://www.unrwa.org/palestine-refugees>.

All these camps can be categorized as informal settlements, meeting the criteria of informality, whether from a legal or spatial perspective, and they are scattered throughout various cities in Jordan. Amman the capital of Jordan, is currently home to over two million residents, with one in four being refugees (Figure 8). This makes Amman the city with the highest proportion of refugees globally⁴⁰.

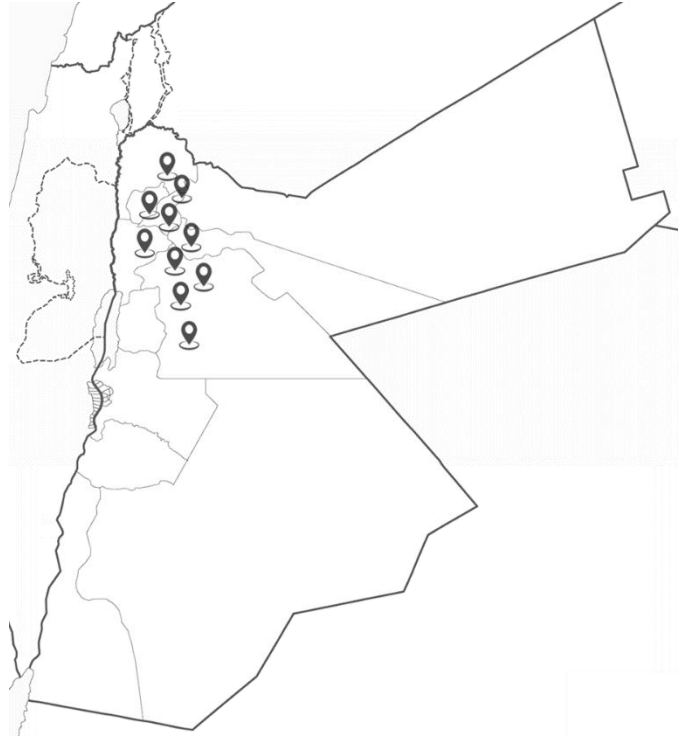


Figure 8: Location of the ten recognized camps (Source: The Author (2023))

⁴⁰ Pilder, Andrew David. 2011. *URBANIZATION AND IDENTITY: THE BUILDING OF AMMAN IN THE TWENTIETH CENTURY*. Oxford, Ohio: Miami University.

The inhabitants of these camps first started living in shelters and tents as a temporary or emergency state, these conditions lasted for almost fifteen years until the 1970s. Subsequently the Jordanian government started working with UNRWA to improve their living conditions, which lead to evolve of these settlements into vertical and horizontal sprawls of houses built according to the dwellers' needs and assets. The land allocated for these camps was initially located in rural areas and the outskirts of the city, however, after the city's urban growth and development over the years some of these camps became embedded within the city context.

These settlements posed a national urban challenge due to their central location within the city, making them highly visible in its urban landscape. Nowadays, these settlements face a myriad of physical, economic, political, and social challenges, given the sensitive nature of the situation and the regulatory framework governing them. Over the years, both governmental and non-governmental organizations have collaborated to implement rehabilitation plans for these settlements. However, one of the key challenges often encountered in these projects is securing adequate funding. Governments often lack the financial capacity to fully support such initiatives. Despite these financial constraints, various attempts to rehabilitate the camps have been undertaken, including reconstruction efforts after the 1970 conflict, which resulted in destruction in some parts of the camps. In 1980, prompted by the World Bank, the Urban Development Department (UDD) was established within the Greater Amman Municipality with the aim of developing an urban renewal project for informal settlements located in the eastern part of Amman⁴¹. One notable example of rehabilitation efforts is the Hitteen camp, where the renovation of housing units is being implemented by UNOPS (operational arm of the United Nations) and funded by the Italian Agency for Development Cooperation⁴². These initiatives underscore the ongoing efforts to address the challenges faced by informal settlements in the urban landscape of Amman.

The patterns of house occupancy inside camps often mirror refugees' social organization: relatives and neighbours who were living in the same villages before the exile have tended to recreate the community⁴³. These over-crowded camps have been built on limited perimeters with specific plots and land areas; accordingly additional structures need to be added to

⁴¹ Ababsa, Myriam. 2013. "Social Disparities and Public Policies in Amman." In *Villes, pratiques urbaines et construction nationale en Jordanie*, by Rami Farouk Daher, 205-231. Beyrouth: Presses de l'Ifpo.

⁴² UNOPS, United Nations Office for Project Services. 2019. *UNOPS to rebuild homes in Hitteen Camp to support Palestinian refugees in Jordan*. Accessed march 20, 2019. <https://www.unops.org/news-and-stories/news/unops-to-rebuild-homes-in-hitteen-camp-to-support-palestinian-refugees-in-jordan>.

⁴³ Rueff, Henri, and Mario Alain Viaro. 2009. "Palestinian Refugee Camps: From Shelter to Habitat." *Refugee Survey Quarterly* 339-359.

accommodate the growing population. Because of this and the fact that these camps are neglected led to the deterioration of the built environment, which is often the case of unprivileged, unstable, and unsettled communities.

The discourse surrounding research on the housing conditions of Palestinian refugees' points to several factors contributing to the poor state of housing in the camps. First, the UNRWA did not implement a program for permanent housing; its focus was on providing temporary shelters, given the provisional status of the refugees. Second, the role of host governments and the restrictions imposed on the development and extension of these settlements has led to overcrowding within houses. Third, camps often remained isolated entities even when situated within the urban structure. In many cases, municipalities or urban authorities did not integrate the camps into their city master plans. The infrastructure and administrative aspects of the camps were often considered separately from the city, hindering efficient urban planning and management⁴⁴.

The housing conditions of refugee camps are officially designated as having a "temporary status". The collaboration between the government and the responsible organization, UNRWA, plays a crucial role in upgrading these settlement conditions. The challenging conditions within these settlements pose a hazard to the urban context of the city. After seventy years of urban expansion, these camps, now transformed into permanent settlements, are grappling with numerous challenges, primarily the deterioration of the built environment and social polarization. The need for comprehensive and integrated urban planning becomes increasingly evident to address these longstanding issues and improve the overall living conditions in these settlements.

4.2. Palestinian refugee camps in Jordan

After the 1967 war, the Jordanian government formed a high ministerial committee tasked with addressing financial, educational, health, administrative, and social issues in the occupied West Bank. In 1972, a specialized executive office for studies and information related to the West Bank situation was established. In 1980, the Ministry of Occupied Territories Affairs was founded, which acted as the secretariat and executive body of the high committee, essentially carrying out the functions of the Ministry of Reconstruction and Development. Following the disengagement decision in 1988, the Department of Palestinian Affairs, under the Jordanian Ministry of Foreign Affairs, was established⁴⁵.

⁴⁴ Rueff, Henri, and Mario Alain Viaro. 2009. "Palestinian Refugee Camps: From Shelter to Habitat." *Refugee Survey Quarterly* 339-359.

⁴⁵ Portal, Jordan Government. n.d. Department of Palestinian Affairs. Ministry of Foreign Affairs. <https://portal.jordan.gov.jo>.

Table (1) source (www.dpa.gov.jo) 2023

Camp	Year	City	Area (km2)	Inhabitants		Housing	
				Population	Families	No. housing units	Area per unit m ²
Wehdat	1955	Amman	0.48	60287	13390	2820	100
Al-Hussein	1952	Amman	0.42	33057	7793	2610	100
Zarqa	1949	Zarqa	0.18	20855	4875	1200	100
Irbid	1951	Irbid	0.24	29890	6975	1660	64
Baq'a'a	1968	Baq'a'a	1.4	128586	28114	11500	100
Husn	1968	Amman	0.77	27918	6348	2314	100
Jerash	1968	Jerash	0.75	33679	7327	2850	100
Hitteen	1968	Amman	0.92	59597	12961	5000	100
Souf	1967	Jerash	0.5	21263	4842	3000	100
Talbiyah	1968	Amman	0.13	10345	2054	810	46

4.3. Housing in the refugee camps

While there have been general improvements in conditions since the 1990s, overcrowding remains a crucial issue in many camps and varies significantly across different settlements. In terms of housing quality, numerous dwellings within the camps are constructed with temporary building materials. These structures are often poorly ventilated, exposed to humidity, and inadequately insulated, making them cold and challenging to heat in winter and uncomfortably hot in summer. The structural density of the camps also results in limited exposure to daylight for the dwellings, and residents often contend with a high degree of noise from the surrounding environment. These challenges underscore the persistent issues faced by inhabitants in terms of living conditions within the camps.

A full survey was conducted in 2011 by the Department of Palestinian Affairs and The FAFO Research Foundation, this report summarizes findings of a study of the living conditions of the Palestinian refugee population residing inside Jordan's 13 Palestinian refugee camps. It also examines how the living conditions of Palestinian camp refugees have evolved since the late 1990s⁴⁶. In the report the scholars summarised the findings regarding housing conditions into apartment housing, tenure, living space, crowding, average dwelling, challenges of the indoor environment and improving dwelling quality. Since 1999, there has been a shift from traditional standalone Dar houses to apartments, particularly within refugee camps⁴⁷. Dars, initially comprising two to four rooms on the ground floor with adjacent outdoor space, have undergone vertical expansion over time. While regulations initially restricted vertical expansion within refugee camps, these rules have gradually relaxed to accommodate building practices. Despite regulations allowing three-storey structures with approval, larger households still classify these buildings as Dars. However, with decreasing household sizes, former Dars now often contain multiple independent dwelling units, including the original Dar on the ground level and additional apartments above. About 81% of households within the camps claim ownership of their dwellings, while 16% rent, and 3% inhabit their homes rent-free⁴⁶. Despite lacking official deeds to the land, refugees assert ownership as the Jordanian Government provides land for free or through long-term leasing agreements with private landowners. Interestingly, dwellings are traded on the real estate market despite the absence of land titles, with 24% of owners having purchased their homes. Additionally, 42% of dwellings are self-built, and 34% are inherited. Ownership varies among camps, with almost 90% of households in Sukhneh owning their dwellings compared to about 70%

⁴⁶ Tiltne, Åge A., and Huafeng Zhang. 2011. The socio-economic conditions of Jordan's Palestinian camp refugees Summary of findings from two surveys. oslo: Fafo. Page 9.

⁴⁷ Tiltne, Åge A., and Huafeng Zhang. 2011. The socio-economic conditions of Jordan's Palestinian camp refugees Summary of findings from two surveys. oslo: Fafo. Page 17.

in Wehdat. Half of renters do so from relatives, while the other half rent on the open market from friends, acquaintances, or other landlords.

The typical living space for Palestinian refugees falls within the range of 15-20 square meters per person. The average and median floor area of dwellings in refugee camps are 78 and 90 square meters, respectively. Approximately one in five Palestinian refugee households resides in dwellings that are 100 square meters or larger, while 15 percent have less than 50 square meters of space. Seventeen percent of households have a minimum of 30 square meters per person, while ten percent have less than eight square meters per person. The variation in living space between camps is relatively modest, with averages ranging from 17 and 13 square meters per household member in Talbiyeh to 22 and 17 square meters in Sukhneh. Sukhneh and Hitteen camps stand out with the highest proportion of households having a floor area of at least 30 square meters per person 20%. In contrast, Hussein and Jarash camps have only 12% of households with over 30 square meters per person⁴⁸. When defining a 'room' as a living room or bedroom (excluding separate spaces for the kitchen, bathroom, hallway, or storage room, the most common dwelling size for Palestinian refugee households is three rooms, encompassing 48% of households. Only 17% of households reside in homes comprising four rooms or more. Crowding, defined as three or more persons sharing one room, has decreased significantly since the 1990s, dropping from 34% to 17% of all camp households. Nearly half of households now have a density of fewer than two persons per room. This reduction in crowding is primarily attributed to a decrease in household size rather than the construction of new, larger apartments or the expansion of existing housing units, crowding is less prevalent among economically better-off households compared to poorer ones.

The study of 2011 conducted by the Department of Palestinian Affairs and The FAFO Research Foundation provides valuable insights into the living conditions of Palestinian refugees in Jordan's 13 refugee camps. Overcrowding remains a prevalent issue in many camps, varying significantly across settlements. The shift from traditional standalone Dar houses to apartments has been observed, with Dars undergoing vertical expansion over time. Ownership of dwellings is common among camp refugees, with the majority owning their homes despite lacking official land titles. Living space varies among households, with a typical floor area of 15-20 square meters per person. Many households report negative indoor environmental conditions, including humidity, noise, and lack of natural light, with disparities observed across different geographic regions. Additionally, observational field studies have identified common characteristics and categorizations of housing units within the camps, emphasizing the need for targeted interventions to improve housing quality and address disparities across settlements.

⁴⁸ Tiltne, Åge A., and Huafeng Zhang. 2011. The socio-economic conditions of Jordan's Palestinian camp refugees Summary of findings from two surveys. oslo: Fafo.Pages 18-21.

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Examining the urban history, development and morphology of refugee settlements is crucial for establishing the background of the study, and to understand how these settlements were formed within the city.

The dissertation outlines the history of Amman as a city, focusing on its urban development and the transformation of refugee camps into informal settlements. By studying the city's urban development, it becomes visible how these settlements evolved, providing a foundation to establish an upgrading strategy to be implemented.

5. Methodology

5.1. Introduction

The study adopts a qualitative research methodology, a case study method. Al-Hussein refugee settlement was selected due to its historical value as one of the first camps established in Amman in addition to its location at the centre of the city which makes it embedded within its urban fabric. The methodology consists of several main phases, starting with the theoretical study and continuing with the practical analysis.

First, is data collection, the process aims to gather information about Palestinian camps in Amman through field study. The study focused on the settlements-built environment. The main goal was to conduct an observational study of the housing units in different sites in Amman and gather information about their physical appearance, building materials and construction quality. To establish a foundation for the classification system of the units' physical conditions. The field study also included interviews with designated organizations and the residents themselves.

Second, in-depth case study analysis, consisting of urban and architecture assessments. Starting by analysing the settlement on an urban scale and its connection to its surroundings, then focusing on a housing block and investigating the architectural aspects of it. The goal is to establish an assessment model of the current situation of the settlement and identify the key challenges and opportunities for upgrading.

Third, a framework for upgrading housing units is developed. By categorizing the housing units through relative and absolute values. A design module based on the categories can be presented as a solution for each category. The framework utilizes urban policies mentioned previously with the findings from the analysis to present upgrading solutions for each unit as a reference for future comprehensive upgrading plans.

5.2. Observational field study

The research involved several site visits conducted between 2021-2024, with the objective of observing and analysing the built environment of the housing units. The primary focus was on refugee settlements in and around Amman. The study encompassed four sites, primarily focusing on the condition of buildings in general and housing units in particular. These four sites are: Al-Baqa'a, Hitten, Al-Wehdat and Al-Hussein. (Figure 9)

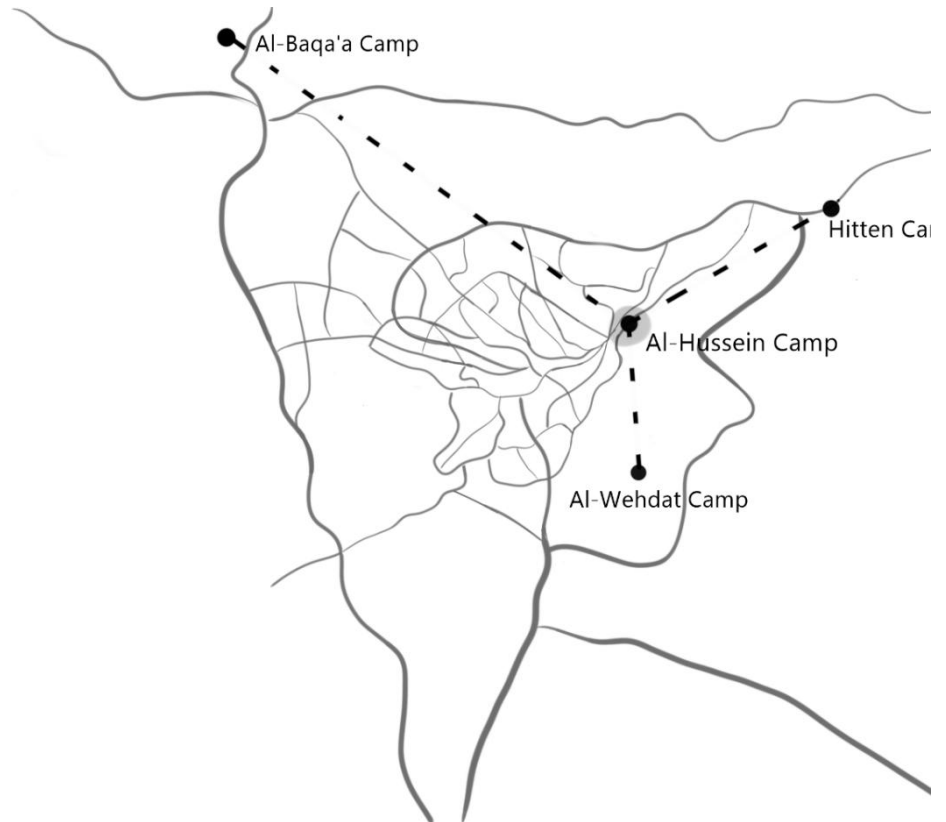


Figure 9: Map of the visited camps (Source: The Author (2024))

Jabal Al-Hussein camp (Figure 16) is one of four camps established in Jordan after 1948 to accommodate refugees who were displaced from Palestine because of the 1948 war. The camp was set up in 1952 for 8,000 refugees on an area of 0.42 square kilometres, north-west of Amman (Figure 17).

