# Evolutionary Characteristics of Floor Plan Design in Public Rental Housing in Korean New Towns: Case Studies from 1990 to 2010

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# Evolutionary Characteristics of Floor Plan Design in Public Rental Housing in Korean New Towns: Case Studies from 1990 to 2010

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**Abstract**

Since the construction of permanent rental housing in new towns began in the 1980s, South Korea has continuously supplied public rental housing. However, research on the qualitative changes in the floor plans of public rental housing and the institutional factors influencing these changes remains limited. This study examines the characteristics of changes in the floor plans of public rental housing in South Korean new towns by analyzing floor plan elements according to construction period and housing size, as well as the related legal and institutional frameworks that influenced the planning process. To achieve this, floor plan types were classified according to housing size for each development period, and the characteristics of floor plan elements were analyzed by type. In addition, floor plan types were compared according to housing size and construction period, and the causes of floor plan changes were examined through an analysis of the relevant legal and institutional frameworks that influenced floor plan planning. The results show that in the 1990s elongated floor plans with a one-bay structure centered on combined living and sleeping spaces were developed under dimensional regulations for individual rooms. In the 2000s, following the legalization of balcony expansion, floor plan types adopting two-bay and three-bay structures began to diversify. In the 2010s, floor plan types became further subdivided under district unit plan regulations and detailed guidelines of public institutions, and the variety of floor plans increased as housing unit size expanded. These findings indicate that the evolution of public rental housing floor plans has been shaped not only by design development but also by policy objectives and institutional frameworks. The results also provide important implications for housing policy and design standards aimed at improving the residential quality of public rental housing in the future.

**Keywords:** public rental housing; floor plan; new towns; institutional regulation; housing policy; South Korea

## 1. Introduction

Republic of Korea began supplying permanent rental housing following the announcement of the 'Two Million Housing Construction Plan' in 1989, as part of efforts to stabilize housing for low- and middle-income households. In addition to permanent rental housing, public rental housing has been divided into various types such as national rental housing, happy housing, and long-term rental housing, and has been built and supplied as an apartment complexes in new towns mainly developed by the public, such as Seongnam Bundang Housing Development District [1].

Public rental housing in Korea has been positively evaluated for the past 30 years in terms of a stable housing tool for the socially vulnerable groups and low- and middle-income households and the rapid large-scale supply of apartment complexes. As the focus is on the quantitative supply of public rental housing, there have also been steadily raised limitations that the plan did not fully reflect changes in demand such as changing family structures, lifestyles, and individual housing

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preferences [2]. These problems have resulted in an increase in the vacancy rate of public rental housing over time, especially in some types and sizes of housing [3,4].

This mismatch between supply and demand is largely attributed to the fact that the spatial composition and floor plans of housing units did not adequately reflect the needs of actual residents, as well as the location and external conditions of the complex [5]. In particular, the floor plan of public rental housing mainly created in new cities seems to have tended to be uniform in design according to certain standards such as planning standards of public institutions and district unit plans of the development district. As a result of prioritizing rapid supply and cost reduction of public rental housing, there may have been limitations in reflecting diverse household types and lifestyles. This legal and institutional framework made it difficult to introduce variability between generations or customized floor plans, and as a result, some housing types became separated from the needs of end-users and led to an increase in the vacancy rate [3,4].

Private-sector apartments, on the other hand, have attempted to diversify and differentiate the floor plan composition through relatively flexible planning and marketing strategies while complying with related laws such as the Building Act and the Regulations on Housing Construction Standards. However, public rental housing has been designed according to specific and rigid planning guidelines such as the 'LH Architectural Design Guidelines', which may have limited the flexibility and diversity of floor plans. In particular, public rental housing was placed under rigid constraints in planning the minimum area of unit households, composition by room, circulation standards, and arrangement of main buildings, which acted as a factor that hindered the possibility of change in floor plan and design flexibility [5].

Systems such as district unit planning and architectural review procedures also served as the background for further deepening the difference in design between the private and public sectors. Since the increase in unsold housing units in the early 2000s, Private-sector apartments have strengthened user-oriented differentiation strategies in floor plan and external space planning through the branding of apartment complexes, and changes that reflect consumer needs have been continuously made. In contrast, because the achievement of quantitative supply targets was prioritized in public rental housing, improvements in the quality of spatial planning tended to be relatively secondary.

In this context, the plan for public rental housing has been centered on standardization within an institutional framework and securing the efficiency of construction costs rather than a design approach to improving the quality of housing, and as a result, the planning gap with the private sector has accumulated. In this context, empirical studies that examine how the floor plans of public rental housing have been shaped and evolved in response to changing social demands and institutional contexts remain limited.

Therefore, this study aims to analyze how the floor plans of public rental housing developed over the past 30 years have evolved over time and how these changes have been influenced by laws and policies related to architecture and housing. The findings of this study may contribute to improving institutional frameworks and establishing related standards to enhance the quality of spatial planning in public rental housing. They may also provide useful references for housing policy development in Asian developing countries where public rental housing programs are expanding.

## 2. Literature Review

### *2.1. Policy and Institutional Framework of Public Rental Housing*

Public rental housing refers to housing built, purchased, and managed by the state, local governments, or public institutions, and supplied at low rents to households below a certain income level or to socially vulnerable groups. Public rental housing in Korea began to be supplied in earnest in new towns following the introduction of permanent rental housing in 1989, and public rental housing policies have changed significantly depending on each administration. These changes have

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influenced housing planning by institutionalizing it through building laws and district unit plans [7,8].

In 1989, the Roh Tae-woo administration set the expansion of housing supply as a major task of the state administration and promoted the "Construction Plan for 250,000 Permanent Rental Housing Units" in accordance with the 'Two Million Housing Construction Plan'. This is considered the starting point for the large-scale supply of public rental housing, and during this period, permanent rental housing was first constructed in the first-generation new towns such as Bundang and Ilsan. In addition, it was intended to build housing more smoothly than before by easing regulations such as relaxing the minimum distance between residential buildings under the Building Act along with the development of the first=generation new town [7,9,10].

In 1993, the Kim Young-sam administration revised the Rental Housing Act to lay the institutional foundation for public rental housing and institutionalize the supply of long-term public rental housing by diversifying the period of rental obligations, and began supplying 50-year public rental housing of various sizes [6,7,9,10].

In 1998, the Kim Dae-jung government introduced the National Rental Housing System as a policy tool to stabilize housing amid the worsening economic situation for low- and middle-income households after the IMF financial crisis, and in 2002, the National Rental Housing Construction Plan was announced to promote large-scale supply. During this period, related laws such as the Housing Act and the Rental Housing Act were enacted and revised, and the regulations on the separation distance and number of floors between residential buildings were more relaxed than before under the Building Act [7,9,10].

The Roh Moo-hyun government, which was launched in 2003, inherited the previous government's policy to specify the construction of 1 million national rental housing units, and expanded the target groups of public rental housing beyond socially vulnerable households, such as basic living recipients and the disabled, to include the middle class and newlyweds, thereby multilayering the demand base for rental housing. [7,9,10].

In 2008, the Lee Myung-bak government implemented 「the Bogeumjari Housing Supply Policy 」 in earnest by integrating public for-sale housing and rental housing policies for the housing-vulnerable households. During this period, various types of public rental housing, including not only permanent rental housing and national rental housing, but also 10-year rental housing and long-term rental housing, were introduced, and the supply form and scale were further diversified [7,9,10].

In 2013, the Park Geun-hye government enacted the Special Act on Public Housing Construction, etc., and introduced a new type of public rental housing, Happy Housing, to resolve the blind spots of housing stability support by expanding the targets of public rental housing to college students and newcomers to society [9,10].

Korea's public rental housing-related policies have changed in terms of supply targets and methods across different administrations, and these policy changes have been accompanied by revisions and new establishments of related laws and systems. The Regulations on Housing Construction Standards, etc. and the Building Act, which are linked to the Housing Act, have had a substantial impact on the planning of public rental housing complexes and the floor plans of individual housing units, and have restricted or guided spatial configurations and design methods [2,11,12]. Therefore, the design direction of public rental housing in Korea has been structured largely by legal and institutional frameworks rather than determined solely by designers' intentions.

### *2.2. Studies on the Planning of Public Rental Housing*

Recent studies on public rental housing have commonly suggested that legal regulations, space standards, and policy guidelines have played an important role in determining design factors.

Deng et al. (2016) analyzed the evolution of public rental housing in Hong Kong over several decades, showing that its design has changed in response to complex factors such as policy, society, and the economy. They visualized this process as a "design evolution map," demonstrating that these changes were the result of institutional responses rather than merely spatial transformations [13].

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Kim et al. (2023) presented the limitation that the minimum housing standards established to protect residential rights and improve the residential environment do not sufficiently reflect the realistic aspect and suggested improvement measures. [14].

Ozer & Jacoby (2024) compared cases of auxiliary housing in 20 countries to consider how spatial standards, legal regulations, and design guidelines affected the floor plan and proved that these criteria determine design outcomes [15].

Daniel & Lluis (2024) analyzed that Sweden's residential design handbook has no legal force, but has been applied as a practical design standard and has had a real impact on the spatial composition and functional planning of public housing since the 1940s [16].

Kim & Roh (2025) analyzed that changes in Korea's public rental housing-related policies have had a substantial impact on the layout plan of apartment complexes by period [7].

These studies suggest that the floor plan of public rental housing is not simply formed by consumer demand or designer autonomy, but has been closely linked to various external factors such as institutions, policies, and cultures to form spatial composition, hierarchy, and types. In particular, institutional regulations are said to act as structural devices that affect detailed designs such as spatial composition, area distribution, and circulation system within individual households units as well as density and arrangement at the level of apartment complex planning. Furthermore, it shows the importance of structurally considering not only the existence of laws and norms, but also how they are reflected in the actual design.

In addition, a study that analyzed how the plane has changed according to the supply period, consumer characteristics, and supply method of Korean rental housing is as follows.

Yoon et al. (2010) analyzed the change in the area of national rental housing in Daegu in the 2000s, and found that the proportion of common spaces such as living rooms, kitchens, and restaurants increased, while the area of private spaces such as bedrooms decreased, reflecting changes in residential culture centered on family activities [2].

