

New approaches to the design and public functions of social rental housing

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Abstract. Social security-oriented rental housing is not only an important way to solve the housing problem for urban residents, but also an effective means to improve the quality of urban life and promote sustainable development of urban environment. Past public rental housing emphasized efficiency in construction, allocation, and use, but lacked public functionality, resulting in many projects becoming identical "miniature commercial housing". Therefore, this article focuses on the "two-type" security-oriented rental housing and lists new design cases of Modern rental housing. It proposes that social security-oriented rental housing should enjoy multiple rights and have the aesthetic function of open shared space and personalized innovation, low-carbon emission reduction intelligent function, fair transfer and participation function. Measures such as providing preferential housing, rental or new housing subsidies, and land price subsidies are provided for specific populations in need. By realizing the design concept of multiple values, social security-oriented rental housing can not only maintain basic rights, but also enhance the quality of residents' lives, further improving their quality of life and environmental friendliness.

Keywords: Social Security Rental Housing; Public function; Design.

1. Introduction

There are two main types of social rental housing: supportive and relief type.

Public rental housing, or low-cost housing, belongs to the relief type of social rental housing. Social rental housing provides secure housing to low income families who meet minimum subsistence standards and are facing housing difficulties, either through rent concessions or direct in-kind rationing. Over the past 20 years, there have been programs in major cities to build new low-cost housing, as well as to purchase old housing to rent or subsidize in the form of low-cost rent. Currently, low-cost housing is integrated with public housing. Low- and middle-income residents have access to a fair living environment and housing rights through low-cost housing, but most of the low-cost housing programs in China still remain at the social security level, with an average of 25 square meters per person, 35 square meters for a two-person household, 45 square meters for a three-person household, and 50 square meters for a household of four or more, making the living area congested. Secondly, domestic low-cost housing construction is mainly built with new housing, vacant buildings, old public housing, etc., so the location is relatively concentrated, for the population to live inconvenient.[1]

Public rental housing is mainly provided for residents whose income level is temporarily at a medium to low level, such as those who have just entered the labor force. Taking Shanghai's public rental housing as an example, as mentioned in the opinion issued by the Shanghai Housing Management Office in 2021, public rental housing is to solve "the gradual difficulties of local young workers, imported talents and foreign workers and other legal and stable permanent residents in Shanghai." During the last 5-year plan, Shanghai launched a total of 150,000 units of public rental housing [2]. Typical features of public rental housing below market rents (about 80%), physical rental, generally small and medium household sizes ,not only for individual but also for established families, the residents of which are usually unable to settle in ordinary households, and lease terms of 2-3 years.

The supportive type is guaranteed rental housing, which is operated by professional organizations and adopts market mechanisms. The area and housing conditions are based on the most basic living standards, government policies are supported, and rental prices are slightly below market prices. The target group of this type of rental housing is mainly young people[3], new citizens and people who

provide basic public services in the city, and its household type is basically small. The design of guaranteed rental housing is generally required to meet the requirements of multi-level living and create a colorful and personalized living environment, and the contract period of such rental housing is generally 1-3 years and renewable.

2. A new approach to the design of social housing for rent in modern cities in the country and abroad

1)Public Rental Housing Conversion Project in Shanghai Huangpu Wuliqiao

This public housing renovation project in Huangpu District has a certain representative significance. It is located in the central area of Shanghai, between Bureau Gate Road and Manufacturing Bureau Road, and originally occupies a small area, and the various facilities and other buildings with complex functions in the neighborhood are very restrictive to this project, which is fully in line with the typical characteristics of urban public housing[4]

The project is known as "Renhuiyuan". Each household is basically a public rental housing. There are two types of public rental housing: single apartment and small suite. As a mature commercial block in the city center, supporting commercial services, emergency centers and management centers are all available. and 150 additional parking spaces for community use.

Renhuiyuan was constructed in 2011 and completed in 2020. Shanghai Zhongfang Architectural Design Co., Ltd. aims to create a design concept for public rental housing in the city center that can be widely applied.

2)High density and lowrise. Because the scope of the original project can be applied to a narrow area, the surrounding original building density, so should reduce the disturbance of this new project to the surrounding original environment, so no new high-rise buildings, and instead rational to improve the coverage.

