# Social Area versus Private Space: Exploring Interior Layout Approaches in Tehran's Current Housing (A Case Study of District 9 Residential Units, Tehran, Iran)

This study examines the prioritization of collective versus individual space in contemporary urban housing in Tehran, focusing on District 9. A quantitative analysis of interior floor plans assessed the distribution between social area (living room, dining room, salon) and private space (bedrooms). Despite excluding open kitchen, social area averaged approximately 45% of space compared to 25% for private bedrooms. Bedroom sizes frequently approached or fell below mandatory minimums, while social area occupied the largest proportion of space.This lack of emphasis on private space occurred not only in smaller units but also in many larger ones with more generous overall area. Other interior spaces like bathroom were often limited to minimum area and positioned to enhance social area functionality. In units smaller than 75m², space distribution was more balanced due to adherence to mandatory regulations. However, in larger units, the tendency towards disproportionately larger social area was more pronounced, with over half featuring only two bedrooms. The findings suggest that the preference for collective activities and family interactions significantly influences Iranian home design in District 9, as evidenced by prevalent large social area and comparatively smaller private space. This study underscores the need for residential designs that harmonizing traditional Iranian values with modern privacy requirements.



## Research Background

### Introduction

Historically, settlements have been influenced by the necessity to conform to societal standards and lifestyles[1]. The outside environment that humans create for themselves reflects their inner state[2]. It shows how social needs will build the living environment. Therefore, housing design and architectural changes have always depended on socio-cultural conditions and people's lifestyles.

The increase in urbanization and costs currently leads to various restrictions for people, especially in metropolitan areas. In densely populated cities like Tehran, the size of residential units and urban land plots is shrinking, restricting people's ability to choose housing that aligns with their cultural and social conditions. Besides

[1]Mahta Mirmoghtadaee, "Process of Housing Transformation in Iran," *Journal of Construction in Developing Countries* 14, no. 1 (June 1, 2009): 69–80.
[2]Seyyed Hossein Nasr, *Islamic Work Ethics" In Traditional Islam In The Modern World* (Kegan Paul International, 1987).

Tehran's high housing prices, the drops in family size have prompted people to move into smaller homes[3].

The new lifestyle has impacted the design of the interior spaces in residential units[4]. This study analyzed the internal layout of contemporary housing in District 9 of Tehran. We focused on the "social area" and "private space" in current residential units to determine whether the existing layout is compatible with the residents' lifestyles. We discussed how to make the interior layout adaptable to meet the changing needs of various residents over time.

## History of Housing and its Various Spaces in Iran

In Iran, most traditional houses were introverted, focusing inward. All the rooms were organized around a rectangular courtyard that connected the house's various areas. In traditional Iranian houses, rooms were not named according to their function, such as a living room, dining room, or bedroom (see a courtyard house in Yazd, Figure 1). Rooms rarely served a single function. The house's main room, known as "Panjdari" (meaning a five-door room), served as a main reception area, also referred to as "salon," and was the most decorated room in the house[5]. "Orosi," another significant room with a high ceiling, was used for special guests and ceremonies. "Seh-dari," a room with three doors, functioned similarly to a living room; the decoration here was simpler than in Panjdari[6]. The family's daily activities- including eating, sleeping, and socializing- typically took place in Seh-dari, which had basic decorations. Close relatives and visiting neighbors were also entertained in this room[7].



[3] Yaser Rahmaniani, Asghar Mohammadmoradi, and Homeira Asgari, "Explaining the Main Indicators for the Proliferation of Small-Scale Housing in Metropolises: A Survey of Residents' Perspectives in the Nawab Area of Tehran Review [ تبیین میزان اثرگذاري شاخصهاي زمینه ساز بر گسترش تقاضا براي سکونت در مسکن کوچک مقیاس در کلانشهرها: بررسی دیدگاه ساکنین محدوده نوابِ شهر تهران]," *Quarterly Journals of Urban and Regional Development Planning* 5, no. 12 (May 21, 2020): 67–103, https://doi.org/10.22054/urdp.2021.60595.1324.

[4]Mazdak Irani, Peter Armstrong, and Amir Rastegar, "Evolution of Residential Building in Iran Based on Organization of Space," *Asian Culture and History* 9, no. 2 (2017): 46, https://doi.org/10.5539/ach.v9n2p46.

[5]Mirmoghtadaee, "Process of Housing Transformation in Iran."

[6]Maryam Gharavi Alkhansari, "Analysis of the Responsive Aspects of the Traditional Persian House," *Journal of Architecture and Urbanism* 39, no. 4 (December 2015): 273–89, https://doi.org/10.3846/20297955.2015.1088414.

[7]Farzaneh Soflaei, Mehdi Shokouhian, and Seyed Majid Mofidi Shemirani, "Traditional Iranian Courtyards as Microclimate Modifiers by Considering Orientation, Dimensions, and Proportions," *Frontiers of Architectural Research* 5, no. 2 (June 2016): 225–38, https://doi.org/10.1016/j.foar.2016.02.002.

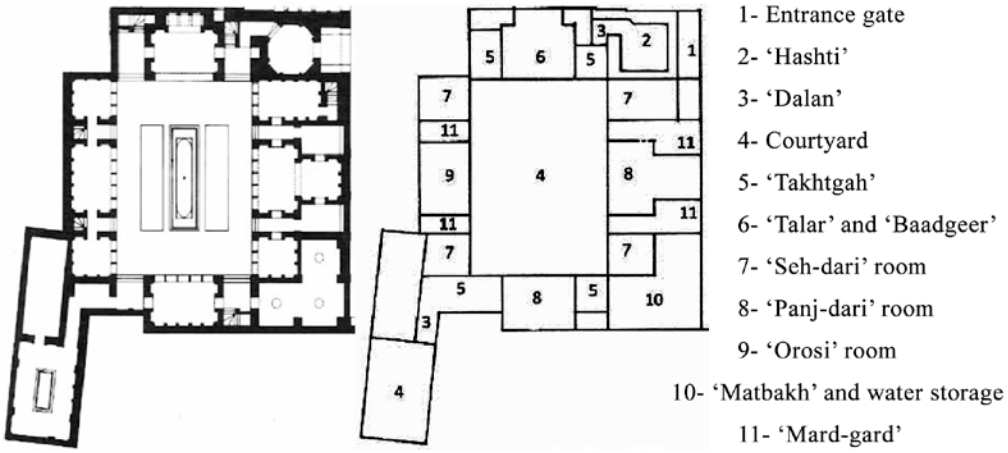



**Figure 1.** *A Courtyard House in Yazd*
*1) Entrance gate, 2) 'Hashti' (vestibule), 3) 'Dalan' (corridor), 4) Courtyard, 5) 'Takhtgah' (raised platform), 6) 'Talar' (hall) and 'Baad-geer', 7) 'Seh-dari' room (three-door room), 8) 'Panj-dari' room (five-door room), 9) 'Orosi' room, 10) 'Matbakh' (kitchen) and water storage, 11) 'Mard-gard'*[8].

Seh-dari and Panj-dari were used as living rooms during the day and transformed into bedrooms at night[9]. According to historical records, there was no room in a traditional Iranian house designated solely for sleeping purposes. The only private space was located above the Seh-dari and on the sides of Orosi or Panj-dari (on the upper level), called "Bala-khaneh Gooshvar." These two small and cozy rooms were utilized for seclusion, though they were not used as personal spaces or for sleeping.[10] In traditional houses, individuals did not have their own space because privacy was defined collectively for the entire household.

Consequently, the house functioned primarily as a social gathering place, with no designated private space for individual use. These courtyard houses suited the extended family lifestyle, which was the predominant household type in Iran for many years,[11] comprising up to three generations living together. In these homes, several families not only cohabited and maintained strong social ties, but also regularly hosted parties and ceremonies. In some noble houses, a room known as "Talar" was perpetually prepared for receiving special guests. It was distinguished by its Persian carpets, colored windows, and other decorative elements, setting it apart from other rooms.



[8]Mohammad reza Ghezelbash and Farhad Abouzia, *Alphabets of Yazd traditional house [الفبای کالبد خانه سنتی یزد]* (Program and Budjet Organization, 1985); Alkhansari, "Analysis of the Responsive Aspects of the Traditional Persian House."
[9]Lakshmi Rajendran et al., "(Re)Framing Spatiality as a Socio-Cultural Paradigm: Examining the Iranian Housing Culture and Processes," *Journal of Architecture and Urbanism* 45, no. 1 (June 14, 2021): 95–105, https://doi.org/10.3846/jau.2021.14032; Mohammad Karim Prinia, *Introduction to Iranian Islamic architecture Tehran [آشنایی با معماری اسلامی ایران]* (Iran University of Science and Technology., 1991).
[10]Alkhansari, "Analysis of the Responsive Aspects of the Traditional Persian House."
[11]Seyed Reza Hosseini Raviz et al., "Iranian Courtyard Housing: The Role of Social and Cultural Patterns to Reach the Spatial Formation in the Light of an Accentuated Privacy," *ACE: Architecture, City and Environment*, November 23, 2015, https://raco.cat/index.php/ACE/article/view/301293.