Kim (2018) compared the floor plan of national rental housing in the 1970s and 1980s and 2010s, revealing that in the past, bedroom-centered space composition was common, but recently, the proportion of public spaces such as living rooms has expanded and the hierarchy of spaces has changed [12].

The floor plan analysis of rental housing related to household types and social classes has also been continued. Han and (2019) compared the spatial characteristics of kitchen and restaurant arrangements for public rental, public distribution, and private distribution apartments in Wirye New Town [17]. As a result of the analysis, it was found that the spatial composition method was different according to the type of supply, which was related to the formation of a spatial hierarchy according to social and economic classes.

Kim et al. (2024) analyzed the unit household plan of public rental housing for the elderly, pointed out the problem of the uniformity of the one-bedroom structure and the lack of indoor comfort, and emphasized the need to diversify flat types reflecting various elderly demands [18].

In addition, Park and Chae (2020), who focused on the functionality and standard adequacy of the flat composition, calculated the appropriate residential area of public rental housing from the perspective of universal design and pointed out that the existing housing standards do not sufficiently reflect various household types and residential characteristics. This study suggested the need to improve the design standards to fill the gap between physical standards and living conditions [19].

The prior studies show that the floor plan of public rental housing has been structured in the context of timing, supply type, social structure change, and interaction with policy and institutional frameworks, not just by designer autonomy or consumer choice.

Overseas studies empirically present the structural impact of legal systems and design guidelines on the hierarchy, type fixation, and repeatability of spatial composition, and domestic studies also empirically reveal the characteristics of spatial planning according to changes in supply types and household characteristics. However, most domestic studies are limited to specific time

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points or cases, and studies that interpret the structural relationship between time series changes in plan planning and the institutional context surrounding it are insufficient.

### *2.3. Contribution of This Study*

Existing studies on public rental housing have mainly examined planning characteristics, related policies, and residents' housing satisfaction, often focusing on specific housing supply types at particular time periods or on case studies limited to specific regions. This study aims to gain insight into the qualitative changes in public rental housing floor plans in Korea over the past 30 years. Specifically, this study compares and analyzes the characteristics of public rental housing floor plans by period and presents empirical findings by examining the related laws and institutional frameworks that have influenced these changes. This study differs from previous studies in that it attempts to clarify the structural relationship between design autonomy and institutional rigidity.

## 3. Methodology

### *3.1. Research Process*

The research was conducted in the following steps.

First, in order to analyze cases of public rental housing by period, the construction periods after 1990 were classified and the case study sites were selected. Second, to analyze the characteristics of public rental housing floor plans, an analytical framework was established by deriving planning elements affecting housing unit floor plans from previous studies. Third, the types of public rental housing based on unit floor area by construction period were classified, and the characteristics of floor plan elements for each type were analyzed using the established analytical framework. Fourth, a comparative analysis of floor plan types was conducted according to housing unit size and construction period. In addition, the causes of changes in floor plans were examined through analysis of the related legal systems that influenced floor plan design. Finally, based on the analysis results, the characteristics of changes in public rental housing floor plans were discussed and key insights into these changes were presented.

### *3.2. Scope and Case Selection of the Study*

In order to empirically analyze changes in public rental housing floor plans, this study selected public rental housing complexes supplied over the past 30 years since the introduction of permanent rental housing in 1989. The spatial scope targets areas in which public rental housing has been built of a certain size among the first- and second-generation new towns. The analysis is limited to permanent rental housing and national rental housing constructed from the 1990s to the present. In the 1990s, the supply of permanent rental housing for basic living recipients and the socially vulnerable groups began in earnest under the "Two Million Housing Construction Plan". Accordingly, public rental housing complexes in Bundang District of Seongnam and Ilsan District of Goyang were selected as analysis cases among the first-generation new towns. The 2000s were a time when national rental housing was mainly supplied as the target groups expanded to the middle class and newlyweds, including the low-income class, to expand social welfare and stabilize housing for low- and middle-income households. Public rental housing complexes in Dongtan District 1 of Hwaseong, Unjeong District of Paju, and Hyangnam District of Hwaseong were selected as analysis cases among the second-generation new towns developed after 2003. The 2010s were a time when the supply of customized public rental housing to respond to consumers by life-cycle stages, including multi-child households, college students, and young adults entering society, focusing on creative economy and welfare improvement. Public rental housing complexes in Pangyo District of Seongnam and Byeolnae District of Namyangju were selected as analysis cases among new towns that were primarily developed and occupied during this period. [20].

The target sites for public rental housing case analysis by construction period are summarized as follows. Table 1. summarizes the selected case study sites by construction period.

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**Table 1.** Case Study Sites for Analysis.

| Period | Site | Number of Complexes | Number of Households |
|---|---|---|---|
| 1990s * | Bundang District, Seongnam | 7 | 9,317 |
| | Ilsan Districtm, Goyang | 7 | 3,203 |
| | Subtotal | 10 | 12,520 |
| 2000's | Dongtan2 District, Hwaseong | 5 | 4,752 |
| | Unjeong District, Paju | 5 | 5,151 |
| | Hyandnam District, Hwaseong | 3 | 3,421 |
| | Subtotal | 13 | 13,324 |
| 2010's | Pangyo District, Seongnam | 3 | 4,994 |
| | Byeolnae District, Namyangju | 11 | 8,781 |
| | Subtotal | 14 | 13,775 |
| | Total | 37 | 39,619 |

*3.3. Analytical Framework*

In order to analyze the characteristics of floor plans of public rental housing by period, the analytical framework was established by reviewing the planning elements related to apartment floor plans identified in previous studies. As a result of the review of previous studies, the composition and arrangement of spaces in the unit, the area and proportion by space, the width-to-depth ratio of housing units, the bay structure, and the area of the balconies were derived as analytical items [21–25]. Based on this review, the bay structure and the width-to-depth ratio of housing units were set as analysis items in relation to the composition and arrangement of each space, the space area and proportion, and the plan configuration.

**Table 2.** Apartment Floor Plan Analysis Items in Previous Studies.

| Floor Plan Elements | 1 | 2 | 3 | 4 | 5 | Selected Items |
|---|---|---|---|---|---|---|
| Spatial composition & arrangement | O | | O | O | O | ◎ |
| Size of each space | O | O | O | O | O | ◎ |
| width-to-depth ratio | O | | O | O | | ◎ |
| Bay Structure | | | O | O | O | ◎ |
| Balcony area and number | O | | | | | |
| Staircase layout | | O | | | | |

[1] 1 Lee, J.H. et al.(2010) 2 Kim, H.B.(2015) 3 Choi. I.,J. et al.(2008) 4 Liu, L.(2013). 5 Choi, J.W. et al.(2016).

**Table 3.** Analytical Framework.

| No. | Analysis Item | Description |
|---|---|---|
| 1 | Spatial composition and arrangement | • Composition of spaces such as bedrooms, living rooms, kitchens, and bathrooms<br>• Connection patterns among entrance, living room, kitchen, and bedrooms |
| 2 | Size of spaces | •Area and proportion of each space |
| 3 | plan configuration | • Bay structure<br>• width-to-depth ratio |

## 4. Results and Analysis

*4.1. Analysis of Floor Plan Characteristics of Public Rental Housing by Period*

4.1.1. Characteristics of Public Rental Housing Floor Plans in 1990s

In the 1990s, the floor area of housing units in public rental housing complexes ranged from a minimum of 26 $m^2$ to a maximum of 49 $m^2$. Based on unit size, spatial composition, and arrangement,

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the floor plan types were classified into two types in the 20 m² range, three types in the 30 m² range, and four types in the 40 m² range.

**Table 4.** Overview of Public Rental Housing Floor Plan Types in the 1990s.

| Category | Type | Unit Floor Area (m²) | Number of Households | Ratio (%) | Number of Complexes | Remarks |
|---|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A | 26 | 1,264 | 10.28 | 1 | |
| | 20B | 26 | 2,086 | 16.96 | 4 | |
| | Subtotal | | 3,350 | | | |
| ≥30 m² <40 m² | 30A | 31, 35, 36, 37, 38, 39 | 6,051 | 49.20 | 9 | |
| | 30B | 35, 36 | 269 | 2.19 | 2 | End Unit |
| | 30C | 39 | 399 | 3.24 | 2 | |
| | Subtotal | | 1,719 | | | |
| ≥40 m² <50 m | 40A | 41, 42 | 1,306 | 10.62 | 4 | |
| | 40B | 42 | 420 | 3.41 | 1 | |
| | 40C | 42 | 60 | 0.49 | 1 | Staircase type |
| | 40D | 49 | 445 | 3.62 | 2 | |
| | Subtotal | | | | | |

The floor plan of the 20 m² range consists of a combined living and sleeping space, a bedroom, a kitchen–dining space, a bathroom, and a balcony. It is divided into 20A and 20B types according to location of the kitchen–dining space. The combined living and sleeping space occupies the largest proportion of the unit, with an average of 9.91 m² (37.56%), followed by kitchen–dining space with an average area of 7.39 m² (28%). The average width-to-depth ratio of units is 2.61, representing a typical one-bay configuration.

The spatial composition of the 30 m² range is similar to that of the 20 m² range; however, the types are classified according to the bay structure and the composition of the balcony. The most basic type, 30A, has the same one-bay structure as the 20A type and accounts for the largest proportion, representing 49.2% of the public rental housing supplied in the 1990s. In addition, the 30B and 30C types, located at the ends of corridor-type apartment buildings, have a two-bay structure. Unlike the 30A type, in which the kitchen–dining space also functions as a corridor, the 30B and 30C types provide a more clearly defined spatial territory. In particular, in the 30B type, which is located at the end units of the apartment building, the kitchen–dining space is arranged on the south side adjacent to the combined living and sleeping space. This configuration represents a unique spatial arrangement among the public rental housing floor plans of the 1990s. The area of the combined living and sleeping space ranges from 21.8% to 38.1% of the total unit area, and the kitchen–dining space occupies between 25% and 33.5%. In terms of balcony area, 30A type has an average balcony size of 6.1 m², whereas the two-bay types (30B and 30C) have larger balconies of approximately 7.0 m² and 8.8 m². Regarding the width-to-depth ratio, the one-bay type (30A) has a ratio of 2.40, while the two-bay types (30B and 30C) have ratios of 1.83 and 1.86, respectively.