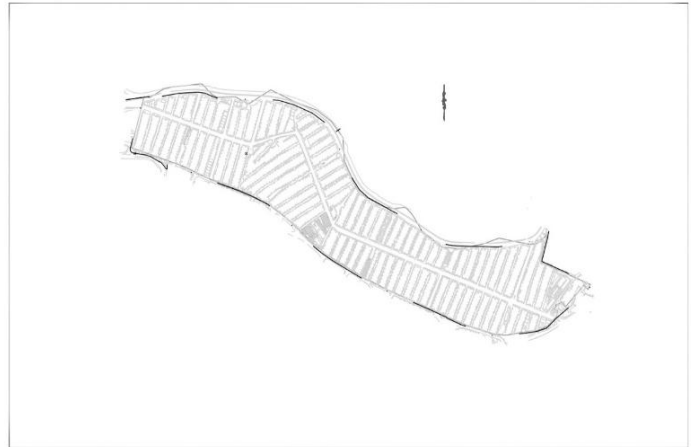


Figure 16: Al-Hussein camp layout (Source: DPA-DWG file (2022))



Figure 17: Al-Hussein camp (Source: The Author (2021))

Amman New camp (Figure 14), known locally as Wehdat, which means (units) in Arabic, was one of four camps set up after 1948 to accommodate Palestine refugees who were displaced from Palestine by the 1948 war. The camp was established in 1955 on an area of 0.48 square kilometres, south-east of Amman (Figure 15).

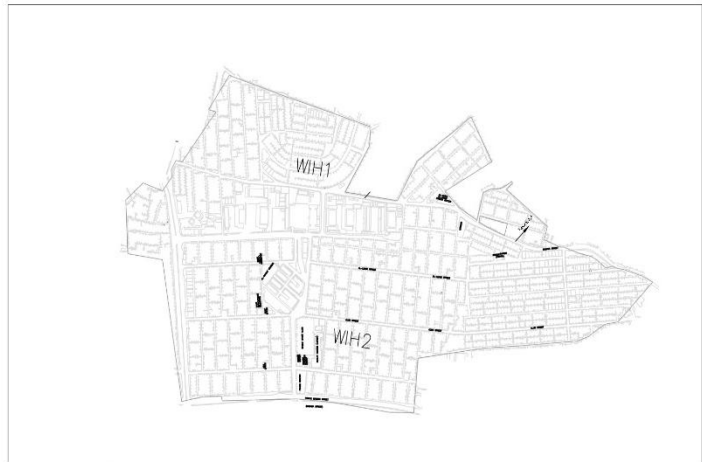


Figure 14: Al-Wehdat camp layout (Source: DPA- DWG file (2022))



Figure 15: Al-Wehdat camp (Source: The Author (2021))

Al-Baq'a camp (Figure 10) was one of six 'emergency' camps set up in 1968 to accommodate Palestine refugees and displaced people who were displaced from the West Bank, including East Jerusalem, and Gaza Strip by the 1967 Arab Israeli war. The camp, which is the largest in Jordan, lies about 20 kilometres north of Amman (Figure 11).



Figure 10: Al-Baq'a camp layout (Source: DPA-DWG file (2022))



Figure 11: Al-Baq'a camp (Source: The Author) (2022))

Hitten camp (Figure 12), was established in 1968 on an area of 0.92 square kilometres, 10 km northeast of Amman. Many camp residents originally came from the Gaza Strip (Figure 13).

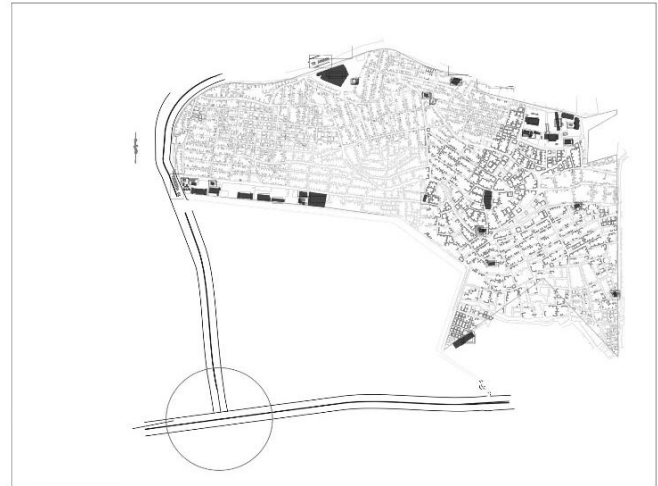


Figure 12: Hitten camp layout (Source: DPA-DWG file (2022))



Figure 13: Hitten camp (Source: The Author (2022))

In all the visited sites, the majority of the built environment consists of residential areas which goes back to the nature and history of the refugee settlements. Along the main road, there are a few small shops, mostly owned by the residents, and one camp even had a large market at its centre. The service buildings are generally provided by the UNRWA, but they often lack proper maintenance, leading to poor conditions overall. Analysing the planning of the camps, one common features of all camps planned by the UNRWA is the plot size. All initial plot size in the camps was around 100m²⁴⁹. (Figure 18).



Figure 18: Plot layout in the camps (Source: DPA DWG file (2022))

The observational study conclude that all refugee settlements share similar characteristics, creating a homogeneous urban fabric, on the other hand the specific urban fabric of the settlement's contrasts with the city fabric. These characteristics developed from the shared history, special circumstance of the urban development and the socio-economic conditions. Upon analysing the housing units, the study categorises the units into three main categories based on their physical appearance, building materials and construction quality to: **Poor, Fair, and Good**. This classification depends on the condition of the construction materials used and their state, the roofs whether it's a concrete structure or metal sheets, the doors and windows if available, level of deterioration and the overall physical appearance (Figure 19).

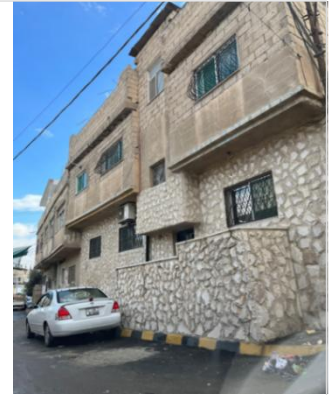
⁴⁹ Information and drawings from Eng. Shadi Alyan in DPA personal interview.

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Collecting data through site visits, interviews, and case study analyses is essential for understanding the built environment of refugee settlements. This information serves as the foundation for a classification system that categorizes housing units based on their current condition.

The dissertation implements a classification system for housing units, based on both absolute and relative variables which were identified through field research. Based on this system the design and upgrading strategies were developed, ensuring that the proposed strategies meet the requirements of the current housing unit conditions.

Good condition



Fair condition



Poor condition



Figure 19: Housing units' categories (Source: The Author (2022))

5.3. Jabal Al-Hussein Analysis

Jabal Al-Hussein camp which is located in the heart of the city has grown from a refugee camp into an urban-like settlement, which resulted that the modern-day settlement became part of the city urban fabric. As with other similar settlements in Jordan, Jabal Al-Hussein faces severe overcrowding with high density leaving no space for further construction, which implies the need to rather develop the existing (Figure 20).



Figure 20: Al-Hussein camp (Source: Google Earth (2021))

Al Hussein camp covers an area of 445 km², with 33057 inhabitants, in 3900 dwellings. The resulting density is 66.4 persons per km²⁵⁰, these density figures are among the highest in Amman. Occupancy rates are also high, with an average of approximately four persons per room, and the camps have the lowest standards of infrastructure services. In addition to housing, the camps also contain commercial areas, schools, youth clubs, health, and cultural centres which also serve refugees living outside the camps. The table below (Table. 2) demonstrates in numbers the population and services.

⁵⁰ DPA. n.d. www.dpa.gov.jo.

Table(2): Al-Hussein statistics (source:DPA (2023))

Date of establishment		1952
Area		445.241 dunam - .445 km ²
Inhabitants	Population	33057
	No. of families	7793
	Hardship cases	1320
Housing	No. of units	2610
	No. of dwellings	3900
	Area per unit	100 m ²
Services	Paved roads (Streets)	18000 m ²
	Paved Footpath	9126 m ²
	Length of pipes for drainage system	645 L.M

	No. of illuminated poles	636
	Percentage of house connection to water supply	98%
	Percentage of house connection to sewer system	98%
Commerce	Commercial shops	751
	Bakeries	5
	Pharmacies	5
Others	Private clinics	11
	Mosques	5
	Police stations	1
	Health centre	1
Schools		4
Youth club		1

5.4. Urban Analysis

5.4.1. Land use analysis and infrastructure

The allocation of land use sectors in refugee camp planning has been replicated in settlements by the nature of its development. The main sectors are residential and services, accompanied by the emergence of a commercial sector driven by the needs of the inhabitants and the evolving urban context. With housing units occupying approximately 75% of the settlement area, the residential sector covers the majority of the land use. The commercial sector, constituting about 15% of the total area, is concentrated along main street strips, reflecting the organic development of economic activities within the camp environment. Meanwhile, services such as schools, health centres, and police stations, provided by organizations like UNRWA, occupy around 5% of the settlement area (Figure 21).



Figure 21: Map of land-use (Source: The Author (2022))

Despite efforts to deliver basic services from the government in cooperation with the UNRWA, the current physical and operational conditions of these services fail to meet the needs of the inhabitants. In addition to the predominant land use sectors of residential, commercial, and services, there has been a growing recognition of the need for open green spaces within or communal public spaces. These spaces serve as vital community gathering areas, promoting social interaction, recreation, and overall well-being among residents. However, the availability of such green spaces remains limited, with overcrowding and high population density often leading to a lack of sufficient open areas. (Figure 22).



Figure 22: Services Buildings in Al-Hussein camps (Source: The Author (2022))

In addition to the challenges posed by high-density development and limited open spaces, the lack of adequate infrastructure imposes several challenges for the inhabitants. Basic services such as water supply, sanitation, and electricity often struggle to meet the needs of the growing population, leading to issues such as water shortages, inadequate waste management, and unreliable power supply. Furthermore, the absence of proper roads and transportation systems makes mobility within the camps and access to essential services outside the settlements harder. These infrastructure deficiencies affect residents' quality of life, on the other hand, they present key challenges that need to be addressed in any comprehensive upgrading or development plan for such settlements.

5.4.2. Pattern analysis

The housing units' plot of refugee camps was planned by the initial organizations that administered the situation back in 1984 (Figure 23). The plots were planned with an average of 100 sqm per plot. When the camp structure morphed into a

permanent structure the size of the plots remained unchanged. And with no to minimum building regulation there were no setbacks determined, causing the housing units to be adjacent to each other with no ventilation and with maximum building footprint.

The average coverage ratio (BCR) is.

(Building footprint/plot area - $90/100 = .9$) A coverage ratio of 0.9 means that 90% of the lot area is covered by the building's foundation.

The average building high is two stories, therefore the floor area ratio. (FAR) is.

(Building built-up area/plot area - $190/100 = 1.9$) A floor area ratio of 1.9 means that the total floor area of the building is 1.9 times the area of the lot it sits on.

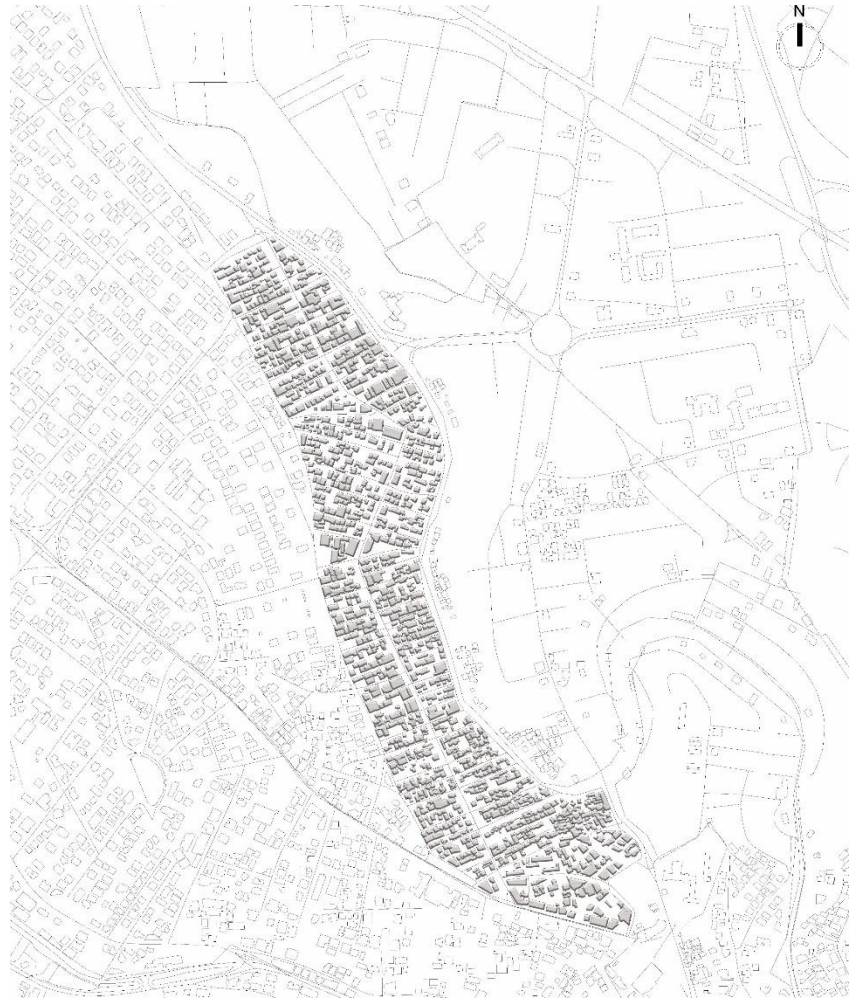


Figure 23: Urban fabric density illustration (Source: The Author (2022))

In terms of density, both ratios are indicators of high-density development. The 0.9 footprint building ratio suggests that the building is built close to the lot's boundaries and takes up a large portion of the available land. The 1.9 floor area ratio indicates that the building has a high degree of floor area efficiency, maximizing the use of available space. Which can cause pressure on infrastructure and result in reduced open space. Due to the nature of refugee camps, open and recreational areas were never a part of the planning, and through the transformation, it was never a priority. This caused an urban pattern in which open areas do not exist. An issue that creates multiple urban challenges for the inhabitants.

The highly dense urban fabric of the settlement separated them from the surrounding (Figure 24). Refugee settlements share a unique urban pattern that distinguishes them. Two main elements can be identified as the segregation elements, in terms of order and hierarchy: **plot sizes and street widths**. The nature of these elements goes back to the origin of the camps which were planned as an area designated for tents, therefore, the development of concrete buildings created overcrowded hard-to-reach districts (Figure 25).