Hospitality and the design of social areas within the house have a long history in Iranian culture[12]. According to Islamic narrations, hospitality and family are essential values, as described by Chardin in his travelogue[13]. Hospitality is a characteristic deeply ingrained in Iranian culture, and this is reflected in their house architecture; in other words, residents were always prepared to welcome visitors.

In the 1940s, the growing population and increasing demand for housing drove up land values and density. By the mid-1940s, many middle-class and upper-class families had moved from traditional homes to smaller houses influenced by Western styles. The demographic shift towards nuclear families - consisting of two parents and several children - became more prevalent. The lifestyle of these nuclear families, being smaller and simpler compared to the extended family structures, correspondingly influenced their housing patterns. [14] As nuclear families required less space, their homes became smaller and more compact.

Contemporary housing began in Iran in 1961[15]. According to census data from 1986 and 1996, the nuclear family predominates in Iran's urban areas[16]. In terraced houses, a collective space (Salon) was larger than other rooms and was elaborately decorated with Persian carpets and furniture to honor visitors and host guests[17]. Salon was well decorated compared to other rooms, such as private space which was quite basic. Bedrooms for individual use were introduced in terraced houses, reflecting a growing desire for privacy, independence, a separate room for children, and spaces for personal belongings. These changes indicated a shifting need for personal space in dwellings,[18] aligning with the individuality valued in modernist culture. Before this modern era, such trends did not exist, and collective values prevailed in society.

Since 1970 in Tehran, due to the increase in the urban population and land prices, the government permitted the construction of multi-story and mid-rise apartments to replace low-rise houses (see Figure 2 for these morphological changes in Iranian housing)[19]. Today apartment housing is the only option in Tehran, and the size of residential units continues to shrink each year. The optimal apartment size approved by the Ministry of Roads and Urban Development in Tehran is 75 m²,



[12]Javaneh Mehran, "The Meaning of Hospitality in Iran," *Bridging Tourism Theory and Practice* 10 (2019): 155–67, https://doi.org/10.1108/S2042-144320190000010010/FULL/XML.

[13]Alireza Einifar, "Explaining the Continuity of Hospitality from Iranian House to Contemporary Apartment," 2021, 155–66, https://doi.org/10.22034/AAUD.2021.150942.1701.

[14]Mahya Hagh-shenas and Pirooz Hanachi, "Influencing Factors on Residential Architecture and Lifestyle in Century-Old Iran(Case Study: Transformation of Housing Models in the Historical City of Lar)," *Jias* 9, no. 17 (July 2020): 57–76, https://doi.org/10.22052/9.17.57.

[15]M. Haeri, "Designing the Contemporary House and the Architectural Principles of Traditional Houses.," *Abadi, Quarterly Journal of Architecture and Urbanism* 6, no. 23 (1997): 18–28.

[16]Marie Ladier-Fouladi, "Iranian Families between Demographic Change and the Birth of the Welfare State," *Population* 57, no. 2 (March 2002): 361–70, https://doi.org/10.2307/3246613.

[17]Mirmoghtadaee, "Process of Housing Transformation in Iran."

[18]Samaneh Nazif, "Investigation of interior and exterior spaces in past residential houses and its change to today's public areas and its impact on the behavior of family members [ بررسی فضاهای اندرونی و بیرونی در خانه های مسکونی گذشته و تغییر آن به عرصه های عمومی امروزی و تاثیر آن بر رفتار افراد خانواده]," in *National Conference on Humanistic Architecture and Urbanism*, 2013, https://civilica.com/doc/248945/.

[19]Homeira Shayesteh and Philip Steadman, "Typo-Morphological Analysis of Housing Layout and Density in Tehran," *Urban Book Series*, 2016, 187–204, https://doi.org/10.1007/978-3-319-26115-7_14/.

while the minimum size, according to the "Detailed Plan of Tehran City," is 35 m². This basic area of 35 m² meets only the initial needs[20].

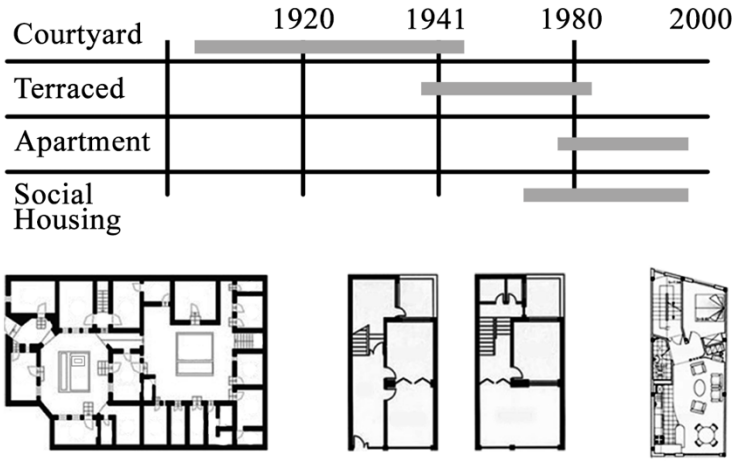



**Figure 2.** *Morphological Changes in Housing in Iran*
*Courtyard houses, Terraced houses, and Mid-rise apartments*[21].

## Previous Research

Studies have primarily focused on the configuration and morphological changes of traditional Iranian houses rather than on contemporary housing styles[22]. Research indicates that traditional Iranian houses prioritized communal values over individual ones[23]. Einifar's research into the enduring nature of hospitality in contemporary houses examined 12 houses spanning from the Qajar era to recent times. The study suggests that recent houses facilitate hospitality through the creation of a spatial hierarchy[24]. Research on private spaces and bedrooms in Iran is less extensive than that on social spaces. Comparative studies of Middle Eastern architecture reveal a preference for multifunctional rooms over individual bedrooms in countries like Iran, Syria, and Iraq. However, separate bedrooms were common



[20]"What are the details of the 'small size' housing plan? [جزئیات طرح مسکن «کوچک اندازه» چیست؟]," Eghtesad online (اقتصاد آنلاین, August 17, 2020), https://www.eghtesadonline.com/news/460479/.
[21] Shayesteh and Steadman, "Typo-Morphological Analysis of Housing Layout and Density in Tehran."
[22]Mirmoghtadaee, "Process of Housing Transformation in Iran."
[23]Mojtaba Valibeigi, Sara Danay, and Yegane Mokhtari, "Forgotten Personal Territories in the Traditional Iranian House: A Critical Reading," *Journal of Civil Engineering and Urbanism* 11 (May 2021): 15–24, https://doi.org/10.54203/jceu.2021.3.
[24] Einifar, "Explaining the Continuity of Hospitality from Iranian House to Contemporary Apartment."

in traditional Egyptian houses[25]. Historically, Iranian homes lacked separate rooms designated for personal use[26].

Multiple studies have explored the concept of privacy within Iranian houses, with researchers discussing its implications in traditional settings[27]. A study compared traditional and contemporary house layouts in Hamedan. They concluded that interior privacy has been diminishing in recent years. The study noted limited hierarchy in access to interior spaces and recognition of territories[28]. Another study on visual privacy in Kerman found that Iranian housing layouts became less integrated between the 1970s and 2010s[29].

In 2019, research analyzed changes in apartment layouts over 50 years in Tehran. The study demonstrated changes in the ratios of bedroom, living room, and dining room sizes during this period[30]. Several researchers have focused on specific interior features, such as balconies and kitchens[31]. Consequently, there is a lack of research on the layout of contemporary houses, attributed to privacy concerns.

Today, houses have become smaller, with some space functions being eliminated or modified. Comprehensive studies are needed to design houses that allow residents to live comfortably with efficient and affordable layouts. In this study, we analyzed the interior layout of 469 newly constructed housing units. In

[25]Loredana Ficarelli, "The Domestic Architecture in Egypt between Past and Present: The Passive Cooling in Traditional Construction." (Proceedings of the Third International Congress on Construction History, Cottbus, May 2009, 2009); Alev Erarslan, "Typological Variations of The Courtyard House with Iwan Tradition. A Comparative Analysis of Examples in Syria, ...," Advances in Scientific Research: Engineering and Architecture, 2020, 407–44.

[26]Mahta Mirmoghtadaee, "Demands and Feasibilities of Open Building in Iranian Urban Context," Open House International 33, no. 1 (January 1, 2008): 61–71, https://doi.org/10.1108/OHI-01-2008-B0006.

[27]Shahrzad Dousti, "Sanctity and Privacy in Traditional Iranian Houses [حریم و محرمیت در خانه‌های سنتی ایران]," *Iranian People's Culture* 53–54 (2018); Siyamak Nayyeri Fallah and Akram Khalili, "PRIVACY AS A CULTURAL VALUE IN TRADITIONAL IRANIAN HOUSING; Lessons for Modern Iranian High Density Vertical Development (HDVD) Housing" 9, no. 1 (2015); Hannaneh Khamenehzadeh, "An Introduction to the Concept of Privacy and How It Is Realized in the House Life-World1 Comparative Study in Pre-Modern and Modern Iranian Houses," *Architecture & Urbanism* 14, no. 49 (2017); Fatemeh Khozaei Ravari et al., "The Development of Residential Spatial Configuration for Visual Privacy in Iranian Dwellings, a Space Syntax Approach," *International Journal of Building Pathology and Adaptation*, February 2022, https://doi.org/10.1108/IJBPA-05-2021-0080; Kazem Seifian and Mohamadreza Mahmoudi, "Privacy in traditional architecture of Iran [محرمیت در معماری سنتی ایران]," *Hoviat shahr Journal* 1, no. 1 (2007): 3–14; M. M. Shabani et al., "Achieving Privacy in the Iranian Contemporary Compact Apartment through Flexible Design," 2010, https://api.semanticscholar.org/CorpusID:113922128.