Changes in spatial composition are observed in the 40 m² range. While the 40A and 40B types still include a combined living and sleeping space, the 40C and 40D types separate the living room and the bedroom, resulting in a layout consisting of one living room, two bedrooms, a kitchen–dining space, and a bathroom. The most commonly supplied type, 40A, has a one-bay structure centered on the bedroom and living space. In contrast, the 40C and 40D types adopt a two-bay structure, in which the living room and bedrooms are arranged separately along the front façade of the unit. Furthermore, the kitchen–dining space in these types functions as an independent space rather than as a circulation corridor. Among public rental housing in the 1990s, the 40C type was the only case designed within a staircase-type residential building. In this type, the rear side of the housing unit

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also faced the exterior, which allows an additional balcony to be installed on that side. In terms of space size, the combined living and sleeping space of the most frequently constructed 40A type accounts for 38.3% of the unit area, which is larger than the average proportion of 35.9% observed in the 20 m² and 30 m² unit types. In the 40C and 40D types, the living room areas are 11.1 m² (25.8%) and 7.2 m² (14.4%), respectively. The kitchen–dining space ranges from 9.3 m² (21.7%) to 13.0 m² (30.2%). This is slightly smaller than the average area of 9.0 m² (26.9%) observed in the 20 m² and 30 m² unit types, where the kitchen–dining space also functions as a corridor. The reduction in size appears to result from the fact that the kitchen–dining space is planned as an independent functional space rather than as part of the circulation area. Regarding balcony size, the one-bay 40A type has an average balcony area of 6.8 m², whereas the two-bay types (40B–40D) have a larger average balcony area of 9.7 m². In terms of the width-to-depth ratio, the 40A type shows an average ratio of 2.49, while the two-bay types (40B, 40C, and 40D) show a ratio of approximately 1.51.

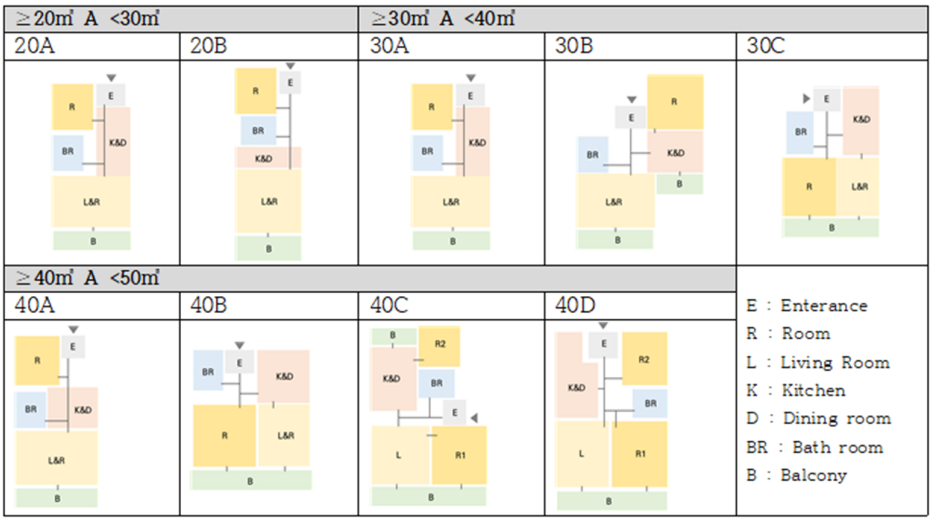


**Figure 1.** Types of spatial layout in public rental housing floor plans in the 1990s.

**Table 5.** Area of Major Spaces in Public Rental Housing (1990s).

| Type | | L&R | R | L | K&D | Others | Balcony |
|---|---|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A | 9.9(37.5) | 5.7(21.5) | - | 6.6(25.2) | 4.2(15.9) | 5.4 |
| | 20B | 9.9(37.6) | 5.0(19.2) | - | 7.6(28.7) | 3.6(13.8) | 5.2 |
| ≥30 m² <40 m² | 30A | 13.2(38.1) | 6.3(18.1) | - | 8.7(25.0) | 6.5(18.6) | 6.1 |
| | 30B | 11.5(32.2) | 6.8(18.9) | - | 10.6(29.7) | 6.9(19.1) | 7.0 |
| | 30C | 8.5(21.9) | 10.4(26.7) | - | 13.1(33.5) | 7.0(18.0) | 8.8 |
| ≥40 m² <50 m | 40A | 16.3(38.3) | 6.6(15.5) | ) | 11.0(22.0) | 9.1(20.4) | 6.8 |
| | 40B | 9.7(22.7) | 13.0(30.3) | - | 13.0(30.3) | 7.2(16.8) | 9.5 |
| | 40C | - | 17.1(39.8) | 11.1(25.8) | 9.3(21.7) | 5.4(12.6) | 12.1 |
| | 40D | - | 18.0(36.2) | 7.2(14.4) | 14.7(29.7) | 9.8(19.7) | 8.6 |

**Table 6.** Plan Configuration of Public Rental Housing(1990s).

| Type | | frontage width | Depth | Width-to-depth ratio | number of bays |
|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A | 3.60 | 9.30 | 2.58 | 1 |
| | 20B | 3.38 | 8.94 | 2.64 | 1 |
| ≥30 m² <40 m² | 30A | 4.20 | 10.10 | 2.40 | 1 |
| | 30B | 5.40 | 9.90 | 1.83 | 2 |
| | 30C | 5.80 | 10.80 | 1.86 | 2 |
| ≥40 m² <50 m | 40A | 4.50 | 11.20 | 2.49 | 1 |
| | 40B | 6.30 | 8.30 | 1.32 | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| | 40C | 6.00 | 9.10 | 1.52 | 2 |
| | 40D | 5.70 | 9.70 | 1.70 | 2 |

4.1.2. Characteristics of Public Rental Housing Floor Plans in 2000s

In the 2000s, the floor area of housing units in public rental housing complexes ranged from a minimum of 26 m² to a maximum of 59 m². Based on unit size, spatial composition, and arrangement, the floor plan types were classified into one type in the 20 m² range, three types in the 30 m² range, two types in the 40 m² range, and four types in the 50 m² range.

**Table 7.** Overview of Public Rental Housing Floor Plan Types in the 2000s.

| Category | Type | Unit Floor Area (m²) | Number of Households | Ratio (%) | Number of Complexes | Remarks |
|---|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A | 26 | 296 | 2.20 | 2 | |
| | Subtotal | | 296 | 2.20 | | |
| ≥30 m² <40 m² | 30A-1 | 36, 39 | 1,646 | 12.24 | 7 | |
| | 30A-2 | 36, 39 | 1,504 | 11.18 | 6 | End Unit |
| | 30A-3 | 39 | 353 | 2.62 | 3 | End Unit |
| | 30B-1 | 36 | 495 | 3.68 | 3 | |
| | 30B-2 | 36 | 86 | 0.64 | 1 | End Unit |
| | 30C | 39 | 136 | 1.01 | | |
| | Subtotal | | 4,220 | | | |
| ≥40 m² <50 m | 40A-1 | 45, 46, 47 | 2,698 | 20.06 | 11 | |
| | 40A-2 | 45, 46, 47 | 990 | 7.36 | 6 | End Unit |
| | 40A-3 | 45, 46, 47 | 1,083 | 8.05 | 6 | End Unit |
| | 40A-4 | 46 | 368 | 2.74 | 2 | End Unit |
| | 40B | 45 | 27 | 0.20 | 1 | |
| | Subtotal | | 5,166 | | | |
| ≥50 m² <60 m | 50A-1 | 51 | 2,029 | 15.09 | 10 | |
| | 50A-2 | 51 | 574 | 4.27 | 6 | End Unit |
| | 50A-3 | 51, 59 | 490 | 3.64 | 3 | Staircase type |
| | 50B | 59 | 475 | 3.53 | 4 | Staircase type |
| | 50C | 59 | 110 | 0.82 | 1 | Staircase type |
| | 50D | 59 | 88 | 0.65 | 2 | Staircase type |
| | Subtotal | | 3,766 | | | |
| | Total | | 13,448 | 100.0 | | |

The floor plan in the 20 m² range is a one-room type in which the bedroom, living room, and kitchen–dining space are integrated into a single space. The main space occupies 20.2 m², accounting for 76.6% of the unit area. The width-to-depth ratio is 2.07, representing a one-bay structure.

The spatial composition of units in the 30 m² range is classified according to the bay structure and balcony. In general, the units consist of a combined living and sleeping space, a bedroom, a kitchen–dining space, a bathroom, and a balcony. Only the 30D type has the living room and bedroom arranged as separate spaces. The most common type, 30A-1, has a one-bay structure. The 30A-2 and 30A-3 types are variations of the 30A-1 type, in which the position of the entrance door or the balcony configuration is modified. In these cases, the units are located at the ends of corridor-type apartment buildings, and the layouts appear to have been modified by utilizing the dead-end corridor space. The 30B and 30C types adopt a two-bay structure, in which the bedroom is arranged

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on the front side of the unit, resulting in an expanded balcony. Unlike the 30A type, where the kitchen–dining space also functions as a corridor, the kitchen–dining space in the 30B and 30C types is planned as an independent space with clear territoriality. The area of the combined living and sleeping space of 30A and 30B types ranges from 10.0 m² (27.1%) to 15.0 m² (38.0%), while the kitchen–dining space ranges from 9.7 m² (26.4%) to 13.3 m² (35.9%). In particular, the kitchen–dining space in the 30B and 30C types has an average area of approximately 12 m², which is slightly larger than that of the 30A type (11.6 m²), where the space also functions as a corridor. Regarding balcony area, the 30A type has an average balcony size of 7.6 m², while the two-bay types (30B and 30C) have larger balconies of approximately 7.8 m² and 9.3 m², respectively. The width-to-depth ratio is 2.44 for the one-bay 30A type and 1.37 and 1.48 for the two-bay 30B and 30C types.