Figure 24: Pattern analysis diagram (Source: The Author (2022))

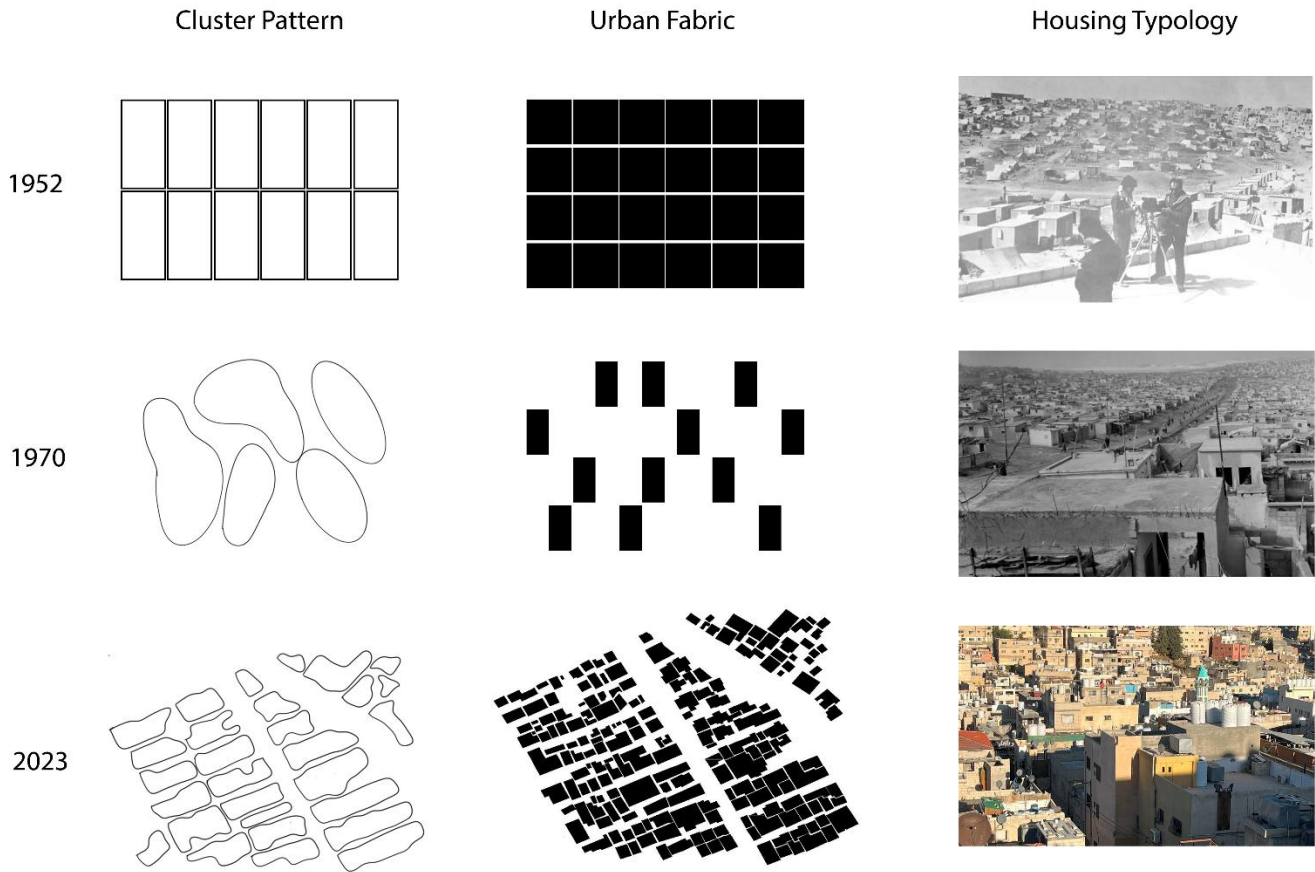


Figure 25: Representation of urban fabric density- Al-Hussien(Source: The Author (2024))

5.4.3. Connectivity analysis

The connectivity assessment is based on the links and junctions' analysis of Al-Hussein, as well as a hierarchical analysis. Al-Hussein settlement has a total of 241 links, 93 of which (38%) are classified as T-junctions and 52 (21%) as X-junctions. While this is considered a reasonable ratio; the concentration of junctions along the main streets, creates limited accessibility to the units situated in the middle plots. The street hierarchy consists of main and secondary streets. Street depth I surrounds the settlement in addition to the main street which runs through the settlement. Street depth II are distributed from the main streets into the inner plots. Despite the well-planned network and connectivity, the streets face multiple challenges due to their origin as a refugee camp network, which is based on pedestrian-only mobility and is not suitable for modern transportation needs. Furthermore, the poor quality of these streets is due to the lack of maintenance. As a result, the camps consist of narrow and poorly managed street networks, most being inaccessible to cars. This chaotic nature of cars entering without following established rules resulted in confusion and disorder in mobility and accessibility (Figure 26).

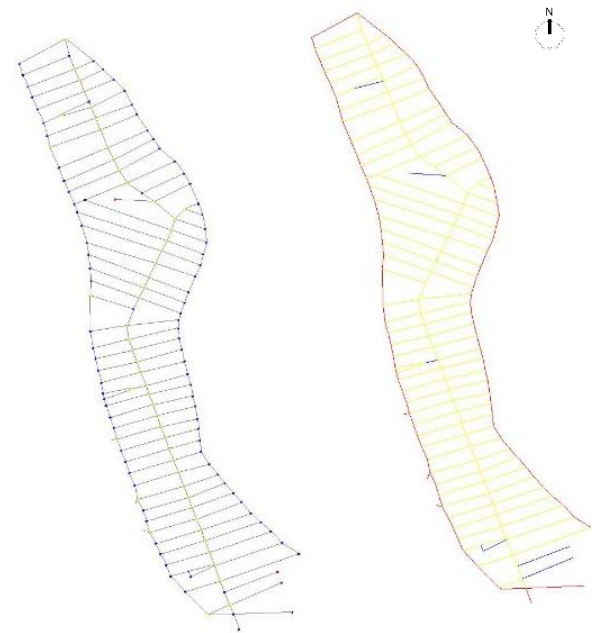


Figure 26: Connectivity analysis (Source: The Author(2022))

5.5. Housing block analysis

5.5.1. Housing units

Given that residential sector dominates the land use, it's crucial to examine housing conditions to understand how to effectively rehabilitate them. The housing units in Al-Hussein camp mainly consist of family dwellings spread across the camps' area and can rise up to three stories. The architectural image of the housing is mainly the homogenise image of the informal settlements' studies previously. According to the FOFA report⁵¹ in Al-Hussien camp there are approximately 2610 housing units and 3800 dwellings, the condition of housing varies as follows:

- .01% board cladding and metal sheets roofing.
- 1.5% Brick walls and metal sheets roofing.
- 7.3% Units in poor conditions.
- 91.2% Units in fair conditions.

To conduct a more in-depth analysis of the housing units in Al-Hussein refugee camp, a sample of housing unit's block will be studied to get an insight of the prevailing living conditions (Figure 27). A block consisting of four rows of housing units have been chosen, located on the edge of the camp facing two main roads that separate the camp from its surrounding, a strategic location since it is considered a barrier between the camp and the city. A thorough field survey has been conducted, accompanied by the mapping of the housing units' locations and respective areas within the chosen block. The block covers 25.7 km² and contains 122 units, between 50m²-100m² per unit. 5% of the units are in poor condition with metal sheet roofing and non-cladded brick wall, 10% are in fair condition and 85% are in good conditions⁵².

⁵¹ Department of Palestinian Affairs. (2011). Comprehensive tabular report for all camps = التقرير الجداول الشامل لكل المخيمات [PDF]. Department of Palestinian Affairs. Page 7.

https://www.dpa.gov.jo/ebv4.0/root_storage/ar/eb_list_page/%D8%AA%D9%82%D8%B1%D9%8A%D8%B1_%D8%A7%D9%84%D8%AC%D8%AF%D8%A7%D9%88%D9%84_%D8%A7%D9%84%D8%B4%D8%A7%D9%85%D9%84_%D9%84%D9%83%D9%84_%D8%A7%D9%84%D9%85%D8%AE%D9%8A%D9%85%D8%A7%D8%AA.pdf.

⁵² Information gathered from site survey

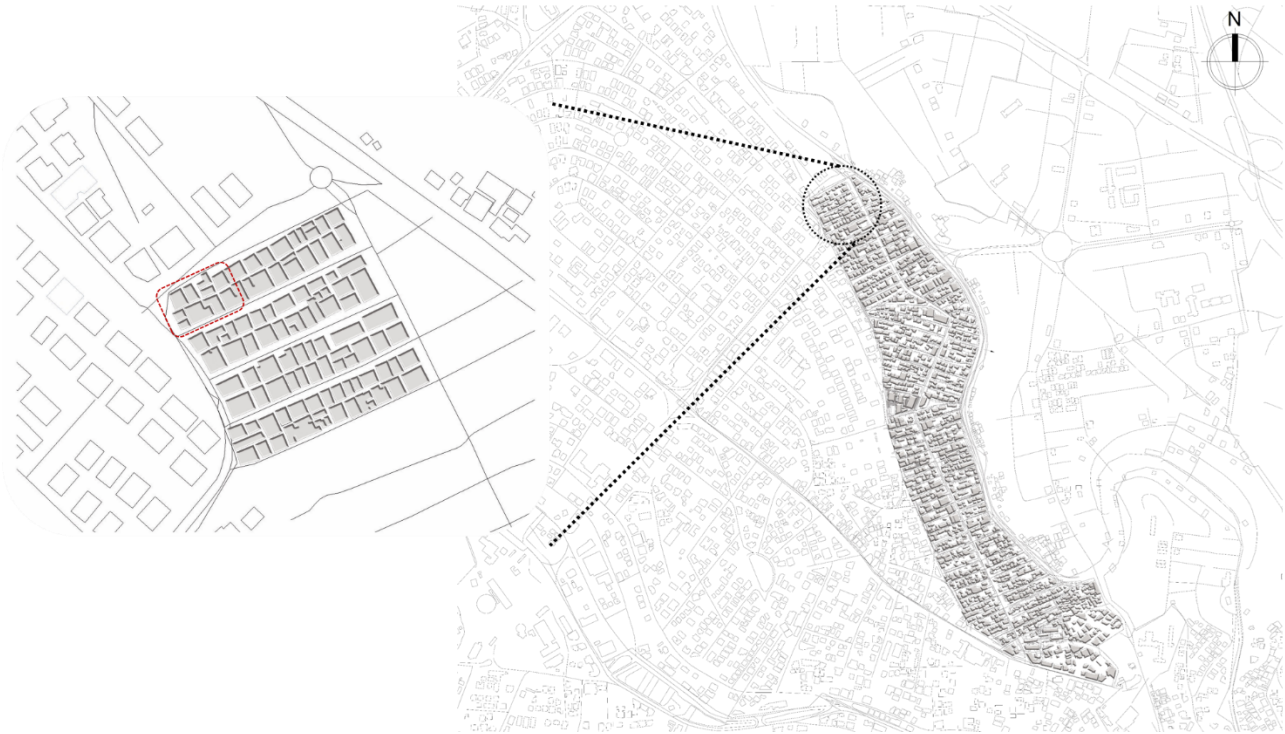


Figure 27: Housing Block selected for mapping (Source: The Author (2023))

The figures presented below (Figure 28) are the findings from the observational study and interviews conducted with the residents. The study focused on evaluating the available space, the condition of stairs, structure integrity, and the adequacy of ventilation and natural light. The results reveal a common key challenge across the units, characterized by inadequate natural light and ventilation, resulting in the decay of walls and door materials. Poor structural elements span from slabs, columns and roofs that used inadequate materials. The staircases which were designed and constructed by the residents themselves, failed to meet standard specifications which resulted in different kinds of unstandardized staircases that can be a danger to the users. In conclusion, the interior and exterior physical environment of the housing units needs instant attention and solutions to make these spaces inhabitant and elevate them to a standard quality housing which increases the quality of living in these settlements.

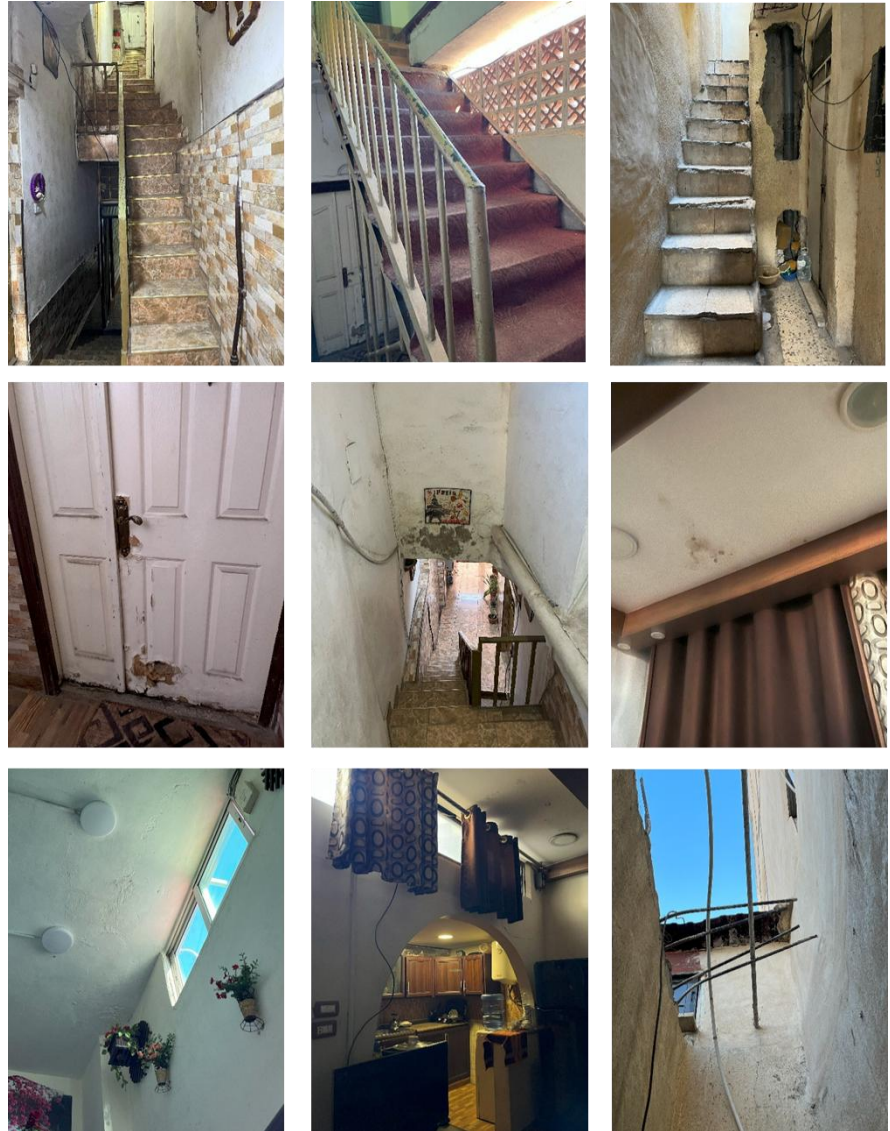


Figure 28: Housing units (Source: The Author(2023))

5.5.2. Typology analysis

The observational study objective is to examine the building materials, structure integrity and overall physical environment while focusing on the structural characteristics and durability. To achieve this, a typology analysis was conducted that classifies the housing units based on number of stories, and spatial organization (Figure 29). This classification acts as the base on which the design modules will be developed. The primary materials used in construction are brick, concrete, steel rods, steel sheets and plaster (Figure 30). These materials are commonly used across Jordan, where reinforced concrete structures are predominant and suitable for the region in general. The overall construction method observed in the camp mainly relies on a skeleton type of construction which consists of reinforced concrete columns and beams to provide structural support.