[28]Saeid Alitajer and Ghazaleh Molavi Nojoumi, "Privacy at Home: Analysis of Behavioral Patterns in the Spatial Configuration of Traditional and Modern Houses in the City of Hamedan Based on the Notion of Space Syntax," *Frontiers of Architectural Research* 5, no. 3 (September 1, 2016): 341–52, https://doi.org/10.1016/j.foar.2016.02.003.

[29]Khozaei Ravari et al., "The Development of Residential Spatial Configuration for Visual Privacy in Iranian Dwellings, a Space Syntax Approach."

[30]Amirpejman Darvish, Fatemeh Dastyar, and Babak Dariush, "The Phenomenon of Lifestyle and the Architecture of Apartments in Iran Case Study: The Apartments in District 9, Tehran," *Socio-Spatial Studies* 3, no. 5 (March 2019): 78–84, https://doi.org/10.22034/SOC.2019.84455.

[31]Seyyedeh Mahsa KamiShirazi, Hossein Soltanzadeh, and Farah Habib, "The Impact of Lifestyle on the Spatial Organization of Residential Architecture in Iran - Case Study: Kitchen from 1925 to 1978 [تاثیر سبک زندگی در سازمان فضایی معماری مسکونی در ایران- نمونه مورد مطالعه: آشپزخانه حد فاصل سال های 1304 تا 1357 ه.ش]," *Women Studies* 9, no. 24 (2018): 33–70.

contemporary compact housing with optimal space utilization, it is necessary to reform the interior layout to ensure that the residential units meet today's residents' collective and individual needs.

## Methods

In this study, we employed the case study method to examine the interior layout of residential apartments in District 9 (Figure 3), one of the central districts among the 22 districts of Tehran municipality. This area is characterized by its dense urban texture and narrow passages, primarily housing middle or low-income residents.

Our analysis primarily focused on the floor plans of buildings, selected through a random sampling process. By selecting sample units constructed between 2018 and 2019, we aimed to capture the latest trends and designs in urban housing. Our case study comprises 469 residential units across 65 buildings, ranging from 3 to 7 stories. These units, often smaller than 100 m² due to Tehran's high housing costs, reflect the dominant urban housing trends in Tehran. More than half of our samples measured less than 75 m², highlighting the constraints of urban living in Tehran.

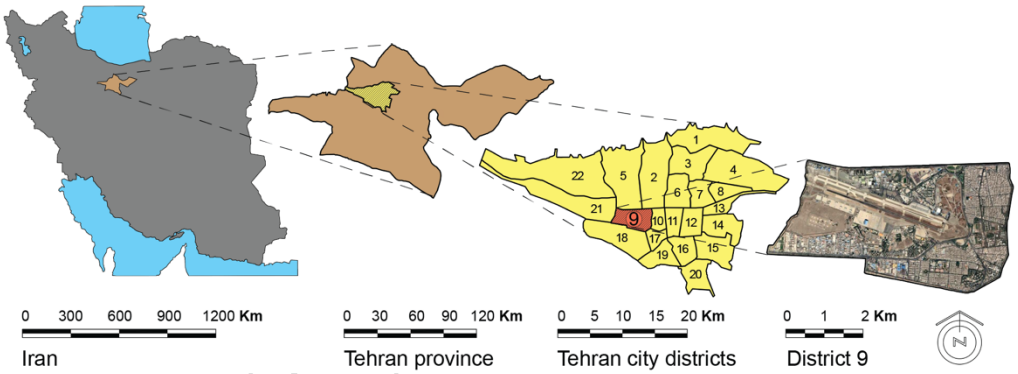



**Figure 3.** *Location of District 9.*
*Geographical location of District 9 within the city of Tehran, the capital of Tehran Province, Iran.*

This study involved a nuanced process of quantifying traditionally immeasurable concepts: individual versus social activities. Within this conceptual framework, we narrowed our focus to two key spatial functions: "social area" and "private space." The social area, emblematic of the collectivist approach, serves as a space where people gather and interact. This area typically includes communal spaces such as the living room, dining room, and salon. Conversely, the "private space," reflecting the individualist approach, is comprised solely of the bedroom, designated for individual activities. The most spacious bedroom was defined as the main bedroom in this study. To facilitate this analysis, we identified various interior spaces. We categorized these into service areas (toilet, kitchen, and bathroom); secondary spaces (entrance, corridor, and balcony); areas for collective activities (living room, dining room, and salon); and bedrooms for individual activities.

This classification was derived from common spaces observed in the residential units within our sample. After collecting primary data from interior floor plans, we conducted a detailed analysis of interior space functions. We divided and defined

social areas and private spaces in all units, a process informed by the lifestyle nuances and spatial characteristics of typical Iranian houses. We meticulously measured and analyzed the unit's total area, social and private zones, and assessed the form, geometry, natural light, and proximities of interior spaces. Furthermore, we reviewed existing rules and regulations that define the minimum size requirements for residential units and their interior spaces. This examination provided a basis for evaluating Iranian society's preference for collective versus individual spaces.

Throughout our research, we adhered to strict confidentiality principles when handling primary raw data. The research process required extensive correspondence with municipal authorities due to the sensitive nature of accessing information on residential units, highlighting the challenges of studying private interior spaces.

The study also involved a quantitative examination of how other interior spaces, including the kitchen, bathroom, and corridor, influence social and private areas, assessing whether the house remains a hub for social activities or primarily serves personal needs. The findings from this study are expected to significantly contribute to the development of design guidelines for interior housing spaces, thereby revealing the underlying socio-cultural dynamics in urban residential layouts.

**Data Collection**

This study focuses on the spatial configuration of residential interior spaces in Tehran's 9th district, with a specific emphasis on social and private zones. Characterized by its dense urban fabric, the district consists of small land plots and narrow passages. The district features a blend of new and historical buildings, notable for numerous land plots with irregular geometries. The district is undergoing a dynamic transformation, marked by the demolition of aging structures and the emergence of new apartment complexes, as noted by Hatami Nejad and colleagues[32]. Reflecting the residents' lifestyles, this area predominantly houses middle and low-income groups and is one of Tehran's more densely populated and older neighborhoods.

The residential units in this area can be considered representative of the majority of the residential units in Tehran, which motivated the selection of this particular district. Sample units were selected through a randomized process to ensure a comprehensive and unbiased sample for our analysis. We scrutinized the status quo to ascertain residents' preferences for interior private space versus social area in the current units.

We analyzed a dataset comprising 469 residential units across 65 buildings in District 9, Tehran, all constructed between 2018 and 2019. The sample included a range of building types: one building with three floors, 31 buildings with four floors, 27 buildings with five floors, five buildings with six floors, and one building with seven floors. The prevalence of four- and five-story mid-rise buildings, constituting 90% of the samples, suggests a harmonious integration with the existing urban fabric. This distribution underscores the predominance of four- and five-floor

[32] Hosein Hataminejad, Ahmad Pourahmad, and sara Allah gholipour, "Analysis of Residential Sustainability Indicators in Urban Worn out Textures, Case Study: Area 1 of District 9 in Tehran [تحلیل شاخص های پایداری سکونتی در بافت های فرسوده شهری، مطالعه موردی: ناحیه ۱، منطقه ۹ تهران]," *Biannual Journal of Urban Ecology Researches* 10, no. 2 (2020): 185–98.

buildings, accounting for the majority of the residential units analyzed. Our examination revealed a variety of spatial functions across the sampled units, including kitchens, living rooms, salons, dining rooms, bedrooms, toilets, bathrooms, entrances, corridors, and balconies. Notably, not all units featured salons, dining rooms, entrances, corridors, and balconies, initially suggesting their omission could be attributed to spatial limitations. However, further investigation revealed alternative explanations for the absence of these spaces. This investigation explains the current approach to housing interior layouts in Tehran.

## Result

Our study examined the size of residential units and its impact on interior space distribution with emphasis on social area and private space. According to the "Detailed Plan of Tehran City," the minimum size of an apartment in Tehran is 35 m². The basic area of 35 m² meets only initial needs. However, our study found instances where some units were smaller than this legally mandated minimum, highlighting significant constraints in urban residential spaces. On the other hand, guidelines from the Ministry of Roads and Urban Development, as cited by Economy Online (2020), stipulate that the optimal minimum size for a residential unit in Tehran is 75 m²[33]. We categorized residential units based on their size to examine the relationship between the area of existing units and the optimal minimum size suggested by the Ministry of Roads and Urban Development for Tehran.

We classified the interior spaces to understand their contribution to overall living quality, with particular attention to the delineation between social spaces - such as living rooms, dining areas, and salons - and private spaces, which limited to bedrooms. This investigation also seeks to understand the impact of various interior spaces on residents' preferences for social and private spaces. The kitchen is identified as a unique space due to its central role in food preparation and the emphasis on cleanliness and hygiene, which are significant under Iranian-Islamic cultural norms. Although our focus was on social and private spaces, the service area, specifically the bathroom, was confined to its minimum designated size. This area is considered a separate space from the toilet, and its influence on our study will be discussed. Additionally, secondary spaces such as the balcony, corridor, and entrance, though qualitative and supplementary in nature, were omitted in numerous samples.