3)The layout was chosen as an envelope. Analyze the spacing of sunlight in different seasons, and come up with a way to make the most of the spacing of sunlight to form the unique skyline of the project, which corresponds to the shape of the base plane, so that the layout and the urban landscape can be "stitched" together in one place in dimension.

4)Mixed Function Distribution. By placing the public buildings on the ground floor facing the street, the high mobility of the public area can be fully utilized while reducing the number of residential households along the street, which are already vulnerable to disturbance. Residents can socialize and communicate on the second floor with a connecting terrace.

5)The green areas are arranged on several floors. Due to the narrow lot, the green space left for the ground floor residence is really stretched, the green layer on the second floor and the greenery on the roof effectively decorate the whole space.

6)Open community model. By opening the green space to the public, the original public welfare of public housing can be reflected and the landscape can be shared with all citizens, while the layout of public buildings placed on the first floor facilitates the opening of the community to the outside world.

7)Create a unique architectural language. Achieving a certain degree of integration with the surrounding architectural forms and attempt to blend in with the existing environment.

The Renhuiyuan project has now become a typical example of a government-led public housing project in China. From the perspective of sustainable development, it has achieved integration and unification with the existing environment, providing a new concept reference for future public housing design and construction.

3. Dorteavej Residence, an affordable housing development in Copenhagen

The Dorteveji House in Copenhagen is an affordable housing project commissioned by BIG Architects as part of the "Home Ownership" program of the affordable housing organization Lejerbo

in the linguistically and ethnically diverse northwest district of Copenhagen. The overall appearance of the building is long and winding, with a total area of 6,800 square meters. The housing project is designed to provide 66 new homes for low-income groups, meeting basic needs while setting new standards and requirements: despite a very tight budget, the homes have large, open floor-to-ceiling windows and outdoor balconies, and are 3.5 meters high. The Dothaway Residence meanders through these industrial buildings. In the project proposal designed by urban planner Jan Gehl and accepted by BIG in 2013, Gehl mentioned the urgent need for new public spaces in northwest Copenhagen to create natural intersections within the dense industrial area, while keeping the original vegetation and green courtyards uncrowded and the sidewalks clear.[5]

The initial concept of the Dothaway Residence is simple in structure, consisting of a single prefabricated structure that forms a distinct chevron pattern on a concave and convex exterior wall that curves slightly inward at the center of the facade, creating additional space for the original public plaza to the south near the street and the green courtyard between the industrial buildings to the north. Toward the public plaza on the south side near the street, the building is designed with an opening for pedestrian and non-motorized traffic. This allows the public and residents to move through the courtyard and plaza to their heart's content.

Each house type has its own individual extra space, as the residential concave and undulating modules are repeated regularly along the overall lines and stacked layer by layer upwards into the same high speed of the surrounding buildings, and each house has a small balcony with alternating inward concave and convex changes, which makes it possible to enjoy a sustainable and healthy lifestyle in a small living environment. On the north side towards the internal courtyard, the house shape is flat, while the south side is the area with plenty of sunlight, where the balconies are treated as recessed shapes inward, adding depth to the house shape. The façade is decorated mainly with long wooden panels, except for the wide floor-to-ceiling windows, which cover every side of the façade, emphasizing the overall lattice pattern of the residence and highlighting its cross-patterned pattern of households. Each apartment varies in size from 60 m² to 115 m², and the exterior and interior construction materials are not cumbersome, with the exterior being mainly light-colored wood paneling and concrete, and large floor-to-ceiling windows allowing the precious Scandinavian sunlight to enter the apartment units in abundance, and the courtyard and community to be visible from the interior and exterior. can use the courtyard inside the residence for their activities, and BIG Associates and Lejerbo were awarded the Lille Arne Prize in 2018 for the successful design of a residence that prioritizes the quality of residential space and public impact within a strictly limited budget.

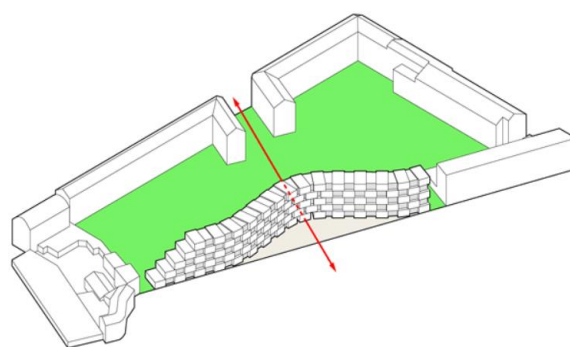


Figure 1. The porous monolithic structure of the building is in harmony with its surroundings. The access structure on the first floor allows the public to move freely between the external plaza and the internal courtyard.