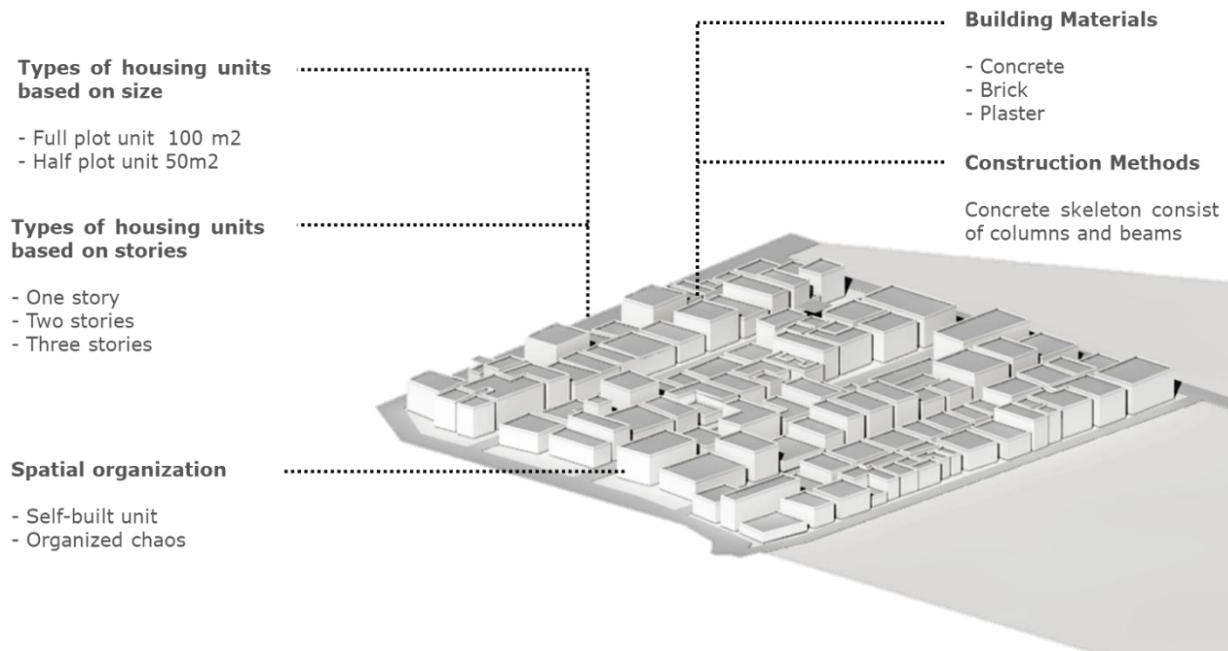


Figure 29: Housing units classification (Source: The Author(2023))



Figure 30: Al-Hussien camp (Source: The Author (2022))

5.6. Design variables.

To establish a foundation for a comprehensive design proposal, the study categorized the housing units based on the analysis and field observations. This categorization aims to create a systematic framework that reflects the common characteristics of housing in refugee settlements.

The main classification was based on two types of variables: absolute and relative. Absolute variables are common and ultimate factors of the camps, while relative variables are associated with the conditions of the units. This approach ensures a thorough understanding of the current state of housing in these settlements, which plays a significant role for developing effective design upgrading strategies.

- Absolute variables

The absolute variables, which are the fundamental factors and conditions of the camp, include the plot size of each unit. As it was pointed out through the analysis, the plot size in al-Hussein refugee settlement is determined by the fact that these settlements were initially planned as refugee camps. The urban planning of these camps limited the plot size to approximately 100m².

When the camp transitioned into an informal self-built settlement, the changes were still based on the same plot size. Some of the existing houses are built on the entire plot, covering around 90m² of built-up area, while others cover half of it. This has resulted in two main categories of housing unit plot sizes: 100m² and 50m². This classification is crucial for understanding the spatial organization and development patterns.

- Relative variables

Relative variables are those that depend on the units' conditions, which in turn influence the condition of the buildings. These variables fall into two main categories: the number of stories and the existing psychical conditions. The number of stories is limited to three, but this depends on the residents as these settlements are self-built. Therefore, the number of stories can vary from one to three per unit. The socio-economic structure also plays a role in this aspect as the urban development in these settlements somehow managed to continue the traditional structure of the villages that the initial inhabitants of the camps came from, for instance, when a son gets married, a new story is typically built above the parents' house, leading to the formation of these cluster-based settlements.

The second category, the existing conditions of the building, largely depends on the financial conditions of the residents, as they are responsible for building and maintaining their homes. If the inhabitants are financially stable, their homes will likely be in good condition. If not, their homes may be in fair or poor condition. Given that most residents belong to the low-income class, there are many buildings that require attention and care.

The study proposed a structural framework to understand the typology within refugee settlements; this will be the base for the proposed design modules of the housing units. By classifying the housing units based on absolute and relative variables, the research highlights the main characteristics that shapes the built environment, and it will be the key for planning the intervention for rehabilitation. It is essential to understand the dynamics of the urban development in such settlements, which will help develop future intervention plans accordingly and to ensure the any proposed design align with the needs of the residents.

Table (3): Units classifications (Source: Author (2023))⁵³

Plot size	Stories	Poor	Fair	Good
50m ²	1	50P-1	50F-1	50G-1
50m ²	2	50P-2	50F-2	50G-2
50m ²	3	50P-3	50F-3	50G-3
100m ²	1	100P-1	100F-1	100G-1
100m ²	2	100P-2	100F-2	100G-2
100m ²	3	100P-3	100F-3	100G-3

⁵³ Each unit can be labeled based on the classification system (Area, condition - no. of stories)

5.7. Application of Housing Solution on Refugee Camps

5.7.1. Implementing urban strategies on refugee settlement upgrading

The study's objective is to come up with a modular design plan, based on both theoretical and field studies conducted earlier. This plan aims to create a framework for the improvement and upgrading of housing units in refugee settlements in Amman. The study explored two primary urban strategies as the foundation for the proposed guidelines: low-cost housing and shared open spaces. Each urban strategy has various solutions that contribute to the design plan. The strategies for affordable housing primarily focus on low-cost housing methods, *including incremental housing, the use of local materials, self-built housing, land-sharing, and contextualisation*. Shared living spaces are defined as outdoor spaces and services units that can be shared by the residences focuses on creating *recreational open spaces within the housing units*.

This approach aims to design housing units, and an example of housing configurations based on these units, providing a solution for improving living conditions in these settlements. The existing correlation between shared living spaces and refugee camps can be seen in the refugees' settlement structure of cooperative and self-built way of living. The inhabitants' shared experiences and collective memory provided a solid foundation for such approach to be proposed. However, these residents now are the third generation of displaced refugees, a concept that could potentially affect the sense of belonging among the current residents. Therefore, shared spaces come as a solution, providing improvement to the physical structure of the camps as well as strengthen the social structure.

To successfully implement a shared spaces strategy, it is crucial to address its two main aspects: the physical and social elements of the developments. Regarding the physical-architectural approach, the principles of collaborative living, self-build, and self-management already have a foundation in the Amman refugee settlement. The challenge lies in improving the built environment and proposing a design for the current housing units that could serve as a solution for unit rehabilitation. On the other hand, proposing a multi-unit configuration with communal open spaces could enhance the social integrity and the sense of ownership and belonging among the inhabitants by providing well-designed spaces.

The unique development of the refugee settlements in Amman is that it is based on the planned refugee camps seventy-five years ago. The analysis indicates a standardized plot size, with an average of 100 m², which allows to design a systemic housing approach, that takes the designated plot as a reference. This approach will allow to have a 100m² unit and 50m² for the proposed housing units' designs.

As for the proposed housing unit design, it follows a set of various strategies dealing with both urban and architecture aspects. The purpose strategies aim to upgrade the develop the existing units, while introducing new techniques and solution to replace outdated ones. The groundwork for these strategies was established through the previous theoretical and practical analysis which was then curated into five main intervention that built the design framework:

- The provision of natural light and ventilation through a systemic design.
- The strategic placement of vertical circulation on the side for enhanced access and standard compliance.
- Spatial arrangement of the functions to guarantee spatial optimization for the benefit of the users.
- Enhancing and enforcing building materials using local low-cost materials.
- Considering the dwellers' privacy by strategically positioning and orienting the windows in each building.

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A modular housing unit design that includes upgrading strategies can provide flexible and adaptive solutions for refugee settlements' renovation.

The dissertation introduces a modular design model which incorporates different design concepts such as optimizing space, maximizing natural light, improving ventilation, and reinforcing materials. This model can be customized for various sites, offering a flexible and scalable solution for upgrading refugee settlements throughout Jordan.

5.7.2. Spatial optimization of the floor plan and shared living spaces

The primary objective of upgrading and restructuring is to enhance the quality of living spaces. The study highlighted the bad conditions of housing units in these settlements, a consequence of various factors over time, to address this, the design proposal introduces standardized modules based on the existing plot sizes in the settlements. These modules are designed for 100 m² plots, either occupying the entire plot or half of it, resulting in two main modules: a 90m² house and a 50m² one (Figure 31).



Figure 31: Proposed housing units plan – 8 units (Source: The Author (2024))

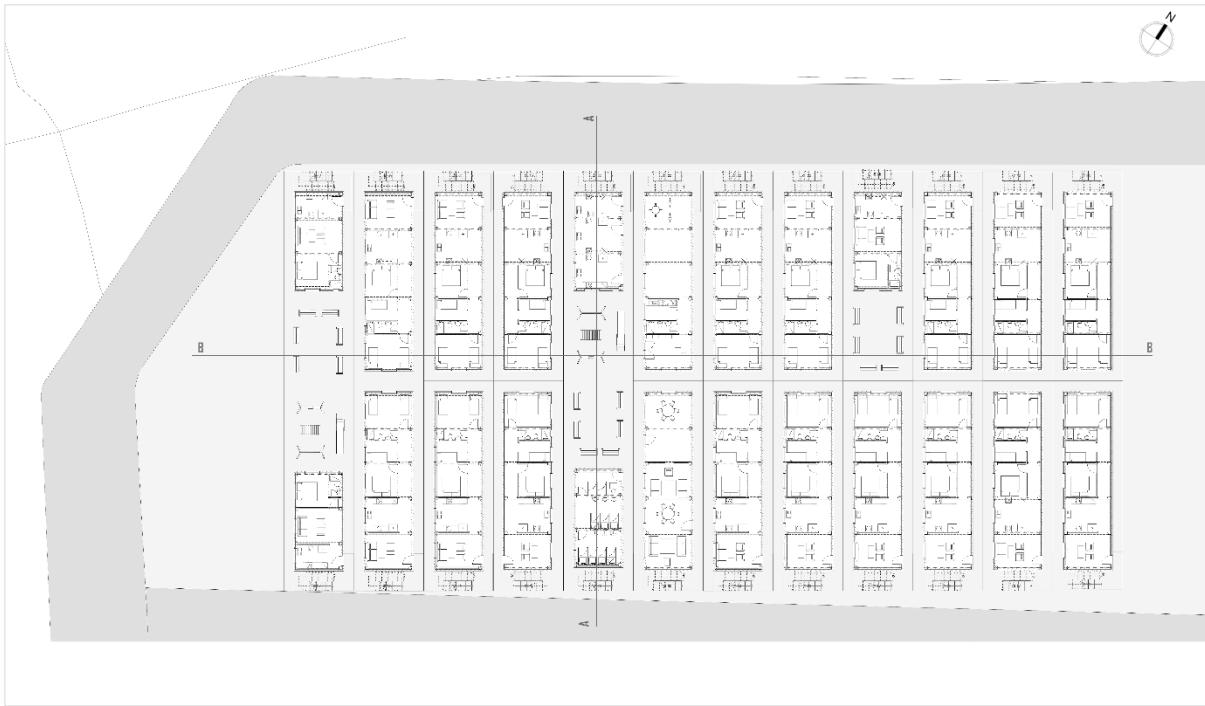


Figure 32: Proposed housing units plan – 24 units (Source: The Author(2024))



Figure 33: Proposed Section A-A (Source: The Author (2024))



Figure 34: Proposed Section B-B (Source: The Author (2024))

The 90m² unit consists of a living room, kitchen, two bathrooms, and three bedrooms, arranged to optimize space usage and accommodate large families, who are the primary residents of the camp. The smaller 50m² unit includes a living room, kitchen, bathroom, and one bedroom, suitable for smaller families or for individuals.

These two modules offer a range of options to meet the resident's needs. Creating housing modules will help transform the non-systematic nature of the refugee settlements into an organized housing settlement, which can be used in the future as a low-income housing development. Furthermore, the standardization of these modules lays the groundwork for various configurations in a low-income housing development project by combining four units into a single entity (Figure 35).

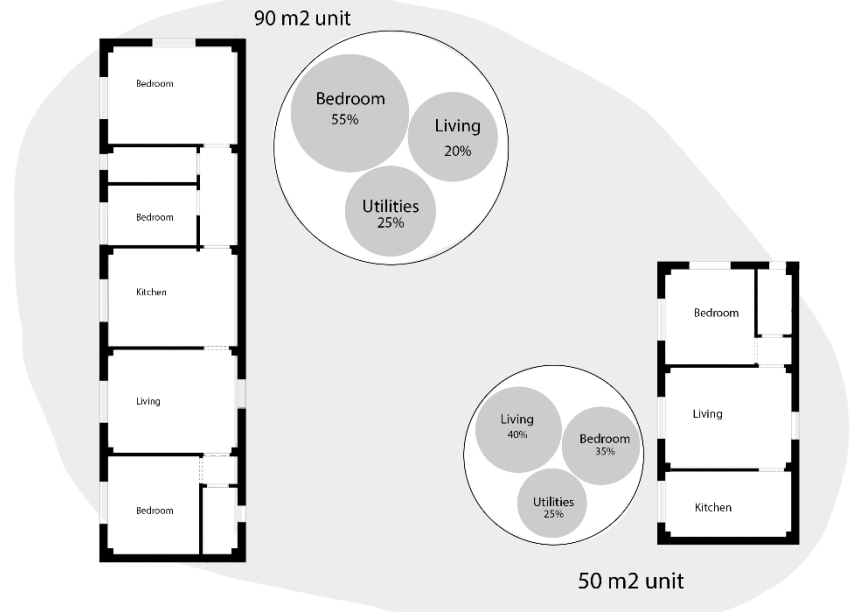


Figure 35: Proposed housing unit zoning plan (Source: The Author (2024))

To address one of the challenges facing refugee settlements in general and Al-Hussien settlements in particular, a set of designed shared living spaces can significantly improve the quality of life and community resilience. These spaces include a communal kitchen, community areas for both women and men to gather, learn, and connect, well-structured sanitation units that promote hygiene, and safe controlled play areas for children. Together, these facilities aim to provide a stronger sense of community, security, and dignity for inhabitants and provide solutions to their current situation. In addition, providing such amenities can free up more space in the main housing units, which they can replace having these amenities with different rooms (Figure 36).

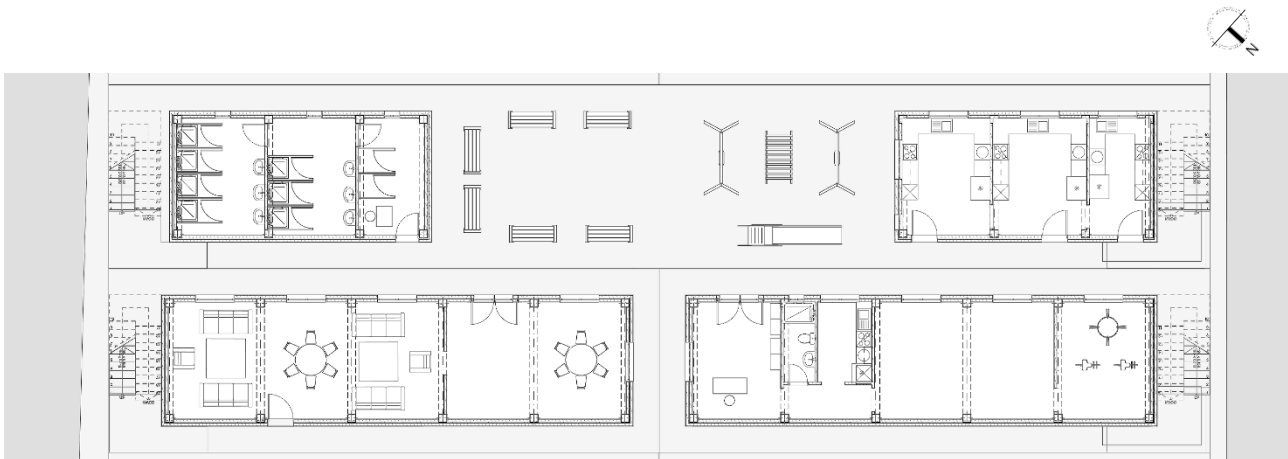


Figure 36: Proposed shared living spaces (Source: The Author (2024))

5.7.3. The provision of natural light and ventilation through a systemic design.

One of the main challenges that face refugee settlements, is the lack of natural light and ventilation. A key measure in the upgrading proposal for the refugee settlements is to introduce a comprehensive design plan that facilitates natural light and ventilation for the residential units. The design proposal concept is to have multiple unit layouts, each incorporating a 1-meter space between buildings in addition to create open space within the configuration of units. The composition aims to enhance access to natural light and ventilation instead the current clusters that can limit the light and ventilation access. As for the design of the individual housing modules, the idea was to create a linear arrangement of the main functions needed and provide each zone with sufficient windows to give access to the whole unit (Figure 37).