### Distribution of Residential Unit Sizes

The dataset revealed a variance in unit areas, indicative of diverse architectural responses to urban living needs. The smallest unit measured a mere 29.5 m², suggesting a compact living solution even smaller than the minimum legal area, likely allocated to single occupants or those with minimalistic preferences. In contrast, the largest unit spanned 144.2 m², pointing to a design that accommodates more expansive familial living requirements. Our analysis categorized 276 of the

[33]"What are the details of the 'small size' housing plan? [جزئیات طرح مسکن «کوچک اندازه» چیست؟]."

469 residential units (58.8%) as falling at or below the 75 m² threshold, with 193 units (41.2%) exceeding it.

The average unit area across the dataset was 71.88 m². This average, along with the median and mode at 71.3 m², is less than the optimal minimum but close to it, suggesting a tendency toward mid-sized units. It could reflect an architectural inclination to optimize space to address the constraints posed by urban development while still adhering to comfort and affordability. This trend likely emerges from various factors, including urban space limitations, economic considerations, and a shift in lifestyle dynamics. The prevalence of mid-sized units, as captured in Figure 4, might indicate a general consumer preference or an economically motivated choice common in urban environments.

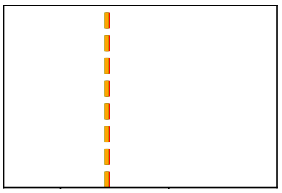


**Figure 4.** *Distribution of Unit Area in Residential Units.*
*This histogram illustrates the distribution of unit areas within the dataset, emphasizing the central tendency measures. The close alignment of the mean (71.88 m²), median (71.30 m²), and mode (71.30 m²) indicates a symmetrical distribution with minimal skewness. This suggests that the majority of unit areas are concentrated around 71 m², with few outliers, reflecting a consistent approach to spatial allocation in residential design.*



## Comparative Regression Analysis of Private Space, Social Area, and Kitchen

To understand the relationship between total unit area and the allocation of space to different functional areas within residential units, we conducted a regression analysis focusing on three key spaces: social area, private space, and kitchen. This analysis provides insights into how these spaces scale with increasing unit size and reveals distinct patterns in spatial allocation strategies. We conducted linear regression analysis to examine the correlation between the total unit area (independent variable) and the areas of social, private, and kitchen spaces (dependent variables). The strength of these correlations is quantified by the correlation coefficient (R-value, ranging from -1 to +1), while the slope indicates the rate of change in each specific area per unit increase in total area. The statistical significance of these relationships is represented by the p-value, with values below 0.05 typically considered statistically significant.

Our analysis revealed distinct correlations for each space type (Figure 5). Social area exhibited the strongest correlation with unit size ($R = 0.9212$, $p < 0.001$, slope = 0.5042), indicating that for every 1 m² increase in total unit area, the social area expands by approximately 0.5 m². Private space, although still strongly correlated, showed a slightly weaker relationship ($R = 0.8804$, $p < 0.001$, slope = 0.2909), expanding more modestly by about 0.29 m² for each additional square meter of total area. In contrast, kitchen areas demonstrated only a weak correlation with unit size

($R = 0.2411$, $p < 0.001$, slope = 0.0129), suggesting that kitchen dimensions remain relatively constant regardless of unit scale. The statistical significance ($p < 0.001$) for all relationships indicates a high confidence level in these observed patterns. This analysis reveals a design paradigm that prioritizes the expansion of communal living spaces in larger units, while maintaining more modest growth in private areas and relatively consistent kitchen dimensions.

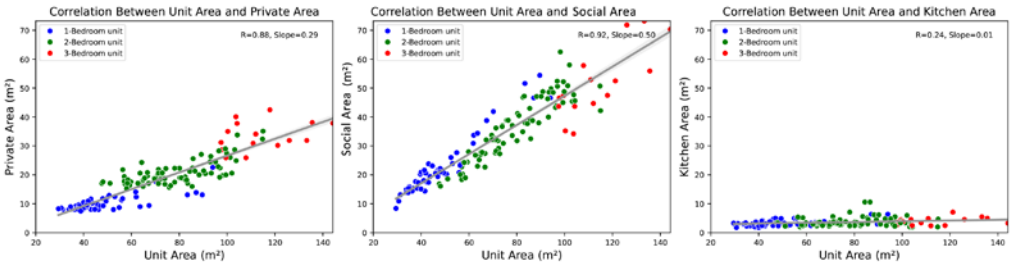



**Figure 5:** *Regression Analysis of Space Allocation in Residential Units (N=469). Scatterplots with regression lines illustrate the relationships between total unit area and the social, private, and kitchen areas. R-values indicate the strength of these correlations (-1 to +1), and slopes represent the rate of change in each specific area per unit increase in total area. Note the strong positive correlations for social (R = 0.9212) and private (R = 0.8804) areas, contrasting with the weak correlation for kitchen areas (R = 0.2411). All relationships are statistically significant (p < 0.001).*

## Private Space (Bedrooms)

The private spaces of a home, specifically bedrooms, serve as a sanctuary for residents, offering a retreat from the communal areas of a dwelling. We scrutinized the allocation of space dedicated to bedrooms. Our dataset is diverse regarding the number of bedrooms within a residential unit, including 164 one-bedroom units (35%), 264 two-bedroom units (56%), and a smaller contingent of 41 three-bedroom units (9%), clearly indicating a marked preference for two-bedroom layouts within the sample population.

For units with a single bedroom, the average area was approximately 49.21 m², with a slightly lower median of 46.2 m². This observation points to a modest inclination towards smaller-sized units within this category, likely more suitable for individuals or couples without children. The standard deviation of 15.38 m² reflects a substantial variation in size, illustrating a range that accommodates compact single-occupancy units to more spacious single-bedroom apartments. Their unit size spans 29.5 to 94.0 m², with the most common (mode) unit size around 40 m².

In contrast, two-bedroom units presented a higher mean area of 79.85 m² and a median close to 78.1 m², suggesting a more equitable distribution of unit sizes. The standard deviation is consistent with the one-bedroom units at approximately 15.79 m². However, the range is slightly broader (67.4 m²); the smallest two-bedroom unit in the study is 47.6 m², and the largest is 115 m². The mode of 71.3 m² for two-bedroom units highlights this as the most commonly observed size, reinforcing the prevalence of this unit type in the urban housing market.

The assortment of three-bedroom units exhibited the largest average unit area of approximately 111.26 m², with a median of 107.9 m², although it was less common. The narrower standard deviation of about 12.26 m² spans a range of 46.7

m² between the smallest (97.5 m²) and the largest units (144.2 m²). The mode for this category is 100.3 m². Figure 6 illustrates the distribution of unit areas across the one-, two-, and three-bedroom units. This examination of bedroom areas within the residential units provides important insights into private space, creating a basis for understanding how the size of a unit affects personal space allocation.


**Figure 6.** *Unit Area Distribution by Bedroom Count.*
*Histograms display area frequencies for 1-, 2-, and 3-bedroom units. Mean areas: 49.21 m², 79.85 m², and 111.26 m² respectively.*

The analysis of private space, defined exclusively as the sum of bedroom areas, shows a relatively consistent distribution among the residential units evaluated. The mean private space ratio is 25.3% of the total unit area, with the median and mode both precisely aligned at 25.3%. This indicates a homogeneous distribution of private space across the dataset, with the majority of units allocating approximately a quarter of the total area to bedrooms. The normality of the distribution is further supported by the close alignment of the mean and median, indicating minimal skewness. The histogram of the private space ratio (Figure 7) visualizes this distribution, with the central tendency depicted by vertical dashed lines.

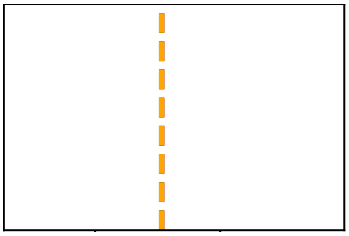


**Figure 7.** *Private Space Ratio Analysis.*
*Frequency distribution histogram illustrating central tendency measures.*

## Regulatory Compliance in Bedroom Sizing

A critical aspect of the design of residential units is adherence to established rules and regulations, continuously refined to enhance living standards. In this study, we compared the sizes of bedrooms in the surveyed residential units against the B4

INBR standards established by the Ministry of Roads and Urban Development[34]. These regulations state that in 75 m² or larger apartments, one of the bedrooms must be at least 12 m². For smaller apartments, one bedroom must be at least 9 m². Our analysis categorized the units into two groups based on the 75 m² threshold.

For units smaller than 75 m², the main bedroom sizes varied from 7.5 to 17.7 m², while in the larger units, bedroom sizes ranged from 8 to 22.6 m². This variation within each category provides a nuanced view of bedroom allocation and, occasionally, shows deviations from the regulatory guidelines. The data revealed that units below the 75 m² threshold had an average main bedroom area that marginally exceeded the minimum requirement of 9.93 m². On the other hand, larger units exhibited an average main bedroom size of 13.03 m², slightly above the 12 m² minimum mandated for their category.