The floor plans in the 40 m² range generally adopt a two-bay structure and consist of a living room, two bedrooms, a kitchen–dining space, a bathroom, and a balcony. The most common type is 40A-1, in which the living room and main bedroom are arranged on the front side of the unit, while the kitchen–dining space and the secondary bedroom are located at the rear. The 40A-2, 40A-3, and 40A-4 types have a similar spatial arrangement to the 40A-1 type, but differ in terms of balcony additions or modifications to the entrance position. The 40B type also modifies the arrangement of the kitchen–dining space by utilizing the characteristics of the end units of the apartment building, allowing the balcony to be arranged toward the front side. In addition, as the kitchen–dining space is planned as a more independent space with clear territoriality, it is directly adjacent to the living room in all types except for the 40A-3 type. The living room area in the most common type, 40A-1, is 9.8 m² (21.0%), which is similar to those of the 40A-2 and 40A-3 types. The kitchen–dining space also shows a similar size of approximately 14.0 m² (30.0%). However, the balcony area averages 9.5 m², which is the smallest among the 40A types. In the 40B type, the configuration of the kitchen–dining space is atypical; however, its area is 13.1 m², which is not significantly different from that of the 40A type. The balcony area is 13 m², indicating an increase compared to the 40A-1 type. The width-to-depth ratio ranges from 1.43 to 1.82.

The floor plans in the 50 m² range are classified according to the number of bedrooms and the bay structure. The most common type, 50A-1, has a spatial configuration similar to that of the 40A-1 type and consists of a living room, two bedrooms, a kitchen–dining space, a bathroom, and a balcony. Each of the 50B, 50C, and 50D types have a floor area of 59 m² and consist of a living room, three bedrooms, a kitchen–dining space, a bathroom, and a balcony. In the 50 m² range, the most common type is 50A-1, in which the living room and the main bedroom are arranged on the front side of the unit, while the kitchen–dining space and the secondary bedroom are located at the rear. In the 50A-2 and 50A-3 types, the main spatial arrangement is similar to that of the 50A-1 type, but additional balconies are provided or the entrance location is modified. These modifications appear to be possible due to the location of the units at the ends of residential buildings or within staircase-type residential buildings. The 50B type has a two-bay structure, in which the secondary bedroom is accessed through the kitchen–dining space. The 50C and 50D types, which adopt a three-bay structure, have two bedrooms and the living room arranged on the front side of the unit. These configurations allow the number of bedrooms to increase as the unit size increases. In addition, two or more balconies are provided at the front or rear sides of the unit. This appears to be possible because these buildings are staircase-type residential buildings without corridor access. The living room area ranges from 14.4 m² (27.8%) to 18.6 m² (31.0%). In the 59 m² types (50B, 50C, and 50D), the average living room area increases to 17.7 m² (29.6%), compared with the 51 m² types. In contrast, the kitchen–dining space in the 50B, 50C, and 50D types has an average area of 8.5 m², which is smaller than that of the 50A types (average 12.2 m²). The balcony area ranges from 10.5 m² to 24.8 m². All types except 50A-1 and 50A-2 have balcony areas exceeding 20 m². The width-to-depth ratio ranges from 1.05 to 1.55, with an average of approximately 1.40. In particular, the 50C type adopts a three-bay structure, resulting in a nearly square plan shape.

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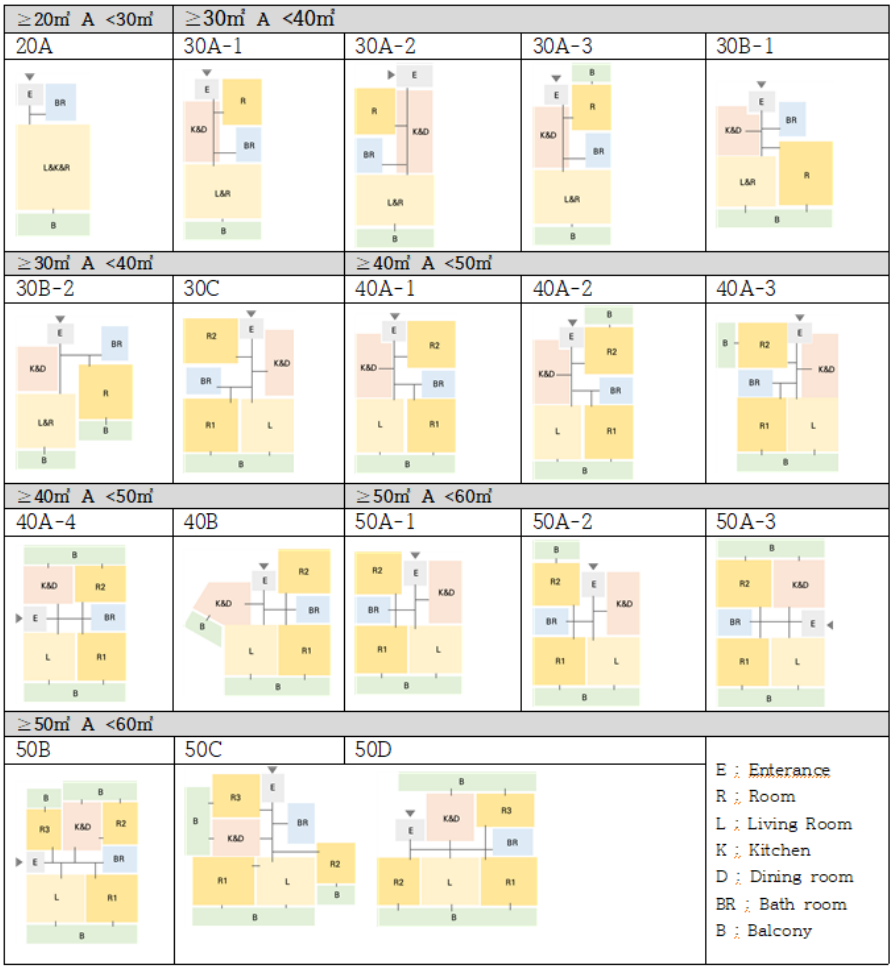


**Figure 2.** Types of spatial layout in public rental housing floor plans in the 2000s.

**Table 8.** Area of Major Spaces in Public Rental Housing (2000s).

| Type | | L&R | R | L | K&D | Others | Balcony |
|---|---|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A | 20.17(75.5) | - | - | - | 6.5(24.4) | 6.51 |
| ≥30 m² <40 m² | 30A-1 | 14.8(38.4) | 8.0(20.6) | - | 11.2(28.9) | 4.7(12.3) | 6.9 |
| | 30A-2 | 14.8(38.0) | 6.7(17.3) | - | 11.9(30.4) | 5.6(14.4) | 7.6 |
| | 30A-3 | 15.0(38.0) | 8.4(21.1) | - | 11.5(29.0) | 4.7(11.8) | 9.4 |
| | 30B-1 | 12.2(33.2) | 9.1(24.8) | - | 9.7(26.4) | 5.8(15.7) | 7.9 |
| | 30B-2 | 10.0(27.1) | 8.5(23.0) | - | 13.3(35.9) | 5.2(14.0) | 7.5 |
| | 30C | | 18.7(23.0) | 10.4(25.3) | 15.4(38.9) | 5.5(13.8) | 9.3 |
| ≥40 m² <50 m² | 40A-1 | - | 17.3(37.2) | 9.8(21.0) | 14.0(30.0) | 5.5(11.8) | 9.5 |
| | 40A-2 | - | 17.2(37.2) | 9.8(21.1) | 13.6(29.4) | 5.5(11.8) | 14.1 |
| | 40A-3 | - | 17.3(27.2) | 9.8(21.1) | 14.2(30.6) | 5.2(11.2) | 12.7 |
| | 40A-4 | - | 17.4(37.2) | 11.7(24.9) | 13.0(27.7) | 4.8(10.2) | 17.6 |
| | 40B | - | 17.2(37.5) | 9.9(21.6) | 13.1(28.6) | 5.6(12.2) | 13.0 |
| ≥50 m² <60 m² | 50A-1 | - | 19.5(37.5) | 14.4(27.8) | 12.5(24.2) | 5.5(10.5) | 10.5 |
| | 50A-2 | - | 19.3(37.1) | 14.7(28.3) | 12.5(24.0) | 5.5(10.6) | 14.8 |
| | 50A-3 | - | 20.9(36.7) | 17.0(29.5) | 10.3(18.1) | 8.7(15.7) | 20.5 |
| | 50B | - | 26.5(44.4) | 17.1(28.6) | 8.7(14.5) | 7.5(12.6) | 23.0 |
| | 50C | - | 27.2(45.4) | 18.6(31.0) | 8.4(14.0) | 5.8(9.6) | 23.4 |
| | 50D | - | 24.6(41.3) | 18.4(30.8) | 8.4(14.0) | 8.2(13.8) | 24.8 |

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**Table 9.** Plan Configuration of Public Rental Housing(2000s).

| Type | | frontage width | Depth | Width-to-depth ratio | number of bays |
|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A | 4.3 | 8.9 | 2.07 | 1 |
| ≥30 m² <40 m² | 30A-1 | 4.7 | 11.0 | 2.34 | 1 |
| | 30A-2 | 4.6 | 11.7 | 2.54 | 1 |
| | 30A-3 | 4.8 | 11.7 | 2.44 | 1 |
| | 30B-1 | 6.5 | 8.5 | 1.31 | 2 |
| | 30B-2 | 6.3 | 8.9 | 1.42 | 2 |
| | 30C | 6.5 | 9.6 | 1.48 | 2 |
| ≥40 m² <50 m² | 40A-1 | 6.5 | 9.8 | 1.51 | 2 |
| | 40A-2 | 6.5 | 10.7 | 1.65 | 2 |
| | 40A-3 | 6.5 | 10.1 | 1.55 | 2 |
| | 40A-4 | 6.6 | 12.0 | 1.82 | 2 |
| | 40B | 6.7 | 9.6 | 1.43 | 2 |
| ≥50 m² <60 m² | 50A-1 | 6.9 | 9.9 | 1.44 | 2 |
| | 50A-2 | 6.9 | 10.7 | 1.55 | 2 |
| | 50A-3 | 7.5 | 11.5 | 1.53 | 2 |
| | 50B | 7.8 | 11.6 | 1.49 | 2 |
| | 50C | 10.3 | 10.8 | 1.05 | 3 |
| | 50D | 8.1 | 10.9 | 1.35 | 3 |

4.1.3. Characteristics of Public Rental Housing Floor Plans in 2010s

In the 2010s, the floor area of housing units in public rental housing complexes ranged from a minimum of 21 m² to a maximum of 59 m². Based on unit size, spatial composition, and arrangement, the floor plan types were classified into two types in the 20 m² range, two types in the 30 m² range, three types in the 40 m² range, and six types in the 50 m² range.