Figure 37: Natural light and ventilation diagram (Source: The Author (2024))

5.7.4. The placement of vertical circulation.

Due to the self-built nature of the settlements, a significant portion of the existing vertical circulation does not meet standard requirements for both interior and exterior staircases. The natural growth of the settlement was the cause of vertical expansion which created various not optimal self-made solutions that can impose danger to the users. This resulted in a complex circulation within the settlements. As a solution, the proposed design strategically places the vertical staircase on the side of each plot. Situating the circulation on the side, it opens up the interior space to accommodate the basic functions of housing units, and better mobility and regulated movement. This organized zoning transforms the settlement into a structured housing community, which can benefit future development and its re-use (Figure 38).

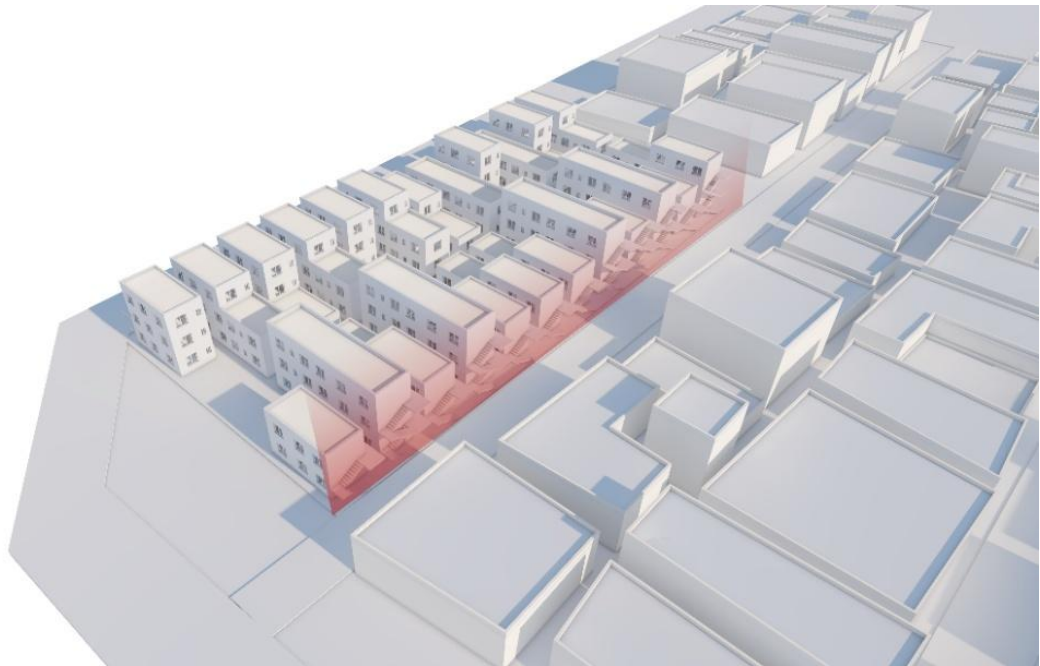


Figure 38: Proposed vertical circulation placement (Source: The Author (2024))

5.7.5. Enhancing and enforcing building materials.

As the refugee settlements transitioned from temporary structures to permanent ones, the transformation was guided by the resources and capabilities available to the residents. Over time, with its unregulated growth, the built environment of the settlements experienced material degradation.

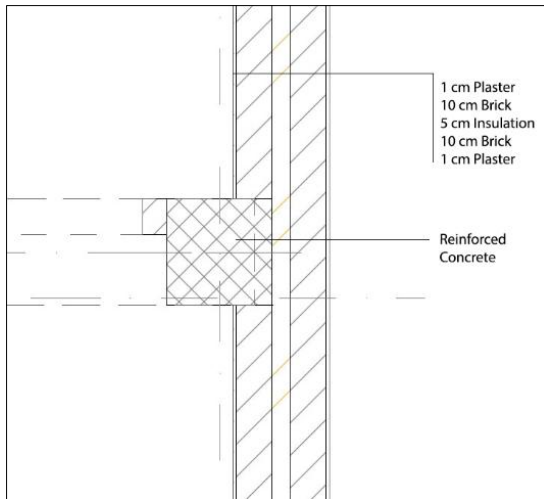


Figure 39: Proposed exterior wall detail (Source: The Author (2024))

The primary materials used in construction are brick, reinforced concrete, and plaster, which are known as the most cost-effective and durable materials used in the region, by using local materials the cost-efficiency of the proposed designs can be ensured. The construction details of each housing unit involve two brick walls, each 10cm thick, with a 5cm gap that can either be filled with insulation or left as is, the current construction does not include any kind of insulation, the proposed design ensures the use of minimum insulation to achieve a better physical structure for the unit without expensive cost. The exterior of the unit will be covered with plaster over the brick walls, creating a more uniform and refined appearance, as well as following the governmental guidelines on the camps which dictate the use of plaster and not stone cladding. For the structure, concrete and reinforced concrete were the primary materials used, as they are considered the best options for building reinforcement and ensuring structural integrity. The structural system follows the existing skeleton construction method using 30x30 cm columns connected with R/C beams, this method is well known as well in Jordan as the main construction method of residential houses (Figure 39).

5.7.6. Considering the dwellers' privacy.

The social dimension of shared spaces plays a crucial role and must be factored into the design process. One important social norm of the settlement's culture is the privacy of its residents. This is reflected in the design of the housing modules. The proposed design offers two solutions regarding the direction of the openings; first where the openings are placed on one side, with circulation on the opposite side. When these modules are positioned adjacent to each other with no buffer zone, each side with an opening faces a solid side, minimizing the possibility of interaction, and to minimise public interaction the shared living spaces can be placed on the ground floor. Second is where we have an outdoor shared living space, in this case, the opening can face inward creating a sense of privacy for the adjacent units and the street will be the solid side. This design approach presents solutions to respect the privacy of the residents, even within the limited space available, and is a potential solution for maintaining individual privacy in such densely populated areas (Figure 40).

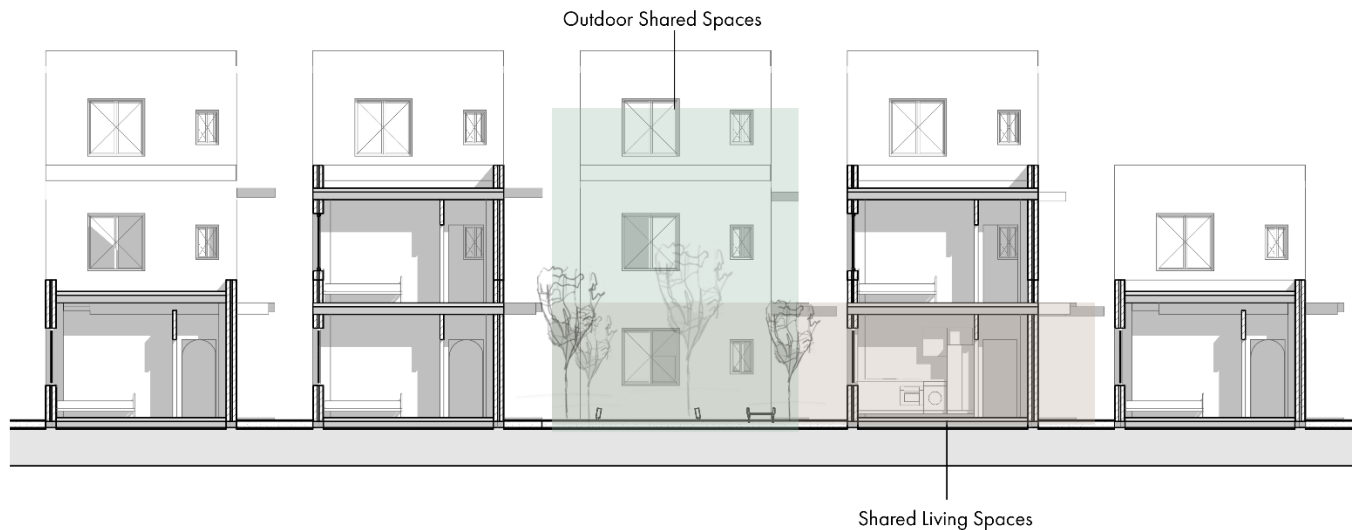


Figure 40: Proposed Shared spaces integration (Source: The Author (2024))

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The application of the methodology of low-cost renovation systems allows residents of refugee camps to access affordable solutions to improve their living conditions. This 'bottom-up', spontaneous process can significantly contribute to the renewal of the refugee camps as a whole.

The dissertation proposes a set of urban policies, such as spatial optimisation, provision of light and ventilation, placement of vertical circulation, use of local material, consideration of privacy and incremental housing. In addition to providing a better living environment these implementations aim to regulate and organize the urban pattern of the settlement. At the same time, all these interventions must be preceded by the preparation of a unique regulation regarding the built environment with these special characteristics given, in cooperation with skilled experts from several involved disciplines, and it must be achieved that the authorities can also enforce the provisions of the regulation. The existence of organized engineering infrastructures, public health and safety regulations, and reasonable solutions required by functions, as well as the construction parameters serving them, provides a sufficient basis for the development of the built environment of the neighbourhood, keeping in mind the initiative need for integration into the existing neighbourhood's urban fabric.

5.7.7. Summary

By proposing a multi-unit configuration that integrates communal living spaces which varies between shared amenities and shared outdoor spaces, it provides a significant improvement to the settlement community. Shared amenities can contribute to the overall services in the settlement, due to the lack of adequate amenities in the current situation, providing a community-centred design to address the density and strengthen the community sense (Figure 41). The proposed design can contribute to improving the quality of the built environment, therefore improving the quality of life. A well-designed interior and exterior units can systematically replace the existing units for better-conditioned housing, by replacing the units which are in bad condition with either open spaces or communal units, which will inevitably transform the refugee settlement in Amman into a future housing development that can be used when the refugee leaves it. The base of these configurations is to combine four plots as one unit and then design different alternatives using the housing modules combination which integrates shared spaces (Figure 42). To upgrade the settlement in a sustainable way, the following regulations are proposed. Building setbacks will be 1.2 meters on one side and 0.8 meters on the other, with no setbacks required from the front or back to preserve the street-facing character. The use of concrete as the main construction material, exterior cladding must be plaster for durability and a unified look, and a maximum height of three stories will manage density. Open areas will be required in each neighbourhood to ensure access to green spaces and prevent clustered growth. Additionally, all new constructions must follow proposed design models to maintain structural integrity, ventilation, circulation and privacy as per the design.

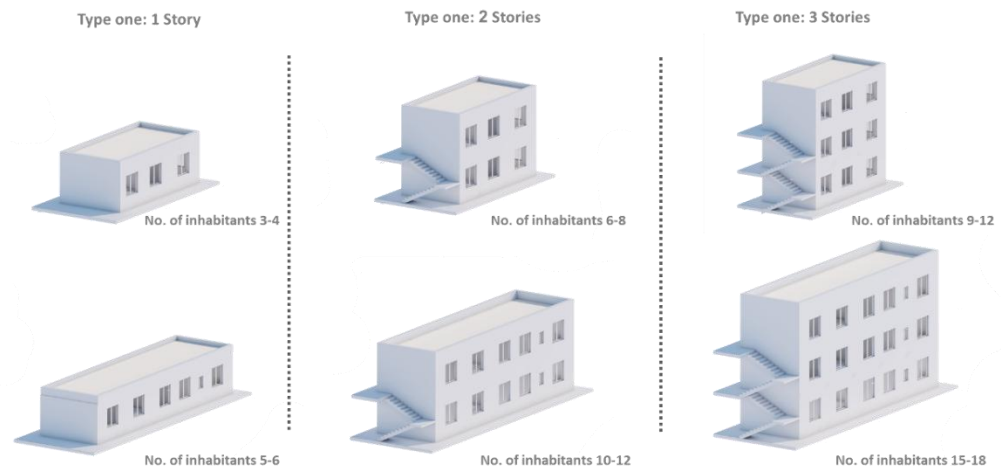
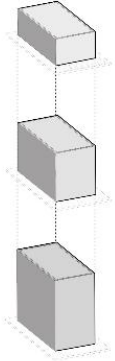
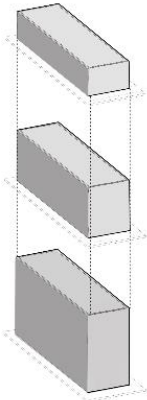


Figure 41: Proposed housing units' modules inhabitants (Source: The Author(2024))

50m² units



100m² units



Configurations

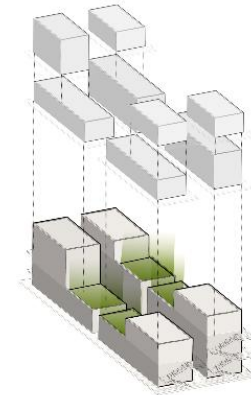
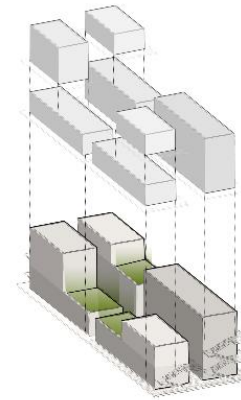
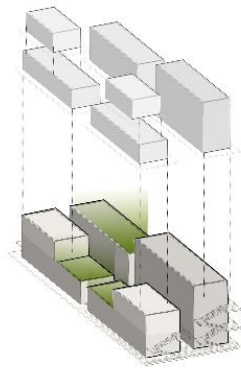
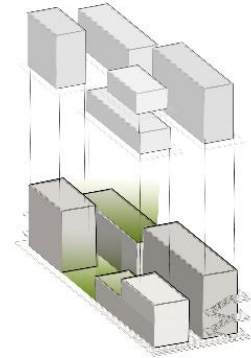
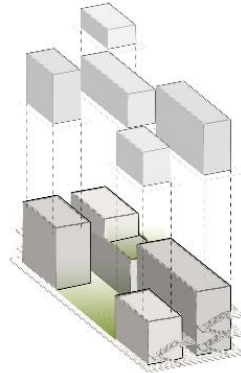
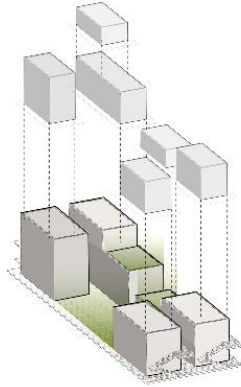


Figure 42: Proposed housing units' configurations (Source: The Author(2024))

As part of the upgrading strategy, some housing units that are in poor condition will be demolished and replaced, while those in fair condition will be preserved and rehabilitated. The Al-Hussein refugee settlement accommodates a total of 2,610 housing units. Among these, 91.2% are categorized as being in fair condition and will be rehabilitated. In contrast, the remaining 8.8%, which includes units with board cladding and metal sheet roofing (0.01%), brick walls with metal sheet roofing (1.5%), and those in poor condition (7.3%), will be demolished. This amounts to approximately 39 units (Figure 43

Figure). The diagram below illustrates the stages of intervention and how it can be carried out. The proposed design chooses one 24-block area from the block; these plots will have to be temporarily displaced. The second stage will be either upgrading or replacing the housing units based on their classification and according to the second guidelines for housing unit designs. Finally, the inhabitants can reinhabit the upgraded section of the settlement. The proposed solution can introduce a more organised urban pattern while addressing the main challenges facing the current situation.

The demolished units will either be replaced with open shared living spaces or reconstructed according to the proposed guidelines. This approach aims to improve the living conditions within the settlement and address issues of density and overcrowding while motivating a sense of community and belonging among residents.