Despite these averages, a significant proportion of the units failed to meet the minimum size criteria: 35.14% of the smaller units and 41.97% of the larger ones. Consequently, approximately 38% of the units did not comply with the prescribed standards, with larger units showing a higher rate of noncompliance. This deviation from regulatory standards is graphically represented in Figure 8, highlighting the differences between prescribed regulations and the actual sizes of bedrooms within the residential units. Such differences highlight the challenges in aligning architectural practice with regulatory mandates. The data suggests a notable absence of effort and interest in extending the dimensions of private living areas, with the space designated for these private zones barely meeting the required legal standards.

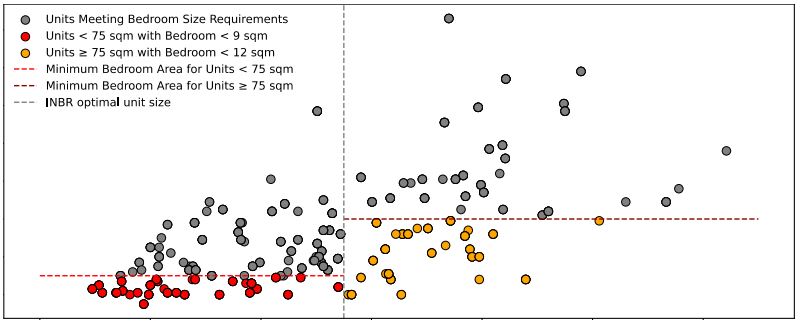



**Figure 8.** *Main Bedroom Area versus Unit Area Compliance.*
*Scatter plot showing B4 INBR regulation adherence: compliant (grey, n=291), non-compliant <75 m² (red, n=97), non-compliant ≥75 m² (orange, n=81). Thresholds: 75 m² (unit), 9/12 m² (bedroom).*

## Social Area (Living room, Dining room and Salon)

The social area within a residence, encompassing the living room, dining room, and salon, plays a pivotal role in shaping the social dynamics of the home. These areas serve as a hub for family members' interaction. Also, this space is used to receive and entertain guests and close relatives in various events, occasions, and

[34]Iran Ministry of Roads and Urban Development., *Iranian National Building Regulations, Booklet For: General Building Requirements [مبحث چهارم مقررات ملّي ساختمان ايران: الزامات عمومی ساختمان]*, third edition (Tehran: Road, Housing and Urban Development Research Center, 2017).

ceremonies that have been popular in Iranian-Islamic culture for a long time. Here our investigation into the social area of the residential units aimed to understand the allocation and distribution of space to this space function, analyzing how it varies with the size of residential units.

In our dataset, we observed that the scaling of the social zone is substantially influenced by the overall unit size. Smaller units, often constrained by size, typically feature a singular, multi-functional social area of the living room that accommodates various collective activities. A separate space for the dining room and salon is rarely dedicated. This optimization demonstrates the necessity to maximize functionality in confined spaces. Dining rooms and salons are more common in more spacious units, mostly when the size exceeds the 75 m² threshold.

Moreover, the mean social area ratio of 45.5% with a standard deviation (SD) of 6.81% and median of 45.0% indicates that, on average, nearly half the total unit area is allocated to social spaces. However, the mode of 37.4% suggests a prevalent design template that dedicates a smaller proportion to communal areas. This discrepancy between measures of central tendency points to a right-skewed distribution (skewness = 0.31), implying the presence of units with substantially larger social areas that influence the mean. The range of 28.47% to 63.65% underscores significant variability in spatial allocation strategies. This distribution pattern reflects a diverse architectural landscape, potentially encompassing various housing typologies, socioeconomic factors, and design philosophies. The predominance of units allocating 40-50% of space to social areas aligns with traditional Iranian architectural principles emphasizing communal living, while the modal value indicates a shift in some contemporary designs towards more compact, compartmentalized layouts. Figure 9 illustrates this distribution, revealing a clear tendency for social areas to expand in larger units.

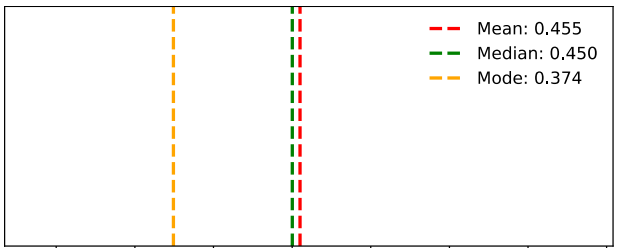



**Figure 9.** *Frequency Distribution of Social Area Ratios in Residential Units (N=469)*
*It shows the central tendency measures and distribution characteristics. mean (45.5%), median (45.0%), and mode (37.4%). The histogram depicts a right-skewed distribution, with a range of 28.47% to 63.65%.*

In addition to the spatial allocation, our analysis extended to the aspect of natural light in social area. Natural light plays a vital role in enhancing the ambiance and comfort of units. Approximately 87.6% of our sample receives direct light in the social area, while about 12.4% of the units feature indirect light in this space function. The range of unit areas with indirect light in living rooms spans from 29.5 to 71.3 m², with corresponding living rooms ranging from 8.4 to 36.2 m². These figures indicate that ensuring natural light in the living room of smaller units is

challenging, highlighting the difficulties associated with natural light access in compact spaces. Our findings indicate that units with indirect natural light in their living rooms predominantly fall within a specific size range, suggesting a potential correlation between unit size and the architectural integration of natural lighting features. In other words, the social space in 12.4% of units with minimal area receives indirect light through the open kitchen, potentially affecting the quality of this space.

**Kitchen Role**

The analysis of the kitchen within our sample units revealed a consistent pattern of spatial segregation with a unique function. Contrary to global trends in small apartments favoring open-kitchen designs merged into social areas, all surveyed units featured open kitchens as distinct, separate spaces equipped with fixed countertops. This spatial configuration underscores the kitchen's role as a specialized area for food preparation, reflecting specific cultural practices and norms in Iranian households. The deliberate separation of kitchens from social areas suggests a persistent cultural preference for maintaining distinct functional zones for the kitchen, even as contemporary architectural trends in other space functions move towards more integration. This finding highlights the enduring influence of traditional spatial structure in current Iranian housing, where the kitchen remains a dedicated, separate space within today’s apartments.

As shown in Figure 5, analysis of area allocations across three different spaces revealed a striking disparity in how kitchen spaces scale in relation to overall unit size. While social and private areas demonstrated strong positive correlations with unit size ($R = 0.92$ and $R = 0.88$, respectively), kitchen dimensions exhibited notably less variation ($R = 0.24$). This disproportionate scaling indicates a prioritization of functional consistency in kitchen design, irrespective of the overall dwelling size. The relative stability of kitchen areas across varying unit sizes suggests that cultural and practical considerations governing kitchen functionality take precedence over proportional spatial allocation. This pattern diverges significantly from the scaling observed in social area and private space. The consistency in kitchen allocation, regardless of overall dwelling dimensions, reflects deeply ingrained cultural values and practices surrounding food preparation and household management in Iranian society.

**Bathroom Role**

The location of bathrooms in residential units affects the interior's spatial quality and functionality. In our analysis, we concentrated on the positioning of bathrooms and their accessibility concerning the private and social zones of the units. It should be noted that units with more than one bathroom were excluded from this part of the study, focusing solely on units with a single bathroom. This aspect of design affects not only space circulation but also the privacy and comfort associated with bathroom use experienced by the inhabitants.

Our data revealed a predominant preference for situating bathrooms that open into corridors in larger apartments. This configuration, observed in 52.8% of the units analyzed, delineates a clear separation between the bathroom and the social

area, thus enhancing privacy and establishing a transitional space between different functional zones. The corridor serves as a buffer zone, maintaining a distinction between the bedrooms and the communal nature of the social area. Contrastingly, a significant proportion of single-bathroom units, approximately 36.2%, feature bathrooms opening directly into the main bedroom. This direct adjacency compromises the seclusion of the bedroom, potentially affecting the tranquility typically associated with private spaces. Another 3.80% of units had a bathroom opening into a secondary bedroom, a less common yet similarly disruptive configuration to personal space. A smaller subset of the dataset, about 6%, features bathrooms opening into the social area. While such an arrangement economizes on spatial allocation, it could affect the ambiance and utility of the social area, particularly when hosting guests or conducting collective activities (Figure 10).

The analysis of bathroom placements within the sample layouts identifies a clear architectural preference for optimizing the efficiency and quality of shared spaces. This preference sometimes compromises the privacy of bedrooms, especially when a corridor is absent. The direct opening of a single, commonly used bathroom into a bedroom presents a design challenge. Our analysis suggests that placing the bathroom adjacent to communal areas is more justifiable when a corridor is absent, given the shared nature of both the bathroom and social area. This implies a more cohesive relationship between two communal areas - the social space and the bathroom - compared to the juxtaposition of a communal bathroom with private bedrooms.