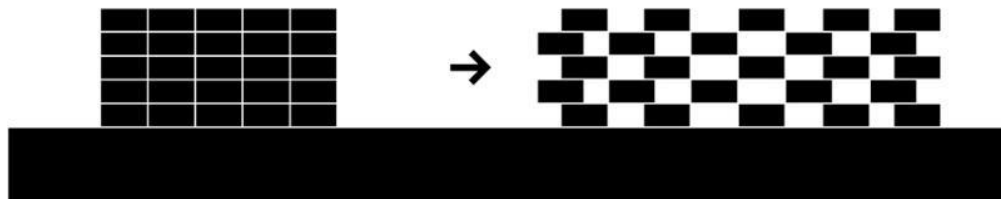


Figure 2. Dothaway apartment module stacking

4. The analysis of the public function of social rental housing

The social welfare of public rental housing, low-cost housing and housing with guaranteed rent is obvious, and the residents are all able to enjoy the right to rent at a price significantly lower than the market price because of their living conditions (no local property, difficulty in paying market rent) and their status (special privileged people, people paying social security, people with local household registration, etc.). The right to move in. The benefits include tax exemptions, control of rental profits, land allocation, project loans, etc. Welfare reform should be "fair and reciprocal justice", the concept of the right to housing is a fundamental constitutional right [6], and since the guaranteed rental housing and its residents have their rights according to the law, the housing itself should also have certain social and public functions (art, space, technical functions, etc.)

4.1 Function of open space

Secure rental housing is not only the legal property of the residents. Most of it is specially planned public land by the government, which in theory can be shared by all citizens. In many economically developed cities, such as Singapore, Berlin, Hong Kong, and Madrid, public rental housing is required to be open to the public, and citizens are not free to enter the hallways of their units, but they are free to enter and exit the courtyards of their residential communities, and even to climb to the roof terraces of their homes to look out over the distant landscape.

In the case of Beijing Chengshousi Collective Land Rental Housing, the corner space is opened so that people can naturally enter the community courtyard, and the main entrance is set up as a 500m² "city living room" with functions such as a book bar, gym, and small theater, and the city living room is raised to the third floor overlooking the elevated area to the north, integrating the community with the city as a whole.

Sharing indoor and outdoor spaces in rental housing communities is very necessary for cities in a spiritual sense, as "sharing is not only the way to use space, but also the regeneration of the exchange value of space"[7]. Among the most important open spaces are outdoor spaces, such as children's activity places and green gardens; indoor shared spaces, such as shared laundry rooms and reading corners, should also be open to the residents of the community.

4.2 The Artistic and Aesthetic Function of Innovative Personalization

In the development of commercial housing, developers are often concerned with maximizing the efficiency and utility of new construction, and copy-and-paste communities are flooding cities, with the excessive pursuit of "refinement and standardization" leaving many residential communities lacking in innovation and aesthetic interest.

Affordable housing should have an innovative and individual urban aesthetic function as a publicly funded project. Examples include the WoZoCo apartments for the elderly, where the staggered shape of the rooms creates a unique facade; the new Mirador social housing development of Madrid, Spain, where a traditional Iberian-style plaza at the center of the building serves as a meeting place for all citizens and residents of the community; and the Aubergneuf Residence, an affordable housing development of Paris. Rue Oberkampf, a low-cost housing community in Paris, has become the new face of Parisian architecture by blending in with the city's original architectural environment.

In recent years, there have also been some excellent cases of public rental housing design in China, such as Beijing Baizhuan Public Housing, designed by MAD, which has a unique overall shape, an open community wall, 12 houses divided into 6 groups, green roofs, and 6 blocks connected by a circular walkway, with connected feeder streets, turning the whole community into a large park. The Y-shaped building plan combined with the setback design gives the buildings a staggered "mountain" shape, and the aerial view of the whole project is atmospheric and full of the glory of humanized and artistic design; Shanghai Longnan Jiayuan public housing rarely uses a semi-enclosed courtyard shape space, which makes the design of living space look imaginative, and the unique distribution rhythm and proportion of the white building group gives the city a unique and unique look. The rhythm and proportion of the distribution of white buildings bring an unexpected decoration to the city, but the overall design still conforms to the specification.