With a total population of 33,057 residents, the planned demolition of the 39 housing units categorized as having brick walls with metal sheet roofing (1.5%) represents approximately 0.12% of the population, which translates to homes for around 165 individuals. This proposed intervention is not expected to decrease the overall population but will reduce residential unit density by reallocating built-up areas toward shared living facilities, such as kitchens, sanitation blocks, and communal gathering spaces. This shift will improve access to essential communal infrastructure. The challenge of relocating affected residents can be managed through incremental housing solutions and by standardizing the neighbourhood layout to minimize displacement as much as possible (Figure 44).

24

SETTLEMENT PLOTS

GOOD CONDITIONS

FAIR CONDITIONS

POOR CONDITIONS

INTERVENTIONS

UPGRADING

PARTIALLY DEMOLISHED

DEMOLISHED

58

HOUSING UNITS

16.6%

SHARED LIVING SPACES

12.5%

OPEN SPACES

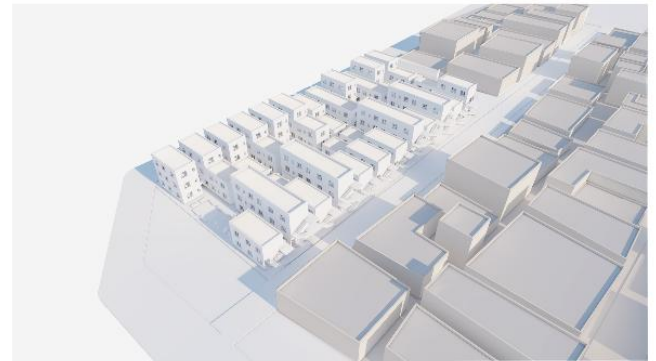
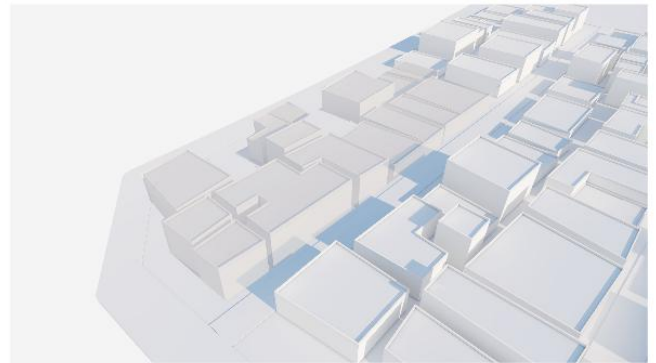
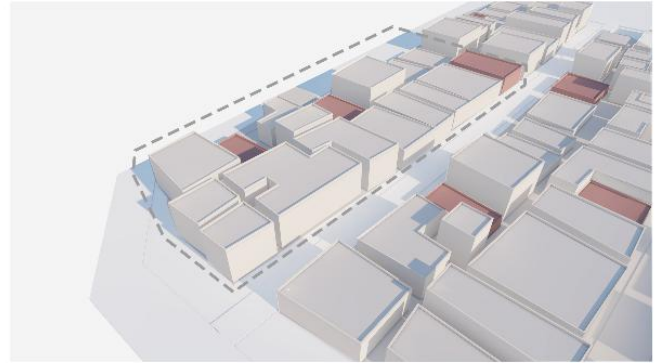


Figure 43: Upgrading stages (Source: The Author (2025))

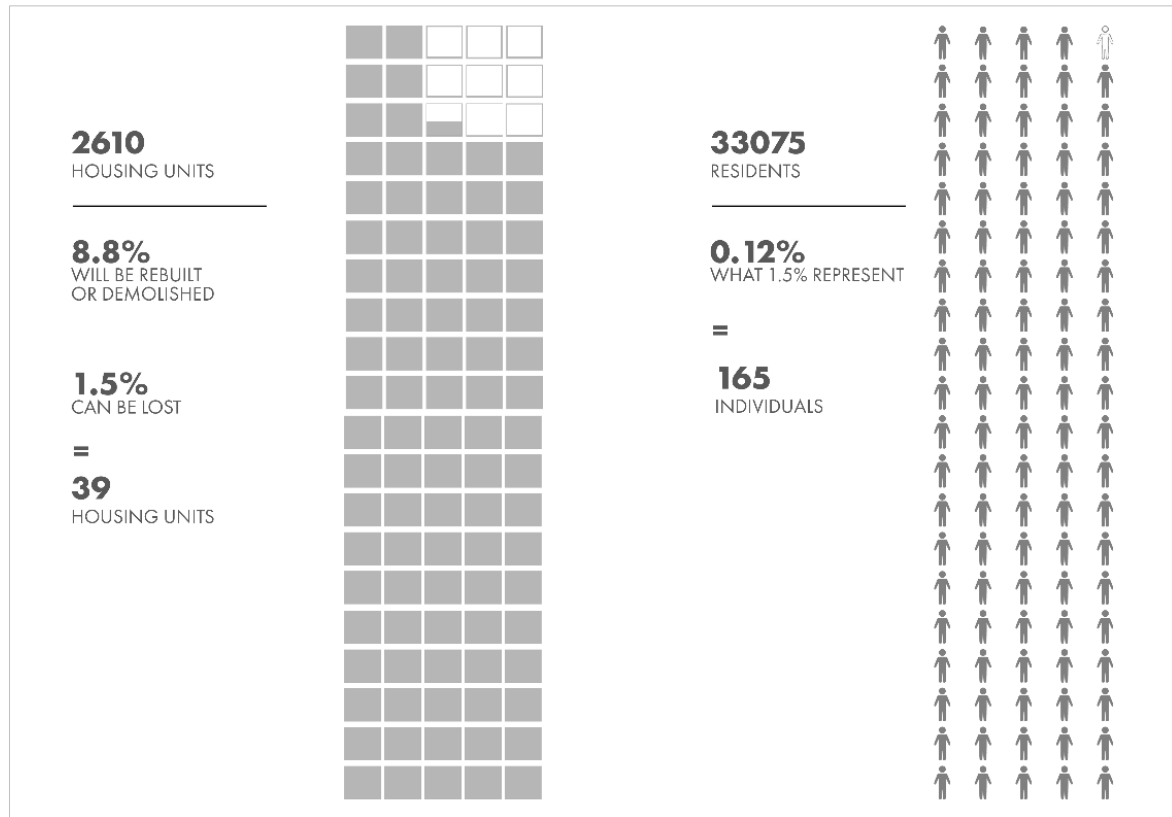


Figure 44: Post intervention statistics (Sources: The Author (2025))

This chapter elaborated on the design strategies proposed for the design of the housing units. All strategies presented aim to improve the quality of living by upgrading the existing units in addition to introducing new order and planning systems. The proposed plan relies on a systematic and standardized design that can be adaptive to the situation of the settlements. The first step is the classification of the existing units based on the classification system; the second step is to implement the guidelines suitable for each case. This classification of housing units and guidelines is presented in the table below (Table 4), for each relative variable there is a set of guidelines derived from the previously mentioned strategies that are suited for this category of variables.

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Creating neighbourhood layouts based on shared living spaces on the ground floor areas and communal outdoor spaces for the public in between houses, on certain streets in between the buildings, sometimes on top of carefully chosen units can enhance positive social interaction and provide open spaces for the use of the inhabitants. These interventions on one hand may result in losing a certain amount of living units in the whole but may create benefits by improving these social activities on the other, as well as letting more air in urban-wise among different blocks of chosen building units.

The dissertation proposes a modular housing configuration that integrates shared living space as well as communal outdoor space. This approach provides a flexible shared spaces that can contribute to the spatial organization of the housing units. In addition, introducing open spaces can help reduce the high density of such settlements and encourage communal interactions for a more community-oriented settlement.

Table (4): Units classifications and guidelines (Source: Author)

Relative variables	Absolute variables				Guidelines
Stories	Plot size				
1	100-50m ²	100-50-1	100-50-1	100-50-1	Opportunity for incremental building of housing units Spatial arrangement Provision of natural light and ventilation Provision of shared open spaces within the floors
2	100-50m ²	100-50-2	100-50-2	100-50-2	Opportunity for incremental building of housing units Spatial arrangement Provision of natural light and ventilation Opportunity of shared open spaces within the floors
3	100-50m ²	100-50-3	100-50-3	100-50-3	Spatial arrangement Provision of natural light and ventilation Opportunity for shared living space in ground floor

Relative variables	Absolute variables				Guidelines
Physical conditions	Plot size				
Poor	100-50m ²	100-50P-1	100-50P-1	100-50P-1	Material reinforcement using local materials Rearranging floor plans Installation of doors and windows Reconstructing exterior walls using local material Placement of vertical circulation Can be demolished for open space or reconstruct following the regulation
Fair	100-50m ²	100-50F-2	100-50F-2	100-50F-2	Installation of doors and windows Insulation enforcement Building exterior facades Placement of vertical circulation Can be partially demolished for open space or reconstruct following the regulation
Good	100-50m ²	100-50G-3	100-50G-3	100-50G-3	Insulation enforcement Spatial optimization Standardization Contextualization Rearrange following the regulation as much as possible

6. Discussion and Conclusion

This study explored how urban policies can facilitate the upgrading of refugee settlements in Amman, with a particular focus on housing unit design as a tool for transforming these areas from marginalized informal camps into integrated and functional urban neighbourhoods for future use as a housing development. The research examined the history and culture of the settlement and their transformation from temporary refugee camps into informal settlements. By proposing a design and upgrading framework, the study aimed to improve the living conditions of residents. Using a qualitative methodology, the study progressed through several phases. The theoretical foundation was established via a comprehensive literature review and policy analysis, followed by an observational field study that examined the physical and environmental conditions of refugee housing. Al-Hussein Camp was chosen as the case study due to its central location and historical significance. Field visits and interviews with stakeholders provided key insights into the challenges of the built environment and the planning process. A housing block of the camp was mapped and analysed in detail as a study sample to form the basis of the proposed upgrading plan.

The upgrading plan concludes a set of design guidelines aimed at addressing the challenges identified during the analysis. These guidelines focus on upgrading the quality and functionality of housing units. They include the use of local materials for reinforcing and reconstructing structures, optimizing floor plans to make better use of space, and improving natural light and ventilation through the installation of proper doors and windows. Shared open spaces are integrated within building floors to promote social interaction and provide open spaces within the density of the settlement. Vertical circulation such as staircases is carefully placed to improve accessibility, while insulated walls are enforced to enhance the indoor environment. The design also allows for incremental building, enabling residents to expand their homes over time. Standardized modules can be used as a reference for future upgrading plans. To ensure this upgrading is structured and sustainable, a set of clear regulations is proposed. These include specific building setbacks of 1.2 and 0.8 meters from the sides, with no setback required from the front or back to maintain the existing street-facing character. Building exteriors are to be finished with plaster for a cohesive and durable cladding, and a maximum height of three stories is enforced to manage density. Crucially, the plan mandates the provision of open areas within each neighbourhood to avoid disorganized, clustered expansion and ensure community access to green space. Furthermore, all incremental building must adhere to the proposed design models to guide organised growth and maintain structural and aesthetic integrity.

The proposed framework is not limited to physical improvements; it can present a plan of how refugee settlements can be reused within the city. By replacing and rehabilitating deteriorated and overcrowded units with standard-designed housing that integrates into the existing urban fabric. It also improves the process of the transition from temporary shelter to permanent,

providing a stronger foundation for community development, improved infrastructure, and social cohesion. Moreover, this approach has strong potential for application in future studies and similar contexts. Its modular, adaptable framework can be adjusted to fit different settlement conditions, making it a valuable model for other informal or refugee areas facing similar urban challenges. By offering practical, scalable solutions, the study contributes not only to academic discourse but also to urban development strategies.

From an architectural point of view, the core method of the study focuses on the urban context and incremental design. Its primary goals include enhancing the functionality and quality of life within existing settlements and preserving the essence of the urban fabric in a more organised manner. The upgrading plan introduces proper design tools while taking into consideration the social and cultural levels. The valuable contribution is the ability to utilise the formality of the settlement's history of planning to upgrade the informal outcome of the built environment. Preserving the nature of the urban fabric of the camp in an upgraded strategy is not only a practical solution but also a recognition of its value. The built environment layout, scale, and density of the camp have evolved into a form of urban heritage, which has a deep meaning for its inhabitants, representing their resilience and identity. Maintaining and enhancing this built environment ensures that redevelopment does not erase the history or community structure that have formed over decades. From an architectural perspective, this includes respecting spatial relationships, human scale, patterns of circulation, and the integration of communal open spaces. The proposed design seeks to preserve the urban structure of clustered units, reflecting the traditional vernacular architecture of the refugees' original village. The urban morphology has its roots in the original camp design and the self-built houses; therefore, it is important to maintain its core structure, which consists of the layout and clustered arrangement of the units. From the financial aspect, the feasibility of the proposed upgrading strategy in Jordan mainly depends on the support of international aid and non-governmental organisations (NGOs). Additional key sources are the organisation responsible for the camps in Jordan, which is the UNRWA. Moreover, the United Nations and global development organisations that are actively involved in refugee support and urban development can be a help. These entities can provide both financial resources and technical expertise to guarantee the implementation of an upgrading initiative. Other forms of support, such as public-private partnerships, governmental contributions, or community-led initiatives, can make a difference. This financial situation can be considered the main limitation in executing a plan on this scale. While it is challenging to find the source of funding, the result can benefit all the parties involved.

In conclusion, this research highlights the importance of transforming refugee settlements by enhancing their environments instead of displacing communities. The goal is to preserve their social structures while addressing future urban needs. Ultimately, we aim to change the narrative from one of marginalization to one of opportunity—transforming refugee camps into inclusive, sustainable, and liveable neighbourhoods that benefit both residents and the larger urban context of Amman.

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7. Appendix

7.1. Interviews

7.1.1. Dr. Fatime Al Nimri

Dr Fatima Al Nimri is a researcher in the field of Palestinian refugee camps in Jordan with multiple publications in her name, my main goal of this interview is to understand her approach to research and gain insight into refugee camps in Jordan and their history. The interview itself was conducted as an open discussion rather than a question and answer.

The questions:

- What was your general approach to studying refugee camps?
- What is the role of UNRWA in upgrading programs?
- Advice on moving forward with camp research?
- what is the methodology in analysing refugee camps and presenting solutions?

Summary of the answers:

Dr. Fatima presented an important argument about the status of the refugees and to serve the Palestinian cause the refugees should not take homes outside Palestine; at the same time, it is important to provide a liveable environment for them until then.

She also provided reference and statistical references where I could find the numbers I needed regarding the camps.

She also presented her research about Talbyie camp, and the community participation approach she studies there. In addition, she mentions the emergency rooms initiative and its negative impact on the clustering of refugee camps.

7.1.2. Eng. Shadi Alyan

Eng. Shadi Alyan is the head of the planning and projects department in DPA on the ongoing projects.

The questions:

- What are the latest statistics available regarding the camps?

He provided the latest reports in the form of online links.

- What are the main policies in administering the camp?

The DPA is a governmental sector which was established to monitor and administer the camps, they are involved in the construction and the regulation of the construction as well, but not the residents themselves.

- What are the current ownership policies?

The land is rented by the Jordanian government to the UNRWA by a long-term agreement. The residents of the camp are only registered in the UNRWA records, but they can sell their spot in the camp within these regulations.

- What are the main construction regulations in the camps?

Mainly the houses in the camp are not allowed to use stone cladding.

In the 1970s concrete was allowed to be used as construction material

In the 1990s a third floor was allowed, so now the maximum height is three stories.

- What is the Housing Rehabilitation project?

The housing rehabilitation project is an initiative by the DPA to help hardship cases in the camps. The main concept is to build basic amenities and leave the rest of the land for the owner to continue. (a sketch was provided)

In addition, the initiative focused on providing concrete slabs to replace metal sheet roof cladding.

Eng. Shadi also provided me with the AutoCAD drawing of the layout of all ten recognized camps in Jordan.

7.1.3. Dr. Wael Al-Azhari

Dr Wael Al-Azhari is a professor at the University of Jordan with various published papers in urban planning and architecture and one study on the Al-Wehdar camp in Amman. The discussion with Dr. Wael was to clarify the methodology and to further understand the nature of refugee camp housing.