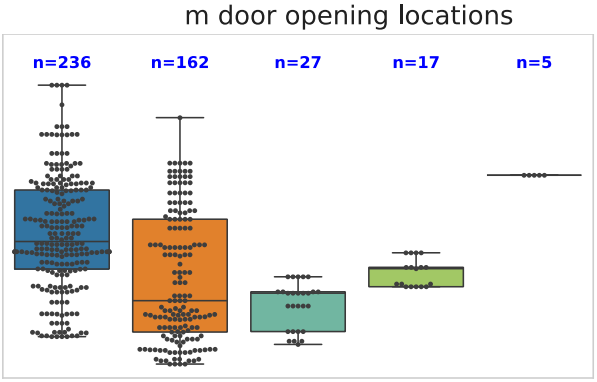



**Figure 10.** *Unit sizes by bathroom door opening location*
*Boxplots illustrate median, quartiles, and range of unit areas (m²) for each bathroom access point. Sample size: 447 units with a single bathroom.*

## Discussion

### Private Space (Bedrooms)

In smaller residential units, particularly those ranging from 35 m² (the basic unit area in Tehran) to 75 m² (the optimal minimum unit area in Tehran by

regulations)[35], a noticeable trend is the adherence to minimum size requirements for different interior spaces. Due to space constraints, these units often lack diversity in both size and layout of interior spaces, with design efforts primarily focused on meeting basic regulatory standards.

Despite regulations stating that main bedrooms in units under 75 m² should measure at least 9 m², our study reveals that 35.14% of such units fall short of this standard, impacting the bedrooms' quality of space. As unit sizes increase beyond 75 m², the size of private spaces, particularly main bedrooms, often remains close to regulatory minimums. Despite regulations requiring a minimum of 12 m² for the main bedroom in these larger units, our observations show that 41.97% fail to meet this criterion[36].

A significant portion of the residential units (56.3%) comprises two-bedroom layouts, spanning areas from 47.6 m² to 115 m². This prevalent pattern suggests a significant demand for such configurations, even in units as small as 47.6 m². Given that the average household size in Tehran is three people[37], this design choice reflects the priority families assign to maintaining distinct, private spaces for parents and children. This underscores the cultural emphasis on privacy within the family unit. On the other hand, the number of bedrooms does not change much in proportion to the increase in unit area and often does not exceed two bedrooms. Three-bedroom units are rarely observed (only 8.7%), and no four-bedroom units were found in our samples. This trend indicates a preference for allocating space to social areas over additional private spaces, even when sufficient overall space is available.

In many units, bedrooms have limited dimensions and suffer from poor length-to-width ratios. The presence of structural elements, such as columns, beams and bracing or HVAC ducts and plumbing pipes, as well as the irregular geometry of their floor plan with sharp angles further detract from the quality of these private spaces. Such design flaws limit bedrooms' functionality, making them suitable only for sleeping. They also constrain furniture placement and convenient space circulation.

**Social Area (Living room, Dining room and Salon)**

In residential units smaller than 75 m², the social area usually consists of just a single living room. The absence of a corridor in these smaller units results in a direct transition between spaces, without the intermediary hierarchy typically provided by corridors. This design approach was also common in housing from past decades, even when the shortage of residential space was not as severe as it is today. A sample of the lack of intermediary space can be seen in Figure 11, which shows a terraced house located in a central district of Tehran, where there is no corridor or intermediary space between social area and bedrooms.

[35]"What are the details of the 'small size' housing plan? [جزئیات طرح مسکن «کوچک اندازه» چیست؟]."

[36]Iran Ministry of Roads and Urban Development., *Iranian National Building Regulations, Booklet For: General Building Requirements [مبحث چهارم مقررات ملّي ساختمان ايران: الزامات عمومی ساختمان]*.

[37]"Household and Population of 22 Districts of Tehran (1375-1395) [ خانوار و جمعیت مناطق 22 گانه شهر تهران (1375-1395)]," Statistical information system of Tehran province [سامانه اطلاعات آماری استان تهران], accessed August 3, 2024, https://amar.thmporg.ir/main-topic/population-and-labor/population.

Furthermore, in larger units, over 75 m², the social area tends to be more expansive and varied, frequently including a living room, dining room, and salon. These areas often blend together, creating an integrated space, as illustrated in Figures 11 and 12. These examples, from the 1970s and 2010s, respectively, demonstrate how social area sub-spaces (living room, dining room and salon) are combined in Tehran's residential units.

**Figure 11.** *Social Area in 1970s Terraced house, Tehran*
*Designed with a generous spatial allocation, this integrated and flexible space lacks solid dividers; instead, residents use furniture to define distinct spaces within the social arae.*
*Source: Authors.*

The presence of a corridor in these larger units effectively connects the social area to adjacent spaces, ensuring a more orderly and structured flow between different spaces. There appears to be a greater emphasis on social areas in residential units exceeding 75 m², where space constraints are less pronounced. This trend is notable compared to other indoor spaces, particularly private ones, suggesting a potential cultural and architectural preference for social areas in larger units.

**Figure 12.** *Two Examples of Social Areas in Tehran Residential Units, 2010s*
*Both cases show living rooms, dining rooms, and salon combined into one open space without dividing walls.*
*Source: Authors.*

In most Iranian housing designs, including all of our samples, the kitchen space, while open in form, is distinct and separate from the adjoining social area. This separation is marked by specific characteristics common in Iranian houses, such as different flooring materials and a slightly elevated floor level compared to the rest of the interior spaces. Additionally, the presence of fixed countertops and the traditional role of cooking in Iranian culture typically sets the kitchen apart, leading to its classification outside the social area. These design elements collectively contribute to the kitchen's distinct identity within the residential layout.

**Figure 13.** *Social Area Integration in a Western Iranian Terraced House*
*Interior view of a terraced house located in western Iran, highlighting the integrated social area and its separation from the kitchen. The image captures typical daily activities within the social zone, illustrating the space's functional use in contemporary Iranian domestic life.*
*Source: Authors.*

In larger units, the living room and other sub-spaces of the social area, including the dining room and the salon, are often integrated and overlap without clear boundaries or dividing elements. Making it challenging to distinguish them from

each other. Figure 13 illustrates a terraced house in the west of Iran, demonstrating the integration of the social area and the separation of the kitchen from this zone. The figure also depicts examples of daily activities that commonly occur in the social zone.

Nowadays, family members often spend less time together due to various individual commitments and evolving lifestyles. This spatial configuration enables eye contact throughout the social areas, including the kitchen, potentially facilitating increased interaction among family members. Figure 14 highlights the furniture arrangement and utilization of social area in three current residential units in Tehran, emphasizing the multifunctional nature of these spaces. In this type of layout, family members are exposed to more social interactions with each other.

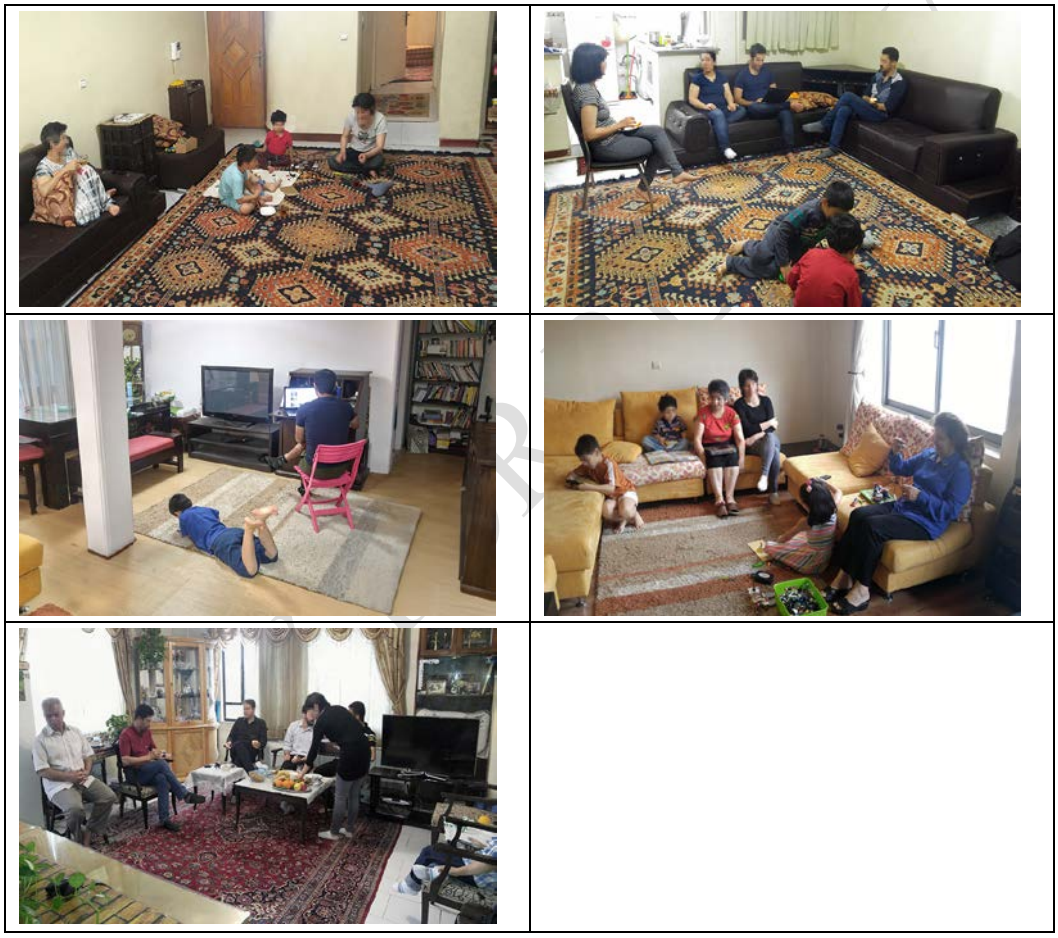


**Figure 14.** *Social Area in Current Conventional Residential Apartments in Tehran*
*Examples of social areas in current Tehran residential units illustrate typical resident interactions and furniture arrangements.*
*Source: Authors.*

Despite societal changes in Tehran, the floor plans analyzed in this study suggest a persistent cultural preference for family-centric spaces. The preference for unified and adaptable social areas reflects deep-rooted values in Iranian culture, accommodating a blend of activities and fostering familial connections. This cultural heritage, traditionally associated with extended family living, hospitality, and communal gatherings, appears to continue influencing contemporary residential

design, as evidenced by the prevalence of large social areas in the analyzed floor plans. Despite modern changes, the preference for social areas within today's residential units remains a testament to these enduring cultural practices.