**Table 10.** Overview of Public Rental Housing Floor Plan Types in the 2010s.

| Category | Type | Unit Floor Area (m²) | Number of Households | Ratio (%) | Number of Complexes | Remarks |
|---|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A-1 | 21, 24, 26 | 1,004 | 7.29 | 4 | one-room layouts |
| | 20A-2 | 26 | 302 | 2.19 | 4 | one-room layouts |
| | 20B-1 | 26 | 216 | 1.57 | 2 | |
| | 20B-2 | 29 | 90 | 0.65 | 1 | |
| | Subtotal | | 1,621 | | | |
| ≥30 m² <40 m² | 30A-1 | 37, 39 | 2,293 | 15.09 | 6 | |
| | 30A-2 | 36 | 2,118 | 16.66 | 9 | |
| | 30A-3 | 36 | 94 | 0.68 | 1 | End Unit |
| | 30A-4 | 39 | 303 | 2.20 | 3 | End Unit |
| | 30B | 37 | 331 | 2.40 | 2 | |
| | Subtotal | | 5,139 | | | |
| ≥40 m² <50 m² | 40A-1 | 46 | 1,558 | 11.31 | 7 | |
| | 40A-2 | 46 | 1,568 | 11.38 | 10 | |
| | 40A-3 | 46 | 532 | 3.86 | 5 | Staircase type |
| | 40A-4 | 46 | 412 | 2.99 | 3 | End Unit, Tower |
| | 40A-5 | 46 | 266 | 1.93 | 4 | End Unit, Tower |
| | 40B | 46 | 68 | 0.49 | 1 | |

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| | | | | | |
|---|---|---|---|---|---|
| | 40C | | 72 | 0.52 | 1 |
| | Subtotal | | 4,476 | | |
| ≥50 m² <60 m² | 50A-1 | 51 | 388 | 2.82 | 2 |
| | 50A-2 | 51 | 446 | 3.24 | 5 |
| | 50A-3 | 51 | 608 | 4.41 | 4 |
| | 50A-4 | 51 | 102 | 0.74 | 2 |
| | 50A-5 | 51 | 84 | 0.61 | 3 |
| | 50B-1 | 51 | 148 | 1.07 | 1 |
| | 50B-2 | 51 | 114 | 0.83 | 1 |
| | 50B-3 | 51 | 208 | 1.51 | 2 |
| | 50C | 51 | 48 | 0.35 | 1 |
| | 50D | 51 | 60 | 0.44 | 1 |
| | 50E | 59 | 278 | 2.02 | 2 |
| | 50F | 59 | 64 | 0.46 | 1 |
| | Subtotal | | 2,548 | | |
| | Total | | 13,775 | | |

In the 2010s, housing units in the 20 m² range were still predominantly one-room layouts, as in the previous period, but the unit size diversified from 21 m² to 29 m². Both the 20A and 20B types adopt a one-bay structure, but they are distinguished by differences in spatial composition. In the 20A type, the bedroom, living room, and kitchen–dining space are integrated into a single space. In contrast, the 20B type has a one-bedroom layout consisting of a combined living and sleeping space, a bedroom, a kitchen–dining space, and a bathroom. In both types, the layouts are further subdivided according to balcony configuration. The average area of the one-bedroom space in the 20A-1 and 20A-2 types is 20.5 m² (80%). In the 20B-1 and 20B-2 types, the combined living and sleeping space measures 10.7 m² (39.7%) and 11.9 m² (39.7%), respectively, while the kitchen–dining space measures 6.7 m² (25.1%) and 9.3 m² (31.1%). In terms of the width-to-depth ratio, the 20A type has an average ratio of 2.24 and the 20B type has an average ratio of 2.19, indicating a floor plan in which the depth is more than twice the frontage width.

The spatial composition of the 30 m² range is classified into two types according to the bay structure. Among them, 30A is further subdivided based on balcony configuration. The 30A type consists of a combined living and sleeping space, a secondary bedroom, a kitchen–dining space, a bathroom, and a balcony. In contrast, the 30B type separates the bedroom and living room and consists of two bedrooms, a living room, a kitchen–dining space, and a balcony. The 30A-1 type represents the most common basic layout, while the 30A-2, 30A-3, and 30A-4 types are modified versions of the 30A-1 type with changes in balcony configuration. In the 30A-3 and 30A-4 types, additional balconies were provided by utilizing the dead-end corridor space in units located at the ends of corridor-type apartment buildings. The 30B type adopts a two-bay structure in which the bedroom is located on the front side of the unit, resulting in an expanded balcony. In addition, a laundry room is provided near the entrance, and the kitchen–dining space is planned as an independent space with clear territoriality, unlike the 30A type where it also functions as a circulation corridor. The bedroom and living room area of the 30A type ranges from 12.9 m² (35.2%) to 15.4 m² (38.6%), while the kitchen–dining space area ranges from 11.4 m² (28.6%) to 11.6 m² (31.5%). In contrast, in the 30B type, the independent living room area is 9.2 m² (24.4%), while the combined area of the two bedrooms is 12.9 m² (31.9%). This indicates that although the size of individual bedrooms decreased compared to the 30A type, the spaces were subdivided into separate rooms. In terms of balcony area, the 30A-1 type has an average balcony size of 8.3 m², while the 30A-3 and 30A-4 types have larger balconies of 10.7 m² and 12.3 m² due to the addition of balconies. The width-to-depth ratio ranges from 2.15 to 2.35 in the one-bay 30A type, whereas the two-bay 30B type shows a ratio of 1.31.

All floor plans in the 40 m² range adopt a two-bay structure and consist of a living room, two bedrooms, a kitchen–dining space, a bathroom, and a balcony. In all types, the living room and the main bedroom are arranged on the front side of the unit, while the kitchen–dining space and the

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secondary bedroom are located at the rear. Types 40A-2, 40A-3, 40A-4, and 40A-5 have the same spatial arrangement as type 40A-1, but their balconies are designed as modified versions of those in type 30A-1. The 40B type was developed in a tower-type residential building. Because the entrance position in tower-type buildings with a staircase configuration differs from that in corridor-type buildings, balconies are provided on both the front and rear sides of the unit. In this type, the secondary bedroom is planned to be accessed through the kitchen–dining space. The 40C type modifies the configuration of the kitchen–dining space by utilizing the characteristics of end units of residential buildings while arranging the balcony toward the front side. In most types, the kitchen–dining space forms a single continuous space and is directly connected to the living room, except in the 40B type. The average living room area in 40A type is 8.5 m² (18.3%), while those of the 40B and 40C types are 9.8 m² (20.9%) and 9.6 m² (20.5%), respectively. The kitchen–dining space areas were 15.3 m² (32.9%), 14.2 m² (30.3%) and 12.8 m² (27.3%) for the 40B and 40C types, respectively. The average balcony area was 11.9 m² for the 40A type, whereas the 40B and 40C types showed larger balcony areas of 19.1 m² and 14.1 m², respectively. The width-to-depth ratio ranged from 1.54 to 1.81, indicating a reduction in the depth relative to the frontage width compared with the previous unit sizes.

The floor plans in the 50 m² range are classified according to the number of bedrooms and bay structure. The 50A-1 type has a layout similar to 40A-1 type and consists of a living room, two bedrooms, a kitchen–dining space, a bathroom, and a balcony. The 50A and 50B types adopt a two-bay structure consisting of a living room, two bedrooms, a kitchen–dining space, a bathroom, and a balcony. In contrast, the 50C type has the same spatial composition but is designed with a three-bay structure, placing both bedrooms on the front side of the unit. The 50D, 50E, and 50F types include three bedrooms and are planned with either a two-bay or three-bay structure. The 50A-2, 50A-3, 50A-4, and 50A-5 types have the same arrangement of major spaces as the 50A-1 type but are modified through changes in balcony configuration or the addition of balconies. In particular, the 50A-3, 50A-4, and 50A-5 types appear to have been planned by utilizing side units of the apartment building or staircase-type apartment buildings. The 50B-2 and 50B-3 types are subdivided variations of the 50B-1 type, differentiated by modifications to the balcony configuration. The 50B type adopts a two-bay structure developed in a tower-type apartment building, and balconies are installed on both the front and rear sides of the unit. In the three-bay structures of the 50C and 50D types, the living room and two bedrooms are arranged on the front side of the unit. The 50E and 50F types, each with a floor area of 59 m², are two-bay structures that include three bedrooms. In particular, the 50F type is distinctive in that the living room and the kitchen–dining space are planned as a single integrated space, unlike the previous types. In a 51 m² housing unit, the living room area ranges from 9.9 m² (19.1%) to 19.9 m² (38.8%), while the kitchen–dining space ranges from 8.2 m² (16.0%) to 17.0 m² (32.8%), indicating that the areas vary by more than twofold depending on the floor plan type. In addition, the balcony area ranges from 10.2 m² to 24.7 m², showing considerable variation. The width-to-depth ratio ranged from 1.54 to 1.81, indicating that the depth relative to the frontage width decreased compared with the previous unit size ranges.