The affordable housing should become a stage for architectural design creation, an open park and beautiful scenery in the city, contributing to changing the urban landscape as much as major construction projects such as high-speed railway stations, museums and theaters.

4.3 Intelligent features designed to help reduce CO2

The goals of carbon peaking and carbon neutrality have set specific requirements for energy savings and emissions reductions in residential buildings. In the Carbon Summit initiative, concepts such as "sponge cities", "climate resilience" and "assembled buildings" have been proposed and implemented as specific requirements. Concepts such as "sponge city", "climate resilient" and "assembled building" are proposed and implemented as specific requirements. From this perspective, new ideas and opportunities for the design of secure rental housing have been brought by the currently popular design of smart cities and smart parks. In China, safe rental housing is a widely used public facility. Therefore, it should be a good model for intelligent energy saving and emission reduction.

In European social housing, funds are set aside for special ecological construction at the time of planning, and it is also mandatory to include a certain size of passive housing in social housing in proportion to the area [8]. For example, the Vauban eco-community in Freiburg, Germany, which focuses on solar power generation, has set standards for wall insulation, recycling of building renovation materials, public participation, and terra-energy use, and has become a model community for energy conservation and sustainability. The Carabanchel House in Madrid, Spain, provides a new method for public building design, using an innovative bamboo facade to protect against the strong Iberian sun while providing good ventilation. This project meets the government demand for green and low-carbon building development, combining the features of prefabricated buildings with ultra-low energy technology.

4.4 Functioning to transfer and participate equitably

The most distinctive feature of affordable housing is that it is designed to help as many people as possible. The tenants, on the other hand, must participate in the management of the community and in the construction of public facilities, and should relinquish their rights to the guaranteed housing to the new tenants who urgently need it after their economic conditions have improved.

To facilitate the transfer of rental dwellings, some assured housing schemes restrict some of the rights of occupants. For example, the Bettenhäuser secure housing in Kassel, Germany, requires residents not to use private cars and to use public transportation instead. The housing is automatically transferred to a more needy population when the resident's income increases and he or she can use a car.

The Riesfeld Residence in Freiburg was specifically designed as passive social housing, prioritizing people with disabilities, encouraging healthy people to live with and care for people with disabilities, and offering significant rent reductions for healthy people.

5. Conclusion

It can be seen that the guaranteed rental housing can practically reflect social justice in physical space, while the guaranteed housing needs to be designed to reflect the common management and participation of residents, provide a variety of options for customers with different needs, and should reasonably control standards in terms of parking, household size and orientation, leaving adequate vacancies to facilitate the flow of rental housing.

References

- [1] "A Preliminary Study on Container Redesign in Low-Cost Housing Construction" [J]. Journal of Chengdu Aviation Vocational Technology College, 2023, 39(01).
- [2] Shanghai Housing Management Office. Management opinions on the development of public housing rental in Shanghai [Z]. 2021.
- [3] Ni Hong. Cracking the outstanding housing problems in big cities by developing guaranteed rental housing as a breakthrough [J]. Administrative Reform, 2021, 9(9) p.44-49.
- [4] Exploring the design of "Wuliqiao Project in Huangpu District", a downtown public housing project [OL]. Design Universe, [2021-05-13]. <https://www.designverse.com.cn/content/home/article>.
- [5] Dortheavej residential building, Copenhagen [OL]. gooddesign.com, [2018-10-10]. <https://www.goood.cn/dortheavej-residence-by-big.html>.
- [6] Lee, Jae-wan, Kim, Yong-gil. Legal Measures to Resolve Public Housing Disputes and Improve Residents' Housing Rights [J]. Collective Construction Law, 2019(01)p.32.
- [7] Li Z.Y., Zhu Y.C. Towards a shared architecture [J]. Journal of Architecture, 2017(12) p.60-65.
- [8] Jayasena Amindha Hewage Kasun, Siddiqui Osamah, Sadiq Rehan. Socio-economic and environmental cost-benefit analysis of passive houses: A life cycle perspective [J]. Journal of Cleaner Production, 2022, p.373.