**Bathroom**

In our study, the bathroom location significantly influences the balance between private and social spaces. We observed that the bathroom opens into the corridor in over half of the units, with a higher prevalence in those larger than 75 m². This design choice effectively preserves bedroom privacy and establishes a clear separation between private and social areas, enhancing the space hierarchy. However, this pattern is not constant across all units. In about 6% of the units, the bathroom opens directly into the living room, often in smaller units where corridors are usually removed to expand the social area. This layout adversely impacts furniture arrangement options and impedes occupant circulation within the social area.

Conversely, in 37% of units with a single bathroom, this space is directly accessible from the main bedroom. Such a layout significantly impacts the privacy of the bedrooms, constraining the functionality of the private space by limiting how the bed and personal items can be arranged and reducing the overall quality of the bedrooms. These findings suggest a tendency to prioritize social areas, particularly in units with limited space.

Considering the family-oriented nature of Iranian society, the bathroom of the apartment is considered a shared space. Locating the bathroom adjacent to the social area is more justifiable in plans without an intermediary corridor. This design rationale is based on the shared nature of both the bathroom and social area, suggesting a harmonious relationship between communal spaces and a shared bathroom. In contrast, placing a shared bathroom within a private bedroom can disturb spatial coherence and balance between communal and private necessities in residential design.

**Kitchen**

Tehran's District 9 has a dense and compact urban texture, predominantly occupied by low to middle-income residents. Its neighborhoods feature narrow land plots and passages, leading to a prevalence of smaller and more affordable housing units. These units often face challenges in natural light accessibility. A critical aspect underscored by regulatory requirements is the mandatory provision of natural light for bedrooms. According to housing rules and regulations, any room without window access and natural light is not considered a bedroom and is more like storage. On the other hand, the design of kitchens in these units is crucial for addressing the need for natural light in both the social area and the kitchen. Due to the narrow width of these units, which limits the entry of natural light, kitchens are often designed with an open layout. All kitchens in our samples are open. This design strategy enables the adjacent living room to share the natural light that enters the kitchen area. This solution is particularly effective in units smaller than 75 m². The choice of an open kitchen design is driven not just by aesthetic considerations

but by the practical need to maximize natural light within space constraints and align with regulatory requirements.

The recommendation of a wall kitchen without a fixed countertop could represent a significant advancement in maximizing interior space efficiency. This design concept effectively blends the kitchen with the adjacent living room, allowing residents to extend their kitchen space into the social area to accommodate a variety of activities and occasions, such as hosting family events or gatherings. This adaptable approach to kitchen design is a practical solution for urban housing constraints. In more compact units, this kitchen arrangement proves incredibly beneficial, optimizing limited space and fostering a social area that is both dynamic and flexible. Consequently, more space can be allocated to bedrooms. This design aligns well with the Iranian preference for social area, offering a way to optimize interior spaces in smaller units.

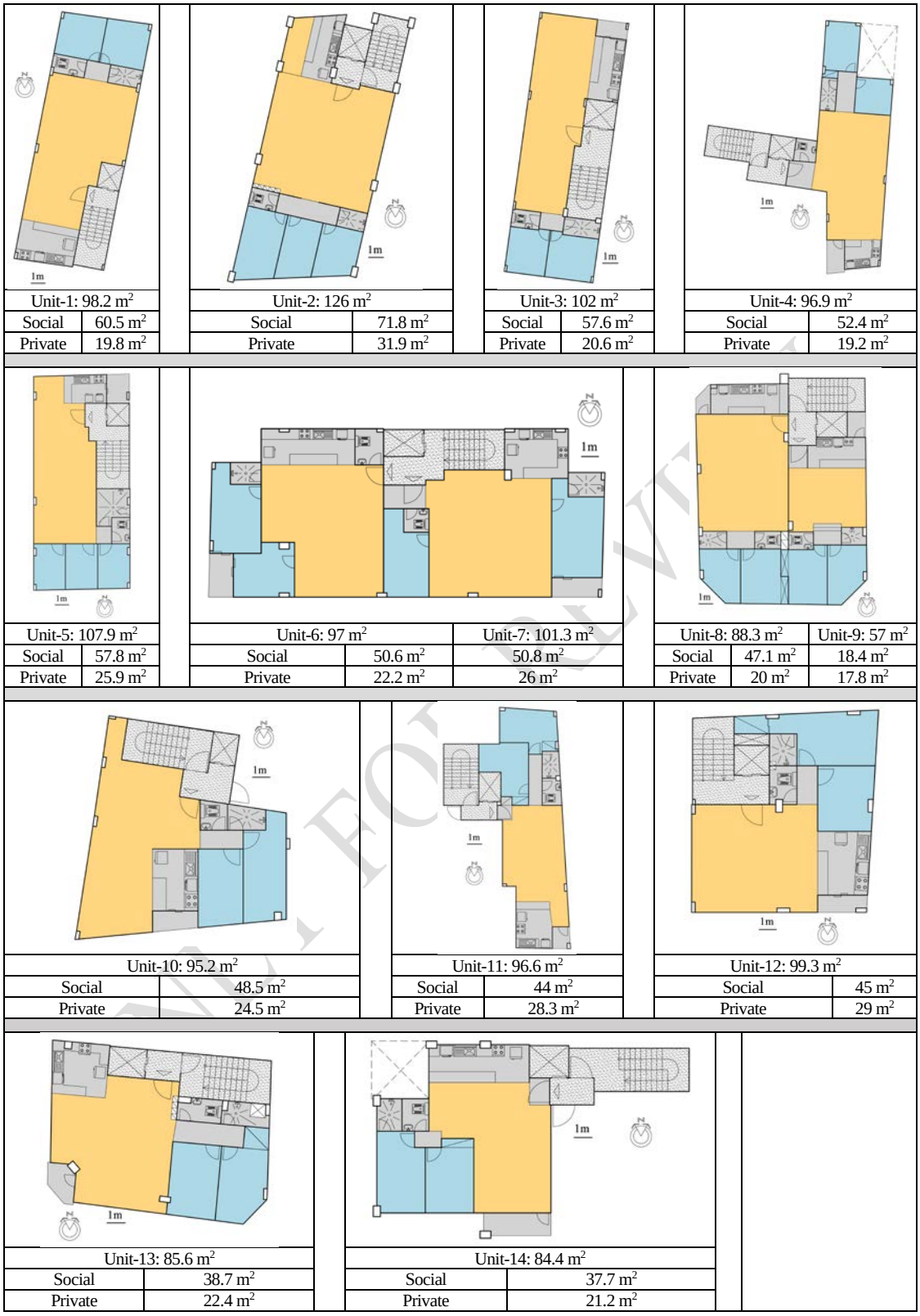
Private space is marginalized in terms of space allocation and attention to the interior layout quality. There is an extreme emphasis on the social area, with the main focus placed on this space. Additionally, other interior spaces are designed primarily to serve the social area. However, today, the role of bedrooms has evolved beyond mere sleeping and resting areas. They now accommodate a wide range of activities and neglecting them can significantly impact the overall living experience in residential units, distorting the balance between private space and social area.

**Layouts and Space Distribution**

We present the following unit layouts to illustrate key trends and patterns in design approaches toward social and private zones. We divided the layouts into units exceeding 75 m² (Figure 15) and units under 75 m² (Figure 16).

Our analysis of larger units uncovered some unexpected challenges. Even in spacious units, we found that bedroom design was a recurring issue. For instance, Unit-1 (98.2 m²) and Unit-3 (102 m²) had inadequate bedroom sizes despite their generous overall areas. This suggests that ample overall space does not necessarily result in optimal bedroom design in these cases. Some larger units exhibited challenges in establishing spatial hierarchies. Unit-5 (107.9 m²) and Unit-7 (101.3 m²) exemplify this issue, highlighting that size alone does not ensure effective space arrangement and hierarchy. Additionally, most units showed extreme proportions in social area allocation. Unit-1 (98.2 m²) dedicated 61.6%, Unit-2 (126 m²) dedicated 57%, Unit-3 (102 m²) dedicated 56.5%, Unit-5 (107.9 m²) dedicated 53.6% of its area to social space, potentially at the expense of other functional needs. This extreme approach is observed in most samples above 75 m², which is mostly intensified by increasing the total area of the unit.