**Table 11.** Area of Major Spaces in Public Rental Housing (2010s).

| Type | | L&R | R | L | K&D | Others | Balcony |
|---|---|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A-1 | 20.1(80.5) | - | - | - | 4.9(19.5) | 6.1 |
| | 20A-2 | 21.1(78.6) | - | - | - | 5.6(21.0) | 6.0 |
| | 20B-1 | - | 10.7(39.7) | - | 6.7(25.1) | 4.6(17.0) | 6.2 |
| | 20B-2 | - | 11.9(39.7) | - | 9.3(31.1) | 4.5(15.1) | 6.7 |
| ≥30 m² <40 m² | 30A-1 | 15.1(38.7) | 7.6(19.4) | - | 11.6(29.8) | 4.7(12.1) | 8.3 |
| | 30A-2 | 13.1(35.7) | 6.1(16.5) | - | 11.4(31.1) | 6.1(16.6) | 7.5 |
| | 30A-3 | 12.9(35.2) | 6.1(16.6) | - | 11.6(31.5) | 6.2(16.7) | 10.7 |
| | 30A-4 | 15.4(38.6) | 8.2(20.6) | - | 11.4(28.6) | 4.8(12.2) | 12.3 |
| | 30B | - | 12.0(31.9)_ | 9.2(24.4) | 8.7(23.1) | 7.7(20.5) | 9.7 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ≥40 m² <50 m² | 40A-1 | - | 17.2(36.8) | 9.9(21.3) | 14.2(30.4) | 5.4(11.6) | 10.3 |
| | 40A-2 | - | 17.1(36.7) | 8.0(17.2) | 16.1(34.6) | 6.1(13.0) | 9.7 |
| | 40A-3 | - | 17.4(37.3) | 8.7(18.6) | 15.4(33.0) | 5.5(11.7) | 15.7 |
| | 40A-4 | - | 17.7(37.8) | 9.8(21.0) | 14.2(30.4) | 5.2(11.1) | 15.4 |
| | 40A-5 | | 17.1(36.9) | 7.8(16.7) | 15.9(34.1) | 5.7(12.3) | 14.6 |
| | 40B | - | 19.4(41.4) | 9.8(20.9) | 14.2(30.3) | 5.7(12.1) | 19.1 |
| | 40C | - | 18.2(38.9) | 9.6(20.5) | 12.8(27.3) | 5.9(12.6) | 14.1 |
| ≥50 m² <60 m² | 50A-1 | - | 19.9(38.3) | 12.0(23.1) | 15.2(29.3) | 5.3(10.1) | 12.8 |
| | 50A-2 | - | 18.9(36.6) | 11.0(21.2) | 15.5(30.0) | 6.3(12.2) | 10.2 |
| | 50A-3 | - | 19.0(36.8) | 10.4(20.3) | 16.3(31.6) | 5.9(11.5) | 16.2 |
| | 50A-4 | - | 19.8(38.3) | 10.9(21.0) | 15.3(29.6) | 5.8(11.1) | 10.0 |
| | 50A-5 | - | 19.0(36.7) | 9.9(19.1) | 17.0(32.8) | 5.9(11.3) | 15.1 |
| | 50B-1 | - | 20.2(38.9) | 16.7(32.1) | 10.1(19.5) | 5.0(9.6) | 24.0 |
| | 50B-2 | - | 17.5(34.1) | 19.9(38.8) | 8.2(16.0) | 5.7(11.2) | 17.7 |
| | 50B-3 | - | 18.7(35.9) | 18.3(35.3) | 9.1(17.5) | 5.6(10.7) | 19.2 |
| | 50C | - | 18.1(34.9) | 17.8(34.3) | 9.4(18.2) | 6.5(12.5) | 23.4 |
| | 50D | - | 22.2(43.0) | 11.7(22.6) | 10.7(20.8) | 7.1(13.7) | 20.5 |
| | 50E | - | 27.4(46.1) | 19.0(32.0) | 7.6(12.8) | 5.3(9.0) | 24.7 |
| | 50F | - | 27.0(45.4) | 13.6(22.9) | 12.7(21.4) | 6.2(10.4) | 12.0 |

**Table 12.** Plan Configuration of Public Rental Housing(2010s).

| Type | | frontage width | Depth | Width-to-depth ratio | number of bays |
|---|---|---|---|---|---|
| ≥20 m² <30 m² | 20A-1 | 4.04 | 8.73 | 2.16 | 1 |
| | 20A-2 | 4.05 | 9.41 | 2.32 | 1 |
| | 20B-1 | 4.20 | 9.10 | 2.17 | 1 |
| | 20B-2 | 4.50 | 9.11 | 2.20 | 1 |
| ≥30 m² <40 m² | 30A-1 | 4.92 | 10.58 | 2.15 | 1 |
| | 30A-2 | 2.78 | 10.34 | 2.16 | 1 |
| | 30A-3 | 4.31 | 11.87 | 2.75 | 1 |
| | 30A-4 | 5.00 | 11.76 | 2.35 | 1 |
| | 30B | 6.44 | 8.44 | 1.31 | 2 |
| ≥40 m² <50 m² | 40A-1 | 6.41 | 9.84 | 1.54 | 2 |
| | 40A-2 | 6.55 | 10.10 | 1.54 | 2 |
| | 40A-3 | 6.50 | 10.18 | 1.57 | 2 |
| | 40A-4 | 6.40 | 11/32 | 1.77 | 2 |
| | 40A-5 | 6.50 | 11.48 | 1.77 | 2 |
| | 40B | 6.40 | 11.61 | 1.81 | 2 |
| | 40C | 6.55 | 10.01 | 1.53 | 2 |
| ≥50 m² <60 m² | 50A-1 | 6.90 | 10.17 | 1.47 | 2 |
| | 50A-2 | 6.87 | 11.67 | 1.70 | 2 |
| | 50A-3 | 6.93 | 10.41 | 1.50 | 2 |
| | 50A-4 | 6.91 | 10.55 | 1.53 | 2 |
| | 50A-5 | 6.91 | 11.99 | 1.74 | 2 |
| | 50B-1 | 7.00 | 11.81 | 1.69 | 2 |
| | 50B-2 | 7.00 | 11.73 | 1.68 | 2 |
| | 50B-3 | 6.94 | 11.83 | 1.70 | 2 |
| | 50C | 9.90 | 10.33 | 1.04 | 3 |
| | 50D | 8.70 | 10.56 | 1.21 | 3 |
| | 50E | 8.30 | 11.74 | 1.41 | 2 |
| | 50F | 8.00 | 9.54 | 1.19 | 2 |

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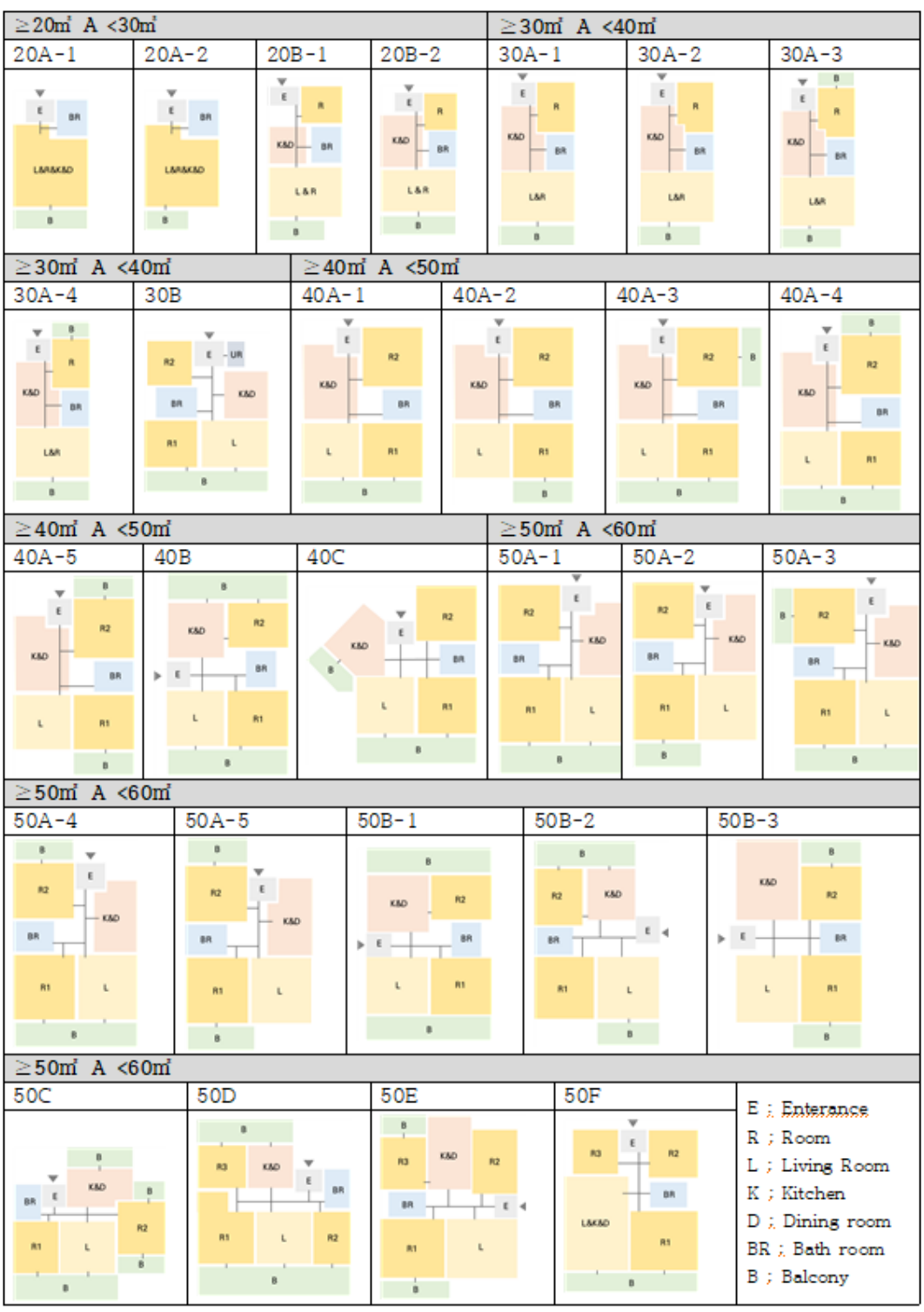


**Figure 3.** Types of spatial layout in public rental housing floor plans in the 2010s.

*4.2. Comparison of Floor Plan Change Characteristics by Size of Public Rental Housing*

In the 1990s, when permanent rental housing began to be constructed in Korea, public rental housing units ranged from a minimum of 26 m² to a maximum of 49 m². However, after the National Rental Housing Supply Policy was introduced in 1998, the maximum unit size increased, and public rental housing constructed in the 2000s reached up to 59 m².

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Examining the unit sizes by period, the 20 m² range consisted only of 26 m² units until the 2000s. However, after 2010, various unit sizes were introduced within this range, including 21 m², 24 m², 26 m², and 29 m². In the 30 m² range, units smaller than 35 m² accounted for approximately 60% of the total in the 1990s. After 2000, however, only units of 36 m² or larger were planned. The 40 m² range shows a different pattern across periods. In the 1990s, units were mainly planned at approximately 41 m² and 49 m², while in the 2000s several sizes ranging from 45 to 47 m² were supplied. In contrast, in the 2010s, only units of approximately 46 m² were planned. The 50 m² range, which began to be supplied in the 2000s, consisted mainly of two sizes, 51 m² and 59 m², both in the 2000s and the 2010s. Therefore, the overall unit size within this range did not change significantly over time.