These are the main points of discussion:

- Clarify the terminologies of low-cost housing and minimum set housing
- Discuss cases of affordable housing in Amman and how they affect the urban planning of the city and did they succeeded in establishing such development.
- Discuss the concept of co-housing and shared living space within the culture of Amman.
- Important points of the study such as the reality that the inhabitants are now the third generation which can affect the sense of belonging, and how it changes the socio-economic structure of the camp during these years.
- The morphology of the settlements and how they can be a part of the city.
- Discuss how to implement the set of guidelines that can presented as a conclusion of the study

7.1.4. Al-Hussien camps residents

I interviewed a number of residents of Al-Hussien camp, they preferred to stay anonymous. The result of the interviews can be summarized into these points:

- Ownership of the land and their ability to sell their house and move out. They stated that they could sell their house and move out since they have Jordanian citizenship, some of the residents displayed their intention to stay in the camp even if they had the opportunity to leave and that was mainly because they wanted to stay as a part of the social structure.
- Regarding the construction methods and techniques. The residents said mostly they rely on their own people to construct new structures; they use available materials, and they design spaces on what they see suitable. They try to optimize space usage, but the lack of knowledge and resources can cause a lot of issues regarding this matter.
- The main problem they face is the lack of space both indoors and outdoors. No insulation which causes a lot of issues with the building materials. There is no planning which leads to chaos in most cases. No natural light or ventilation in most of the clustered houses.
- They said most of the inhabitants are still of Palestinian refugee descent, around 90% in addition to some illegal immigrants and low-income population who are renting rooms in the camp.
- One resident who is working as a contractor described the spatial arrangement of the housing units and how most of the houses are planned that way and he provided a sketch representing the plan of the unit.
- Another resident described the bad situation of the lack of natural light and ventilation and the poor planning of her unit which accommodates a big family.

7.2. Field study photos

These photos were taken by the author on the span of three years (2021-2022) visiting the camps site on different occasions. The main goal was to capture as much information as possible during these visits.

7.2.1. Al-Hussien camp

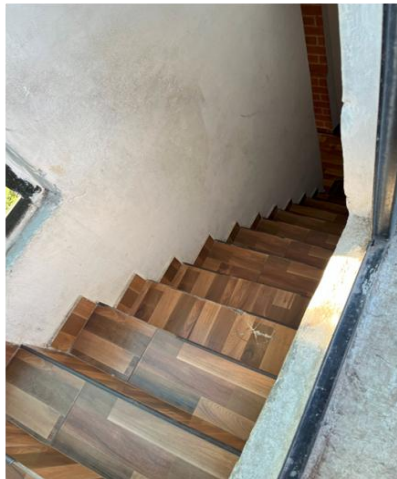
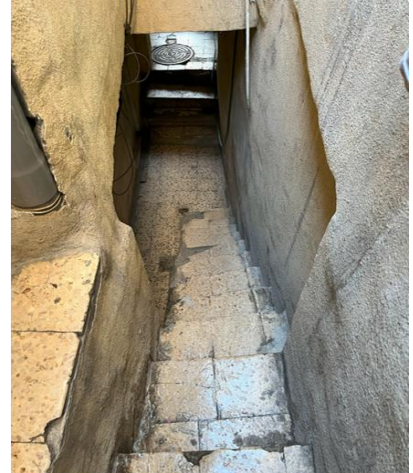
Al-Hussien camp was the main case study the dissertation. This camp is one of four camps established in Jordan. The camp was set up in 1952 for 8,000 refugees with 33057 inhabitants currently on an area of 0.42 square kilometres, north-west of Amman. The field visit was in three stages in 2021, 2022 and 2023. First to study the urban typology and second phase to study the housing units and their interior as well as interview the inhabitant.



Typology and Areal view of the camp (Source: The Author 2021)



Commercial street and services (Source: The Author 2022)



Housing units survey (Source: The Author 2023)

7.2.2. Al-Wehdat Camp

Al-Wehdat camp is one of the largest and highly populated camps in Jordan with 60287 inhabitants on 0.48 square kilometers south-east of Amman. The camp was visited in 2021, and pictures were taking mainly for the build enviroment.



Typology of the camp (Source: The Author 2021)

7.2.3. Al-Baq'a Camp

The camp, which is the largest in Jordan, lies about 20 kilometres north of Amman with 128586 inhabitants. The camp was visited in 2022 and the visit mainly focused on observing the housing units of this large camp. It was raining beforehand, so it was good opportunity to observe the infrastructure as well.



Typology of the camp (Source: The Author 2022)



Areal view of the camp (Source: The Author 2022)



7.2.4. Hitten Camp

The camp was established on an area of 0.92 square kilometres with 59597 inhabitants, 10 km northeast of Amman. The site was visited on 2022 to capture the housing units conditions within a camp near the city center of Amman.



Typology of the camp (Source: The Author 2022)

8. Masterwork

NERC the first net zero building in Amman

Author: Rania Matrouk

Project description

Location: Ahmad Al Tarawneh St. 70 Al Jubaiha, Amman- Jordan

Year of design: 2016

Construction started: 2020

Architectural office: Dabbas Architectural Office

Architect in chief: Imad Al-dabbas

Co-Designers: Senior architect Lara Asa'ad and Arch. Rania Matrouk

Area: 2660 sqm2

Client Royal Scientific Society RSS

The National Energy Research Centre (NERC) is part of the Royal Scientific Society (RSS), this centre is dedicated to research, development, and training related to new and renewable energy sources. NERC aims to standardise energy usage across various sectors and promote the adoption of renewable energy in Jordan. NERC is actively involved in EU programs that focus on developing new energy-efficient technologies and techniques while transferring knowledge.



Figure 1: Building visualization (Source: Imad Al-Dabbas Office (2016))

Dabbas Architectural Office was the main designer for this project. Considering that the building is primarily dedicated to research on energy and sustainable development, it was essential to ensure that the design followed the same principles. The design team focused on incorporating both sustainable design techniques and contemporary aesthetics simultaneously. It was important to highlight the importance of building in its architectural image.

The morphology of the masses originated from a cube that has been divided based on the functional use of the zones. The concept was to ensure the optimal utilization of the space in addition to integrating the different functionalities within a distinctive architectural design. To distinguish the building's vertical circulation of the building, an axis from free-standing walls was created to dominate the cubical masses.

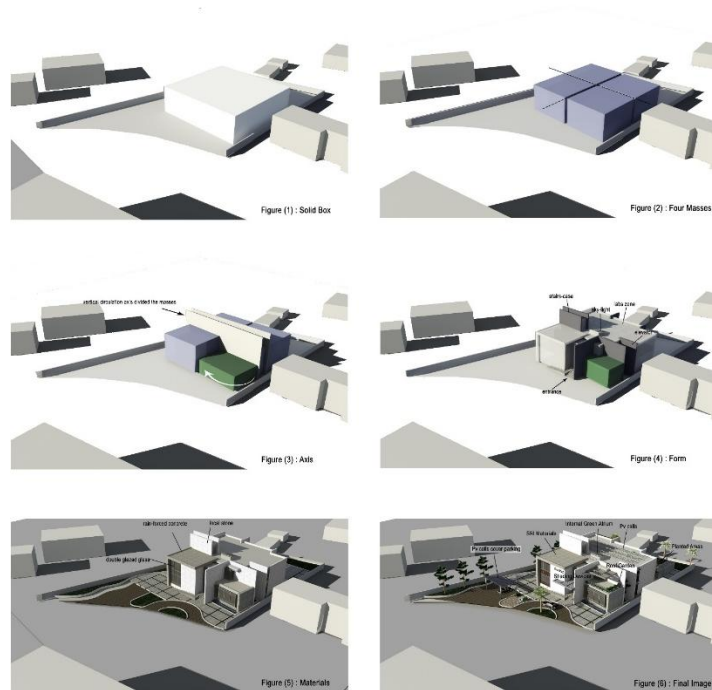


Figure 2: Conceptual diagrams (Source: Imad Al-Dabbas Office (2016))

The building hosts various functions, as it acts as a research centre as well as an academic facility. The main zones of the building are the academic, administrative and research. Each of the zones consist of sub-function that serve its purpose. On the ground floor you find the more public functions placed on the front side, which are the main lobby, training/ lecture hall and a café lounge. On the back side right after the vertical circulation you find the more private functions of the research centre which are the labs distributed based on their types. Going to the first floor there are the administrative office, workshop, and a private library. On the basement mainly the rest of the workshops and additional offices were placed there.

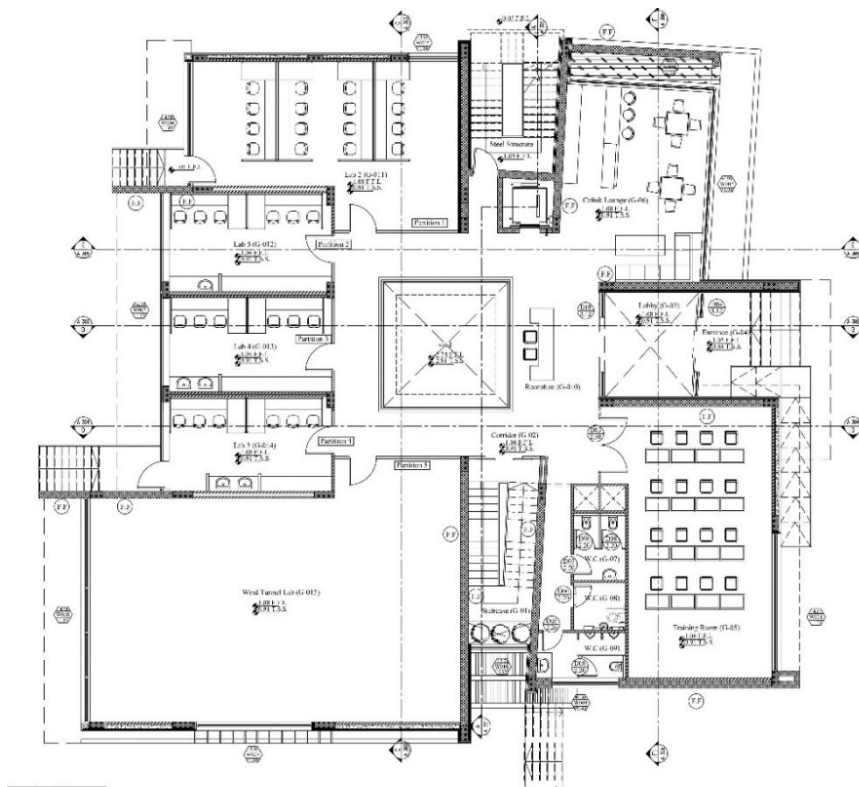


Figure 3: Floor plan (Source: Imad Al-Dabbas Office (2016))

The design team based their sustainable design on the Jordan Green Building Guide. This guide aims to set up a private green building in Jordan codes and clarify the technical and artistic standards necessary to get to the sustainability requirements in buildings and evaluated in Jordan for reducing water and energy consumption, environmental impact of buildings on the surrounding environment, minimise building materials impact and encourage recycling after occupancy. The guide categorizes the Green Building Criteria into six main categories, spanning from the initial stages of design to post-occupancy of the building. The design process for NERC followed these criteria right from the early stages of design research. These categories were implemented as followed:



Figure 4: Building visualization (Source: Imad Al-Dabbas Office (2016))

Sustainable site

As for the site selection the project is located in the Royal Scientific Society, which is considered an urban area with existing infrastructure to protect agricultural land and protected areas for environmental and natural resources. Concerning community connectivity, the site is considered well-connected to the available services within a 1 km radius zone and well-connected to the public transportation network near Queen Rania Al-Abdallah Street.

Regarding the development of the site itself, the design made sure to maximize open spaces, use of the local vegetation and the implementation of green areas within the building. The design utilized 25% of the land and green zones in order to reduce the building's footprint. To achieve a lower Heat Island, effect the building uses Low Solar Reflectance Index (SRI) material for flooring and roofing and reduces the hardscape effect by shading through planting trees. The design was conscious of the light and noise pollution and tried to reduce outdoor light and use trees as a noise control buffer. Meanwhile, the design should take into consideration the aesthetic of the building, at the end of the day, it is important to create a comfortable environment to look live and work.

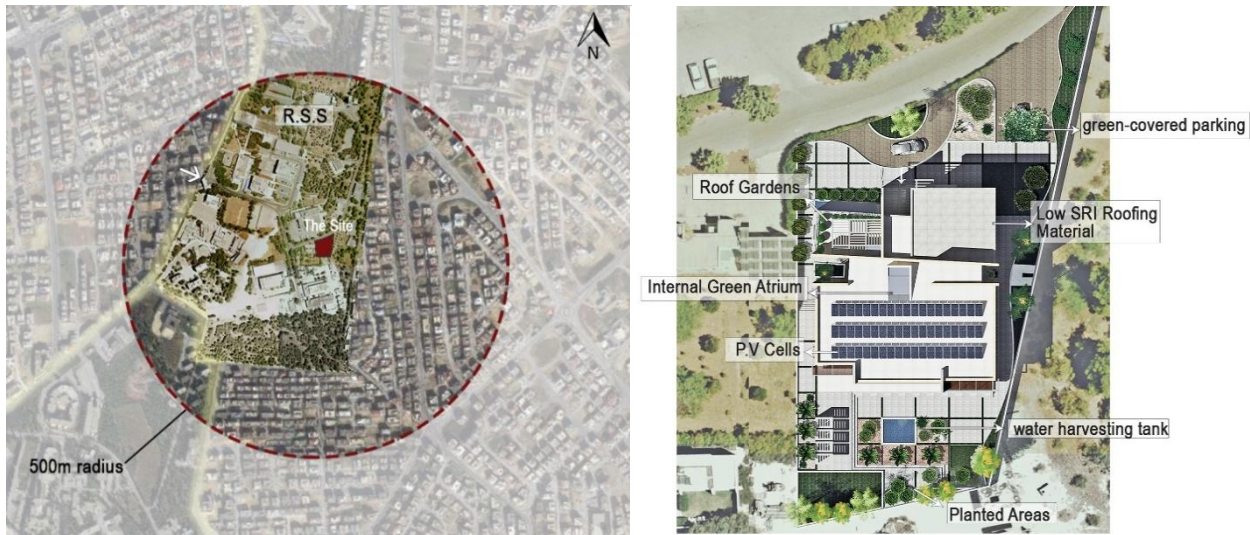


Figure 5: Site analysis and site plan (Source: Imad Al-Dabbas Office (2016))

Energy Efficiency

The main focus of the project sustainability is achieving energy efficiency. The goal is to create a Net Zero Energy Building, which is a building with zero net energy consumption, meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on the site. The key to designing net zero energy buildings is first reducing energy demand as much as possible and then choosing good energy sources. This can be accomplished by applying these strategies: reduce energy loads, optimize design for passive strategies, optimize design of active systems, recover energy and generate energy on-site. The design employs a combination of passive and active methods to optimize energy consumption. Passive techniques are prioritized, with the building-oriented North-South to maximize natural light exposure. Trees are strategically planted on the southern side to provide shade and act as windbreakers. Thermal insulation is incorporated into the building envelope in accordance with Jordan's national building codes to enhance energy efficiency. Building openings are minimized on the east and west sides. The material U-value for the southern elevation is 1.6 watt/m².k, and the visual lighting transmittance for the windows is 0.45. Shading devices play a crucial role in passive design, with horizontal louvres designed for the south elevation to mitigate high-angle sunlight, while vertical louvres are utilized on the east and west elevations to combat lower-angle sunlight. The shading coefficient of these devices is less than 0.2. The design prioritizes the optimization of natural light and ventilation to enhance overall energy efficiency, particularly in the warm climate of Amman.