The following samples reveal that the social area consistently occupies the largest proportion of unit area. For other space functions, the designs generally adhere to the minimum dimensions specified in the regulations. In the examined samples, the social area, which consistently occupies the largest portion, is rarely divided into sub-spaces such as living room, dining room, and salon through solid dividing elements like walls. Spatial separation within the social area is primarily achieved through the use of non-fixed elements, mostly furniture.



| Unit-1: 98.2 m² | |
|---|---|
| Social | 60.5 m² |
| Private | 19.8 m² |

| Unit-2: 126 m² | |
|---|---|
| Social | 71.8 m² |
| Private | 31.9 m² |

| Unit-3: 102 m² | |
|---|---|
| Social | 57.6 m² |
| Private | 20.6 m² |

| Unit-4: 96.9 m² | |
|---|---|
| Social | 52.4 m² |
| Private | 19.2 m² |

| Unit-5: 107.9 m² | |
|---|---|
| Social | 57.8 m² |
| Private | 25.9 m² |

| Unit-6: 97 m² | |
|---|---|
| Social | 50.6 m² |
| Private | 22.2 m² |

| Unit-7: 101.3 m² |
|---|
| 50.8 m² |
| 26 m² |

| Unit-8: 88.3 m² | |
|---|---|
| Social | 47.1 m² |
| Private | 20 m² |

| Unit-9: 57 m² |
|---|
| 18.4 m² |
| 17.8 m² |

| Unit-10: 95.2 m² | |
|---|---|
| Social | 48.5 m² |
| Private | 24.5 m² |

| Unit-11: 96.6 m² | |
|---|---|
| Social | 44 m² |
| Private | 28.3 m² |

| Unit-12: 99.3 m² | |
|---|---|
| Social | 45 m² |
| Private | 29 m² |

| Unit-13: 85.6 m² | |
|---|---|
| Social | 38.7 m² |
| Private | 22.4 m² |

| Unit-14: 84.4 m² | |
|---|---|
| Social | 37.7 m² |
| Private | 21.2 m² |

**Figure 15.** *Interior* Layouts *of Units Exceeding 75 m²*

*Despite the generous overall size, these layouts demonstrate recurring challenges in bedroom design, spatial hierarchy, and disproportionate allocation of social area. We can observe a consistent emphasis on expansive social areas, often at the expense of private spaces and other space functions.*

| Unit-15: 29.5 m² | |
|---|---|
| Social | 8.4 m² |
| Private | 8.3 m² |

| Unit-16: 57 m² | | Unit-17: 46 m² | Unit-18: 64.8 m² |
|---|---|---|---|
| Social | 22.8 m² | 20.6 m² | 27.4 m² |
| Private | 19.4 m² | 9.7 m² | 18 m² |

| Unit-19: 72.4 m² | |
|---|---|
| Social | 29.2 m² |
| Private | 19.8 m² |

| Unit-20: 40 m² | |
|---|---|
| Social | 20.9 m² |
| Private | 8.5 m² |

| Unit-21: 58.3 m² | |
|---|---|
| Social | 24.3 m² |
| Private | 17.1 m² |

| Unit-22: 36.8 m² | |
|---|---|
| Social | 15.4 m² |
| Private | 9.2 m² |

| Unit-23: 31.3 m² | |
|---|---|
| Social | 13.1 m² |
| Private | 8.1 m² |

| Unit-24: 35 m² | |
|---|---|
| Social | 15.9 m² |
| Private | 8.2 m² |

| Unit-25: 58 m² | |
|---|---|
| Social | 24.3 m² |
| Private | 15.3 m² |

| Unit-26: 43.7 m² | |
|---|---|
| Social | 19.4 m² |
| Private | 10.2 m² |

| Unit-27: 38.8 m² | |
|---|---|
| Social | 17.4 m² |
| Private | 7.5 m² |

| Unit-28: 36.3 m² | |
|---|---|
| Social | 14.4 m² |
| Private | 8 m² |

| Unit-29: 41.6 m² | | Unit-30: 41.4 m² |
|---|---|---|
| Social | 20.6 m² | 21.6 m² |
| Private | 10.5 m² | 9.5 m² |

| Unit-31: 71.3 m² | |
|---|---|
| Social | 36.2 m² |
| Private | 17 m² |

**Figure 16.** *Interior Layouts of* Units *Under 75 m²*

*The following layouts show design challenges in compact spaces, including issues with bedroom sizes, aspect ratios, and shapes. We can see the lack of spatial hierarchy between private and social zones, and the frequent placement of bathroom doors opening into bedrooms to optimize the living room, particularly in units under 50 m².*

In the smaller units' category, illustrated in Figure 16, bedroom design issues were particularly evident. Several units, including Units 15, 16, 18, 19, 20, 22, and 23, exhibited challenges with bedroom size, aspect ratio, and overall shape. This indicates the limitations of design on limited land plots with narrow widths, which often lead to irregular geometry in their floor plans. Many smaller units demonstrated difficulties in maintaining clear spatial hierarchies between different space functions, particularly between private and social zones. This was observed across various sizes within this category, from the smallest example, Unit-15 (29.5 $m^2$), to larger ones like Unit-31 (71.3 $m^2$).

In samples with compact areas, where space optimization is crucial, bathroom doors frequently open into bedrooms to maintain the efficiency of the living room. This design approach, however, affects the efficiency and privacy of the bedroom. In several unit examples, particularly those under 50 $m^2$, such as Unit-23 (31.3 $m^2$) and Unit-30 (41.4 $m^2$), demonstrate this compromise, highlighting the trade-offs often necessary in compact designs. This pattern is also established in Units 15, 17, 23, 24, 26, 27, 28, 29, and 30. Despite all these efforts, achieving an optimal shape and size for the social area in small units with narrow widths and irregular floor plans was challenging, as seen in Unit-19 (72.4 $m^2$) and Unit-20 (40 $m^2$).

Many larger units face challenges in efficiently utilizing their available space, while smaller units often encounter difficulties accommodating all necessary functions. In both cases, bedroom design in comparison with the social area, consistently stands out as an area needing improvement, highlighting its importance in optimizing residential layouts.

## Conclusion

In concluding this study on the dynamic interaction between social and private spaces in Tehran's District 9 residential units, our analysis reveals distinct trends shaped by cultural norms, space constraints, and related rules and regulations. In smaller housing units, mostly between 35 and 75 $m^2$, the interior layout and the allocation of different spaces tend to be more uniform and consistent, with less variety and closely limited to the minimum mandatory rules and regulations. There is a more balanced approach to allocating and distributing space among various space functions in smaller units. Notably, a considerable number of these units fail to meet the minimum area requirements for bedrooms, a trend that appears more pronounced in units exceeding 75 $m^2$ where spatial constraints are less critical. Across all unit sizes, there is a clear preference for expanding the social area, often at the expense of private space. This has resulted in bedrooms frequently adhering to or, even in numerous cases, falling short of the minimum spatial standards. The focus tends to be on providing two bedrooms as a nod to family privacy, yet there is often less consideration for the quality of these bedrooms in the private zone.

Particularly in larger units, there is a notable emphasis on expansive social areas, overshadowing the attention to private spaces. Interestingly, no specific regulations mandating minimum sizes for the living room, dining room, or salon exist. In more expansive units, these spaces often overlap each other with no clear boundaries, making it difficult to distinguish them from one another. The social area mainly

consists of an integrated wide space, which is typically the most spacious and frequently utilized area within the residential unit. This preference appears to be voluntary, independent of existing regulations, and significantly influenced by social norms rooted in Iranian history and culture.

Despite ongoing changes in urban lifestyle and the challenges of providing adequate residential space in large cities, especially for lower-income residents in the central districts of Tehran, there appears to be a persistent preference among many residents for maintaining separation between the kitchen and social areas. On the other hand, despite the global trend towards individualism, Iranian society continues to exhibit a more family-oriented and collectivist approach in practice. The historical, traditional, and cultural values deeply rooted in Iranian society manifest in the design of residential units, emphasizing open, unobstructed, and adaptable social areas.

However, while fostering communal interactions, this extreme focus on social areas unintentionally diminishes the quality and dynamics of private spaces. Recent lifestyle changes and economic conditions have also impacted traditional social practices. Family gatherings and ceremonies are increasingly held in public spaces such as cafes, salons, restaurants, and mosques, challenging the interior space arrangement focused on hosting such events at home. The potential rise of remote working and online jobs further emphasizes the need for adaptable private spaces that can serve as home offices, though this requires further investigation in the context of Tehran's housing. The present contrast between rapid socio-cultural changes in recent years and interior residential layouts can be explained by the slow pace at which cultural and social changes influence the design and layout of interiors. The reason for this delay is because the arrangement of interior layouts has a solid nature and is slow to adapt to new societal trends and preferences.

In Iranian housing, while the desire for collective and familial interactions remains a strong cultural undercurrent, there is a growing demand to balance this with individual privacy and personal space needs. Especially in the contemporary era, there is a high emphasis on privacy and individual needs, even in traditionally rooted societies like Iran. Balancing the collective with the individual in residential unit designs can optimize interior space usage and enhance the overall quality of space. This study underscores the need for a more nuanced approach to urban residential design that harmoniously blends traditional values with modern living requirements.



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