These results indicate that since the 2010s the smallest housing units in the 20 m² range have become more diversified in size, whereas units larger than 40 m² have tended to concentrate on a limited number of standardized sizes rather than diversifying in area.

Based on the analysis of floor plan changes by period and unit size, several characteristics were identified. Regarding the classification of floor plan types by construction period, the 1990s floor plans were categorized mainly according to bay structure or the location of the kitchen–dining space. After 2000, however the floor plan types were first classified by bay structure and then further subdivided according to balcony configuration.

The floor plan structure of 20 m² range remained a one-bay configuration across all periods, but changes occurred in the spatial composition of the units. In the 2000s, however, the previous configuration of a small bedroom and kitchen–dining space was replaced by a one-room layout in which these spaces were integrated into a single space. This type of layout also continued in 2010, although additional variations were introduced through changes in balcony configuration. In addition, in the 2010s, a new floor plan type was introduced that modified the balcony configuration of the 20A type from the 1990s. Although all units in the 20 m² range maintained a one-bay structure, the frontage width increased after 2000 compared with the 1990s. In particular, in the one-room layouts of the 2000s, the width-to-depth ratio decreased to approximately 2.07, indicating that the frontage facing the exterior became wider.

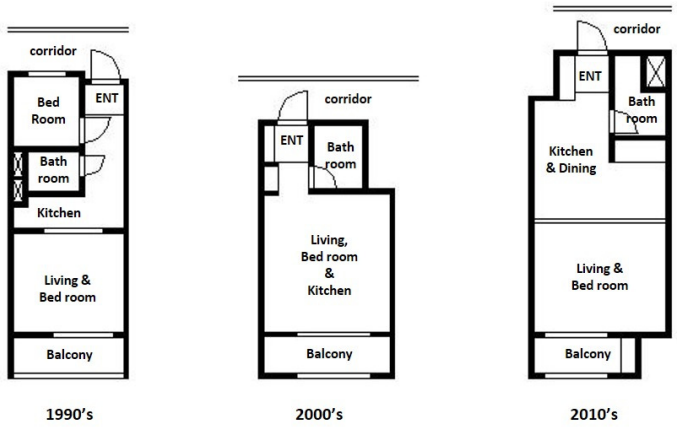


**Figure 4.** unit plan in the 20 m² range.

Floor plans in the 30 m² range were designed with either one-bay or two-bay structures, although the proportion of each type varied by period. In the 1990s, when the supply of housing units in the 30 m² range was the highest, the 30A type was the only one-bay floor plan and accounted for about 90% of the floor plan types in this size range. In the 2000s and 2010s, one-bay structures continued to account for the majority of public rental housing units in the 30 m² range, representing approximately 83% and 93.6% of the supply, respectively. Within the one-bay structure, the arrangement and composition of spaces remained largely unchanged across periods. However, in the

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2000s and 2010s, the 30A type from the 1990s was further subdivided into three to four variations through changes in balcony configuration. In the 1990s, the 30C type with a two-bay structure arranged the combined living and sleeping space and the bedroom on the front side of the unit, while the kitchen–dining space was planned as a space with clear territoriality. This spatial configuration continued to appear in later periods. In contrast, in the two-bay structures of the 2000s and 2010s, the bedroom and living room were clearly separated, and an additional bedroom was arranged on the front side of the unit. As a result, a new floor plan type emerged that included a main bedroom along with a kitchen–dining space. In terms of floor plan proportions, the one-bay structure showed little variation over time. However, the width-to-depth ratio of the two-bay structure decreased from 1.85 in the 1990s to 1.40 in the 2000s and 1.31 in the 2010s. This indicates that the frontage width of the living room and bedroom facing the south gradually increased.

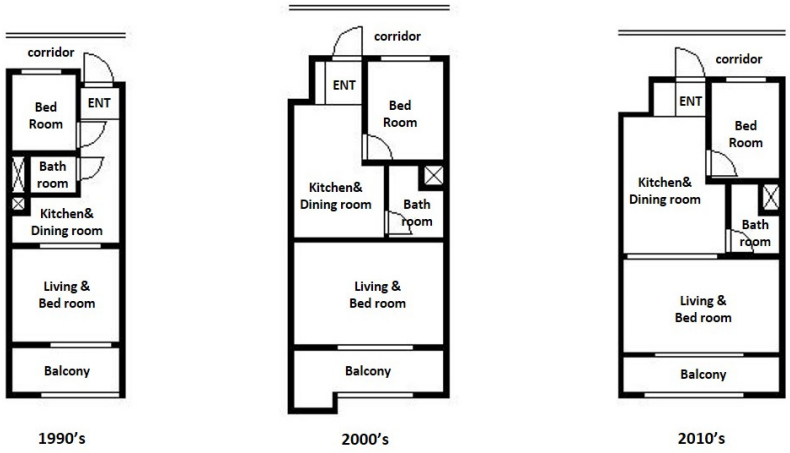


**Figure 5.** unit plans in the 30 m² range.

In the 40 m² range, both one-bay and two-bay structures were planned in the 1990s, whereas only two-bay structures were developed after the 2000s. In the 1990s, the floor plans commonly included a combined living and sleeping space, whereas after the 2000s the bedroom and living room were separated and planned as independent spaces. In particular, in the 1990s the 40A type, which arranged the bedroom and living space in a one-bay structure, accounted for approximately 58% of the total supply and represented the most typical floor plan type in this size range. After the 2000s, however, all floor plans adopted a two-bay structure consisting of an independent living room and two bedrooms. In addition, in both the 2000s and 2010s, the 40A-1 type was further subdivided into four to five variations depending on changes in balcony configuration or the addition of balconies. The results show that both the number and the area of balconies increased over time. The width-to-depth ratio of the two-bay structure was 1.51 in the 1990s, 1.59 in the 2000s, and 1.64 in the 2010s, which is higher than that of the two-bay floor plans in the 30 m² range.

The 50 m² floor plans, which began to be supplied in the 2000s, were designed with both two-bay and three-bay structures. However, in both periods, the two-bay structure accounted for more than 95% of the total supply. In terms of spatial composition, both the two-bay and three-bay structures consisted of independent living rooms and bedrooms. In both the 2000s and the 2010s, the arrangement of major spaces according to the bay structure showed similar characteristics. In each period, the 50A-1 type represents the most basic floor plan and is subdivided according to balcony configuration and entrance location. In particular, in the 50 m² range, various floor plan types emerged in addition to the subdivision of types through changes in balcony configuration. In corridor-type residential buildings, the entrance was generally located along the rear corridor. However, in staircase-type residential buildings, the entrance position changed, which appears to have contributed to greater diversification of floor plan types. For example, in the 50C type of the

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2000s, the kitchen was placed between the bedrooms, and a balcony was connected to the side. In addition, in the 50F type of the 2010s, the living room and kitchen–dining space were planned as a single integrated space. This configuration is notable considering that the unit size is 59 $m^2$, which is the largest among public rental housing units. The width-to-depth ratio of the two-bay structure increased slightly from 1.51 in the 2000s to 1.56 in the 2010s. In contrast, the three-bay structure showed a decrease from 1.20 in the 2000s to 1.13 in the 2010s, indicating different trends over time. In particular, the 50E type in the 2010s shows a ratio of 1.04, indicating a floor plan shape close to a square. This trend reflects a planning intention to strengthen the south-facing arrangement of major spaces. It also suggests that sunlight and views have become increasingly important considerations in the floor plan design of public rental housing.

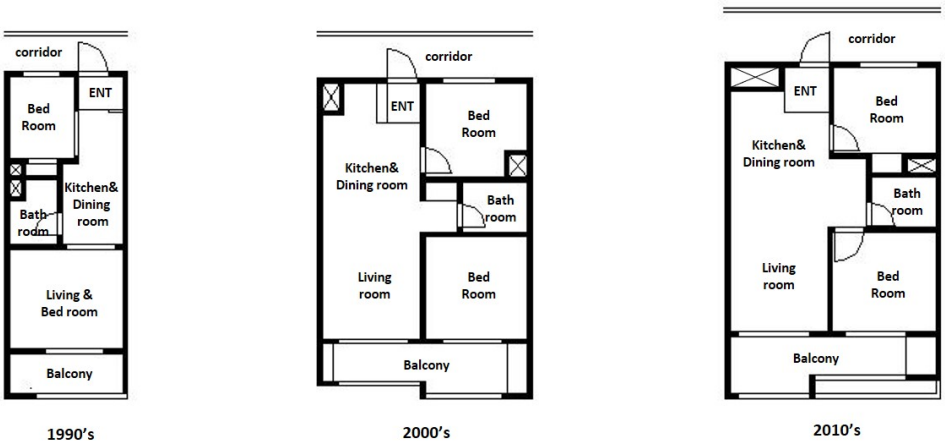


**Figure 6.** unit plans in the 40 $m^2$ range.


**Figure 7.** unit plans in the 50 $m^2$ range.

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*4.3. Review of Legal and Institutional Frameworks Related to Floor Plans*

The legal and institutional frameworks related to the floor plans of public rental housing in Korea include the Building Act, the Housing Act, district unit plan implementation guidelines, and the housing construction standards of the Korea Land and Housing Corporation (LH). This section examines the major regulations that have influenced the planning of public rental housing floor plans.

The *Regulations on Housing Construction Standards*, enacted in 1991, provide detailed provisions related to housing construction under the Housing Act. At the time of enactment, Article 3 (Dimensions and Standard Sizes) required that, for housing units with an area of 50 $m^2$ or less, the living room and bedrooms should have minimum dimensions of at least 2.4 m on each side. However, these dimensional requirements were removed in the 1997 revision and have not been applied since then. Article 10 of the same regulation also required the length of an apartment building to be less than 120 m, but this provision was deleted in 1996. These two regulations, which are now abolished, were found to have been widely applied in the planning of public rental housing during the 1990s.

Within the Building Act, provisions directly related to floor plans include regulations concerning balconies and windows. According to the relevant laws, balconies are additional spaces installed outside the external wall of a building and are not included in the exclusive floor area. Due to Korea's climate conditions, it was common for residents to illegally enclose balconies by installing windows and removing the external wall doors in order to expand interior space. As a result, balcony expansion was legalized through a revision of the Enforcement Decree of the Building Act in December 2005. After this revision, apartment floor plans began to incorporate balcony expansion into the design, which allowed greater flexibility in the arrangement of kitchens, dining spaces, and bedrooms. According to Article 52 of the Enforcement Decree of the Building Act, windows must be installed with an area of at least one-tenth of the floor area for daylighting and one-twentieth for ventilation in living rooms. These regulations appear to have constrained floor plan design by fixing the living room as a primary space facing the south and the balcony.