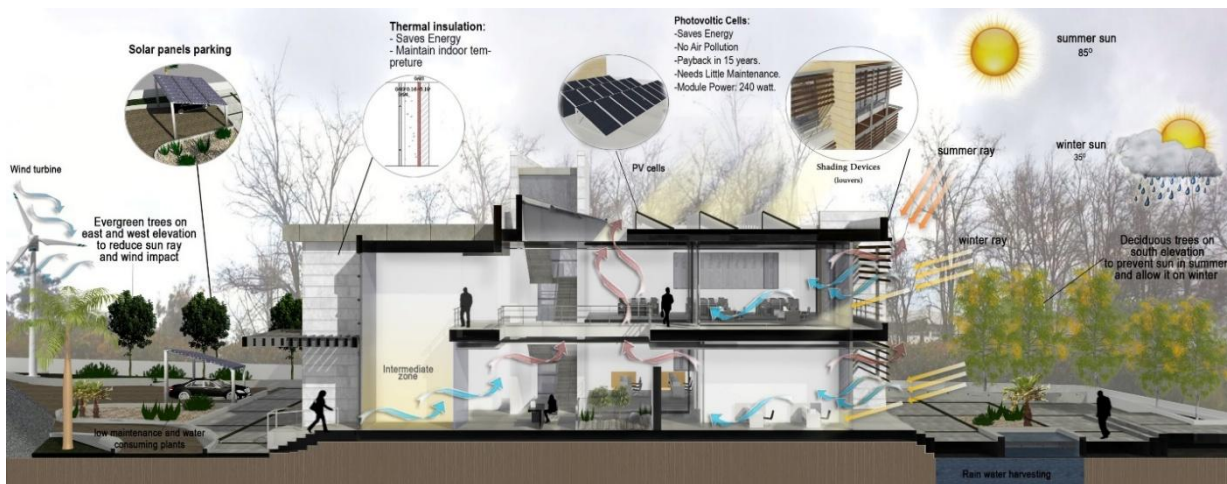


Figure 6: Section presenting sustainable features (Source: Imad Al-Dabbas Office (2016))

Zero Net Energy Building

PV SYTEM ANALYSIS

Based on planned installed electrical load as estimated by the MEP consultant and the projected usages patterns, the followings assumptions are as follows:

ESTIMATED ELECTRICAL CONSUMPTION

Demand Electrical Load	200KW
Daily Consumption	560 KWH
Yearly Consumption	162000 KWH

ASSUMED TECHNICAL PARAMETERS

Panel Type	Poly Crystalline
Panel Tilt Angel	15 Degrees Towards South
Panel Efficiency	Min. of 15%
Panel Expected Yearly Degradation	0.8%

ECONOMICAL ANALYSIS ASSUMPTIONS

System Capital Cost	JD1000/KWp
Replacement Cost	10% of initial capital cost after 10yrs
System Lifetime	25 yrs.
Cost of Electricity	JD 0.13/KWH

ECONOMIC RETURNS

Estimated yearly power cost	JD21000
Estimated System Size	93KWp
JD/KWp	JD800-1000
Initial Capital Investment	JD74400-93000
Pay Back Period	Approximately 3.5-4.4 yrs. And also depends on the KWH rate.

<u>Notes:</u>			
Project Area			1,340m ²
Estimated Daily consumption (kW.h/day)			562
Estimated Monthly consumption (kW.h/month)			13,499
Estimated Yearly consumption (kW.h/year)			161,986
Size of PV system (kW Peak)			93.47137219
YEARLY POWER COST			21058.1654
RETURN ON INVESTMENT IN YRS	(ROI)	AT JD1000/KWp	4.43872342 YEARS
		AT JD800/KWp	3.55097874 YEARS

Water efficiency

Water efficiency is a cornerstone of the building's sustainability initiatives, encompassing various strategies to conserve and responsibly utilize water resources. Rainwater harvesting is facilitated through the installation of tanks for irrigation and toilet flushing, supplemented by maximizing solid surfaces to optimize rainwater collection. Landscaping and irrigation prioritize the use of high-efficiency plants and dripping irrigation systems, complemented by rainwater harvesting for irrigation purposes. Water-saving devices, such as high-efficiency mixers and self-closing taps, are implemented to minimize water wastage in lavatories and kitchen sinks. Greywater systems are integrated to recycle water from sinks and showers for non-potable uses. Additionally, water consumption is carefully monitored through the installation of meters for both domestic and non-domestic water usage, including separate meters for irrigation systems. These initiatives collectively aim to reduce water consumption, alleviate pressure on local water sources, and promote sustainable water management practices within the building.

Technical drawings

Proposed Site plan

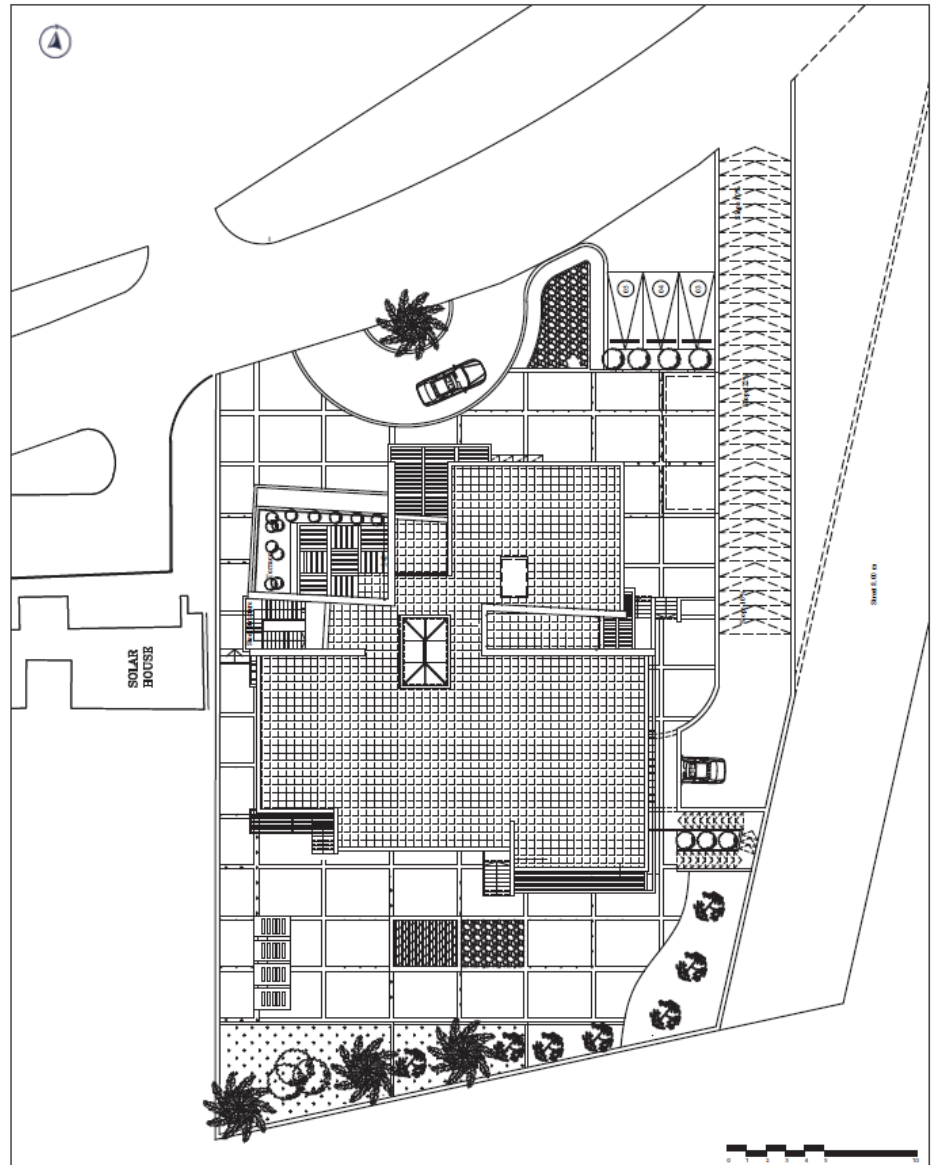


Figure 7: Site Plan (Source: Imad Al-Dabbas Office (2016))

Proposed Ground Floor

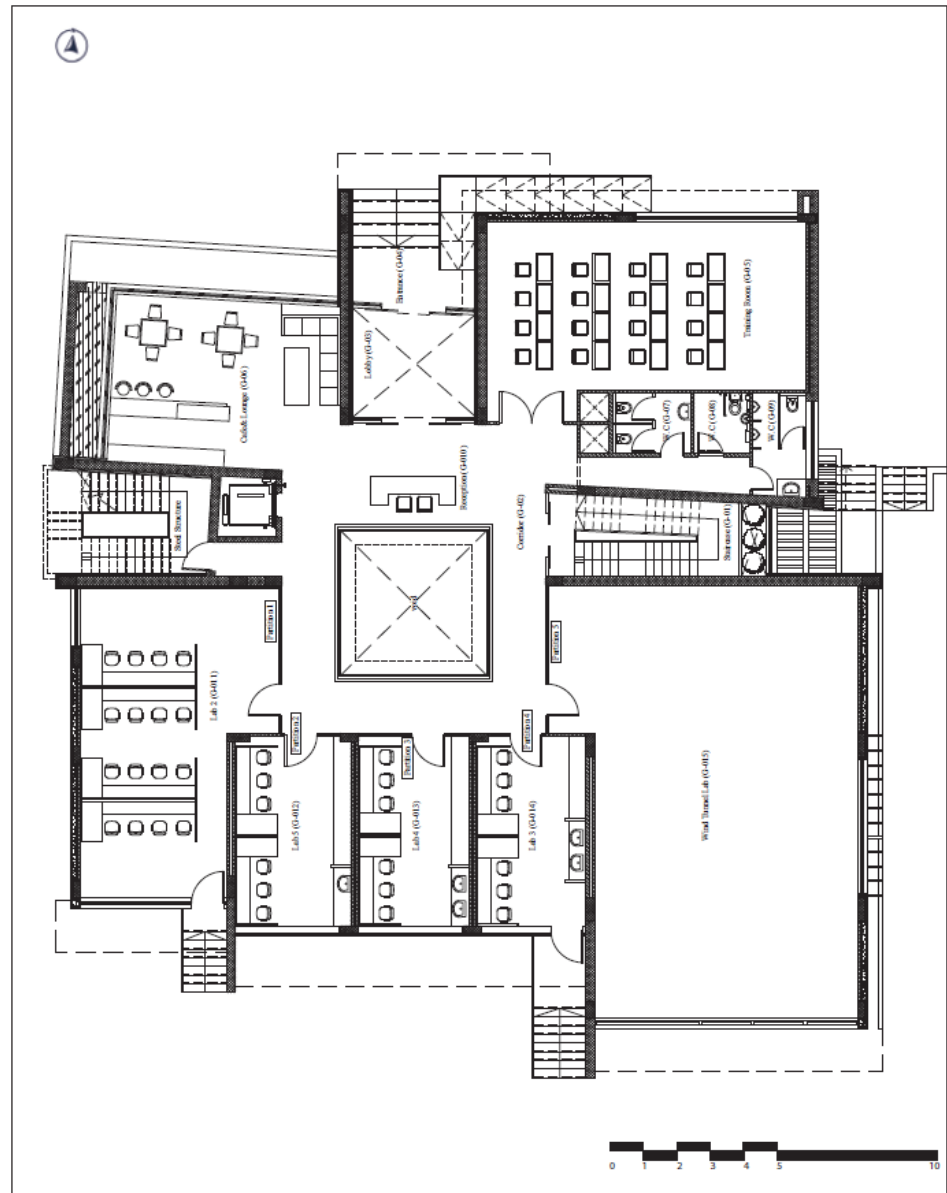


Figure 8: Ground Floor (Source: Imad Al-Dabbas Office (2016))

Section A-A

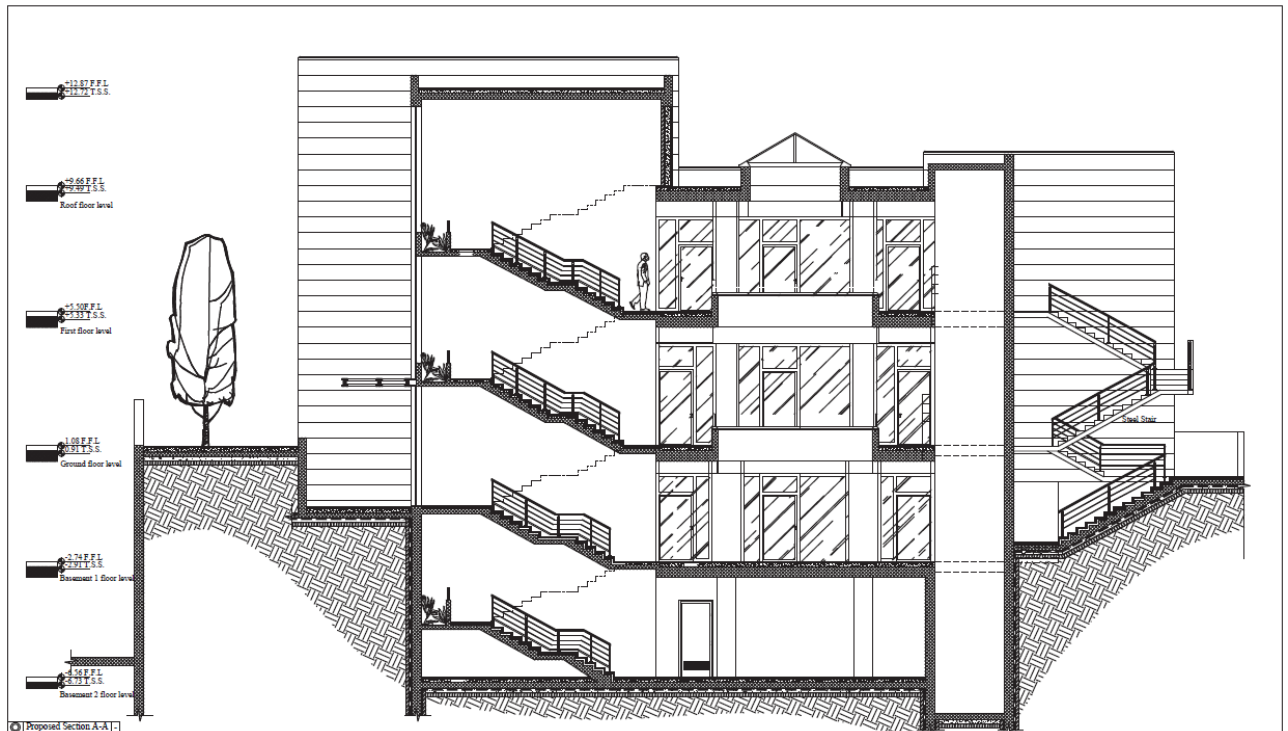


Figure 9: Section A-A (Source: Imad Al-Dabbas Office (2016))

North Elevation



Figure 10: Noth Elevation (Source: Imad Al-Dabbas Office (2016))

Construction phase

The building's construction utilizes materials that are sourced locally, which is in line with the goals of sustainability by reducing the environmental impact. The combination of reinforced concrete, brick walls, and Ma'an stone cladding ensures that the building is both robust and visually appealing while blending in with its surroundings. As the construction project nears completion, the next stage is the finishing phase. This step involves adding the final touches, both inside and outside the building. These tasks include painting, installing flooring, plumbing and electrical work, landscaping, and any other remaining tasks required to complete the construction project and create a functional and welcoming space for occupants. Additionally, the use of sustainable construction practices highlights the commitment to environmental responsibility throughout the project's lifecycle, which is commendable.

In conclusion, the National Energy Research Centre (NERC) in Amman stands as an icon of sustainability and innovation, representing a significant step towards achieving net zero energy consumption in Jordan. As part of the Royal Scientific Society, NERC not only conducts vital research on renewable energy but also sets a high standard for sustainable building design and construction practices.

The project has been guided by a commitment to sustainability, evident in its adherence to the Jordan Green Building Guide and incorporation of green building criteria. The design process prioritized energy efficiency through a combination of passive and active strategies, including optimized orientation, thermal insulation, shading devices, and renewable energy sources like photovoltaic cells and wind turbines. The result is a building that not only minimizes its environmental footprint but also serves as a model for future sustainable development projects.

Moreover, water efficiency measures, such as rainwater harvesting and greywater recycling, further contribute to the building's sustainability goals, while the use of locally sourced materials underscores a dedication to reducing environmental impact throughout the construction phase.

As NERC pioneers the way forward in sustainable building practices, it sets a precedent for future developments in Jordan and beyond, demonstrating that environmentally responsible design is not only feasible but also essential in the fight against climate change. With its net zero energy consumption target and commitment to sustainability, NERC exemplifies the transformative power of architecture to create a greener, more sustainable future for generations to come.



Figure 11: Construction phase (Source: Imad Al-Dabbas Office (2021))