Although the specific provisions vary across development districts, the district unit plan implementation guidelines commonly include regulations related to the length of residential buildings and the arrangement of building heights. Before the 1990s, most apartment buildings in Korea were planned in linear flat forms [9]. In order to avoid monotonous urban landscapes resulting from long flat-type buildings, district unit plans imposed restrictions on the maximum length of apartment buildings. However, these regulations were applied differently to rental apartments and privately sold apartments. For example, in the Byeolnae District of Namyangju analyzed in this study, the maximum building length was limited to less than 100 m for buildings up to 10 floors and less than 80 m for buildings between 11 and 15 floors. This limit was approximately 20 m longer than the standard applied to privately sold apartments. In most district unit plans from the 1990s to the 2010s, the building length limit for residential buildings between 11 and 15 floors was generally set at less than 80 m. A review of district unit plan implementation guidelines confirmed that all case study sites were planned within the 80 m limit, except for the Hwaseong Dongtan 1 District, where the building length was restricted to less than 70 m for buildings between 11 and 15 floors. Because public rental housing units are typically small and often adopt one-bay structures, most buildings were planned as corridor-type slab buildings. Consequently, slab-type residential buildings with repetitive unit layouts have been the dominant building form for public rental housing over the past 30 years, resulting in relatively similar floor plan patterns. However, in the 2010s, district unit plans introduced designated high-rise zones, where building forms were required to respond to the permitted building height. In these zones, tower-type residential buildings began to appear, and this change in building form contributed to greater diversity in floor plan types. Furthermore, tower-type buildings allowed variations in balcony configurations depending on the location of the housing unit within the building, which also contributed to the diversification of floor plans.

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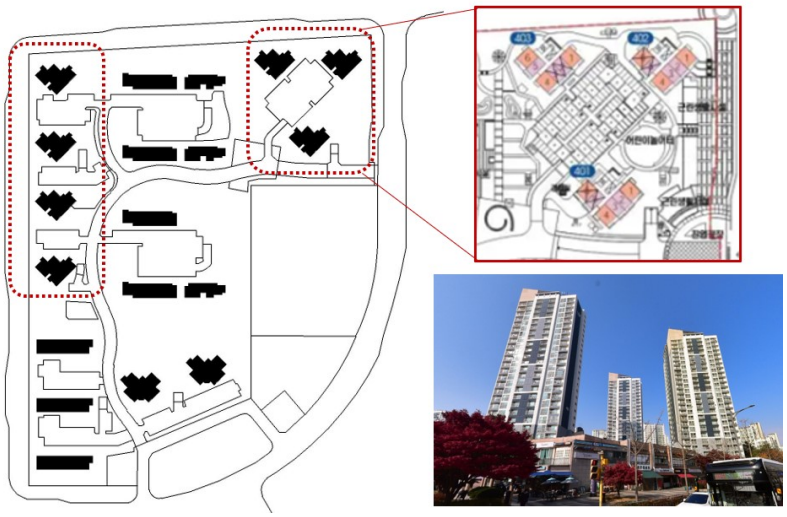

**Figure 8.** a tower-type apartment building (Baekhyeon Village Complex 4) as an example.

Finally, the architectural design guidelines, unit design guidelines, and development design competition guidelines of the Korea Land and Housing Corporation (LH), which has been responsible for constructing most public rental housing in Korea, provide detailed standards for unit design. These guidelines specify minimum dimensions for various spatial elements, ranging from storage furniture such as shoe cabinets to the minimum size of each room. For example, according to the *Unit Design Guidelines (Draft)*, the minimum width of the main bedroom must be at least 3 m, and the minimum balcony expansion width must be at least 2.4 m. In the case of development design competition guidelines, the minimum width of the living room is required to be at least 3.6 m, while that of the main bedroom must be at least 3.3 m. In addition, the design standards present recommended bathroom dimensions according to housing size, and kitchen layouts such as linear or L-shaped configurations are specified depending on the housing area. The minimum effective width of a balcony is generally required to be at least 1 m. However, the spaces eligible for balcony expansion differ according to housing size. For example, in 51 $m^2$ units, balcony expansion is typically allowed only for the living room, whereas in 59 $m^2$ units, both the living room and secondary bedroom may be expanded.

Overall, the floor plans of public rental housing in Korea appear to have been shaped through a staged process according to these legal and institutional frameworks. Among these regulations, the arrangement of living rooms in relation to daylighting has been the most fundamental requirement influencing floor plan design across all periods. The minimum dimensional requirements and building length restrictions under the Housing Act in the 1990s functioned as limiting factors in floor plan composition. In contrast, the legalization of balcony expansion in 2005 provided an important opportunity for diversification in floor plan design. Although the building length restrictions in district unit plans remained largely unchanged over the past 30 years, the introduction of high-rise zones after the 2000s encouraged changes in building form. This change, combined with the expansion of balconies, contributed to the diversification of floor plans. Furthermore, the architectural design guidelines of the Korea Land and Housing Corporation established detailed standards for minimum room sizes and balcony expansion ranges according to housing size. These guidelines functioned as more practical regulatory tools influencing floor plan design than general legal regulations. Therefore, the floor plans of public rental housing in Korea have been shaped primarily by institutional standards and guidelines established by public authorities rather than by autonomous design changes driven by market demand.

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## 5. Discussion

The results show that the floor plan characteristics of public rental housing in Korean new towns have changed according to both period and unit size. Unlike privately sold apartments, public rental housing has been developed as a structured spatial form within the framework of various institutional regulations, including housing policies by period, the Building Act, the Housing Act, district unit plans, and the internal design guidelines of the Korea Land and Housing Corporation (LH).

In the 1990s, public rental housing floor plans were predominantly planned as slab-type buildings with one-bay structures in the 30 $m^2$ range, under the policy background of the "Two Million Housing Construction Plan." Although floor plans were influenced by dimensional regulations and restrictions on the length of residential buildings, the policy goal of large-scale housing supply and cost-efficiency in rental housing construction appears to have been a major factor shaping the planning characteristics. This can be observed in the fact that the major floor plan types by unit size at that time commonly adopted a one-bay structure, in which the combined living and sleeping space functioned as the central space of the unit, while the kitchen–dining space was arranged as a circulation space connecting the spaces within the unit. The fact that the one-bay 30 $m^2$ type accounted for approximately 50% of the total supply in the 1990s indicates that the early standardized housing type became established as the basic unit of public rental housing planning. While this standardization improved planning efficiency and construction economy, it simultaneously limited the flexibility of floor plan design.

In the 2000s, the legalization of balcony expansion played an important role in transforming floor plan design. As balconies became convertible into expandable interior spaces, the floor plan types adopting two-bay and three-bay structures began to diversify. This change was not merely a simple spatial expansion but led to transformations in spatial composition and layout. In addition, very small housing units such as those in the 20 $m^2$ range were converted into one-room layouts, while in units of 30 $m^2$ or larger the combined living and sleeping space began to be separated into independent spaces. This change can be interpreted as an attempt to clearly define functional spatial zones according to unit size by utilizing expandable balcony spaces.

The 2010s represent a period when housing construction in second-generation new towns accelerated, and when existing housing construction standards were reorganized following the establishment of the Korea Land and Housing Corporation (LH), which resulted from the merger of the Korea Housing Corporation and the Korea Land Corporation. Accordingly, this period can be characterized as a time when design standards became more standardized and detailed through the application of unified housing construction standards of public institutions. In other words, this period reflects the coexistence of relatively relaxed Building Act and Housing Act regulations after 2000, stricter district unit plan regulations, and the architectural design guidelines of public institutions. Nevertheless, compared with the previous period, floor plan types became more subdivided, and floor plan configurations diversified or were simplified depending on housing area.

The process of change in public rental housing floor plans can be interpreted from the perspective of institutional path dependence [26,27]. In the 1990s, standardized floor plan types centered on the one-bay structure were established. After 2000, these floor plans were not fundamentally replaced but instead evolved flexibly in response to changes in related laws and institutional frameworks based on the existing floor plan types. Thus, public rental housing floor plans represent a form of institutionalized spatial planning, as they are not simply regulated by laws but are spatial forms produced through the interaction between legal regulations and institutional guidelines.

As a result, the evolution of public rental housing floor plans in Korea can be understood as a process in which institutional standards created and reproduced the spatial forms of housing based on national housing policies. This suggests that public rental housing floor plan design should be understood not merely as an architectural product but as a spatial outcome shaped through the interaction between housing policies and legal–institutional frameworks.

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## 6. Conclusions

This study examined the characteristics of changes in the floor plans of public rental housing in Korean new towns by analyzing floor plan elements according to construction period and unit size, as well as the related legal and institutional frameworks that influenced the planning process. Through this analysis, it was confirmed that the evolution of public rental housing floor plans has been shaped not only by design improvements but also by policy objectives and institutional frameworks.

In the 1990s, elongated floor plans with a one-bay structure centered on the combined living and sleeping space was commonly developed under dimensional regulations and building length restrictions. In the 2000s, following the legalization of balcony expansion, floor plan types adopting two-bay and three-bay structures began to diversify. In the 2010s, floor plan types became further subdivided according to district unit plan regulations and detailed design guidelines of public institutions, and they diversified as the unit size increased.

Overall, legal regulations such as the Building Act, the Housing Act, and the architectural design guidelines of public institutions have played a key role in shaping the fundamental configuration of floor plans by defining the arrangement of the living room, the minimum dimensions of rooms, and the range of balcony expansion. As a result, the floor plans of public rental housing in Korea have been structured largely by institutional standards and supply policies rather than evolving naturally through market demand, as seen in privately sold apartments.

Over the past 30 years, public rental housing in Korea, similar to many other Asian countries, has been supplied through large-scale development projects in new towns. While this supply approach has provided affordable housing opportunities for low-income households, it has also raised continuous debates regarding the quality of residential environments. To improve the spatial quality of public rental housing in the future, greater flexibility in internal design guidelines and planning standards will be required. In particular, planning frameworks should be developed that can respond more flexibly to changes in housing types and evolving lifestyles.

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