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A Study on the System for Ensuring the Safe Environment
of Residential Welfare Facilities for the Elderly in an Ageing Society

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SUMMARY

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Chapter 1. Introduction

Among the 1,099 deaths of the elderly in one year in Korea, the proportion of deaths due to various accidents accounted for 6.5%, resulting in a loss of 17.111 trillion won. When an increase in housing cost in places adjacent to cities and social conditions such as various cultural and service infrastructures, as well as an increase in the construction of complex buildings that improves space efficiency considering housing and facilities which are basic requirements for residential welfare facilities for the elderly, are expected, the importance of safe facility use corresponding to the expansion policy of residential welfare facilities for the elderly is emerging, and moreover, the basis for the safe space use of the elderly who are physically weak people must be given priority.

The purpose of this research is to prepare an institutional improvement plan for securing the safety of the residential welfare facilities for the elderly, corresponding to the housing welfare policy for the elderly of Korea which is entering the advanced age society. To achieve this purpose, safety accidents of the elderly, especially life safety accidents, fire occurrence status, and causes thereof were observed, and the supply and management policies of the residential welfare facilities for the elderly in the advanced age and the legal system related to safety were examined and analyzed. In particular, the contents of the safety standards of related facilities stipulated in the relevant legal system such as the "WELFARE OF OLDER PERSONS ACT", "ACT ON GUARANTEE OF

PROMOTION OF CONVENIENCE OF PERSONS WITH DISABILITIES, THE AGED, PREGNANT WOMEN, ETC.", "BUILDING ACT", "HOUSING ACT", etc. were analyzed intensively, and the implications of the research were derived by observing cases in the United States and Japan that have already entered the advanced aged society.

In addition to theoretical examination, compositional status and actual operational situations of the residential welfare facilities for the elderly in Korea were investigated in parallel with the building statistics and actual condition surveys. In addition, by examining the laws and regulations related to domestic and overseas facilities and conducting actual condition surveys, institutional improvements required for ensuring the safety of residential welfare facilities for the elderly as well as the main focus of the initial stage of planning were derived, which were suggested as a facility planning guideline. Finally, based on this guideline, a simulation for the planning of residential welfare facilities for the elderly (institutions for the elderly and communal living homes for the elderly) was conducted.

Chapter 2. Present Condition of Safety Accidents of the Elderly and Safety-Related System for Residential Welfare Facilities for the Elderly

Life safety accidents of the elderly are gradually increasing, and the percentage of the occurrence of fall and slip accidents is the highest at 40%. This occurrence increases with aging, that is, physical activity becomes inconvenient, and in general, the accidents occur most frequently in residential facilities (62.5%), and in terms of space, there is a high rate of accidents in the bedroom, the yard, the bathroom, the entrance, the hallway, the stairs, the living room, etc. For spatial and environmental factors inducing life safety accidents, especially floor finishing materials used for toilets and bathrooms, stairs and corridors are pointed out, and other furniture standards such as bedroom furniture (bed) are also problematic.

Meanwhile, there are about 110 fire accidents per year at institutions for the elderly and infants including residential welfare facilities for the elderly, among which facilities related to the elderly account for 30%. In a situation where the elderly population and the demand for the institutions for the elderly and infants are increasing and the deterioration of the buildings is in progress, it can be predicted that the number of occurrences of such fire accidents will also increase. Although fire accidents are generally caused by careless management of users, such as electrical causes, user inattention, machine overheating, arson, etc., the actual cause of injury to life and property is determined by how much a combustion is expanded by the physical and mechanical building environment of the facility. Particularly in the case of the elderly whose physical activity is unnatural, the initial response is considered to be important in the event of a fire, and in fact, the causes for the increase in damage that are recognized in the examples of large-scale fire accidents in facilities related to the elderly after the 2000s have been pointed out as not installing sprinklers, blocking evacuation passages, piling up of finishing materials and products generating toxic gas, etc.

The legislations related to residential welfare facilities for the elderly are under the jurisdictions of the Ministry of Health and Welfare, the Ministry of Land, Infrastructure and Transport, the Ministry of Public Safety and Security, and the Ministry of Strategy and Finance, respectively. According to the "WELFARE OF OLDER PERSONS ACT", the residential welfare facilities for the elderly are divided into residential facilities for the elderly, communal living homes for the elderly, and welfare housing for the elderly, and are classified into the institutions for the elderly and infants, and independent and apartment houses according to the building use classification of Article 2 of the "BUILDING ACT", and correspond to the social welfare facilities among the infrastructure of Article 2 of the "NATIONAL LAND PLANNING AND UTILIZATION ACT" (NATIONAL LAND PLANNING ACT). Matters concerning the installation of residential welfare facilities for the elderly according to the "WELFARE OF OLDER PERSONS ACT" are facility standards, staff placement standards, establishment/modification/abolition of facilities, and obligation/recommendation standards to establish convenience facilities for residential welfare facilities for the elderly, and excluding these matters, the

"BUILDING ACT" and "ACT ON FIRE PREVENTION AND INSTALLATION, MAINTENANCE, AND SAFETY CONTROL OF FIRE-FIGHTING SYSTEMS" apply to the matters related to the construction and safety management of the building.

Current provisions for securing the safety of the residential welfare facilities for the elderly can be classified into "facility safety" concerning installation of facilities and "life safety" for ensuring convenience and safety of users. "Facility safety" refers to matters concerning the installation and management of facilities of buildings and includes the contents of the structure, materials, equipment, etc. of the buildings. "Life safety" refers to the standards for convenience and safety of facility users, and can be classified into "life convenience" concerning facility installation, securing of necessary areas, certification system, etc. and "life security" for crime prevention. Standards, guidelines, manuals, etc. related to residential welfare facilities for the elderly are based on the universal design and barrier-free design which are guidelines for the planning and design of facilities, presenting the design elements and the detailed dimensions for each element for the elderly and the disabled.

However, in the detailed contents of such existing legal system, institutional safety standards considering the physical and mental conditions of the elderly are currently absent. In the "WELFARE OF OLDER PERSONS ACT", only a minimum of facility management provision is presented, and even in the "BUILDING ACT" and the "FIRE SERVICES ACT", they are generalized to the institutions for the elderly and infants or the housing standards for facilities of independent houses and apartment houses are applied, and thus, the safety provisions differentiated according to the characteristics of facility users or the facility operation scale (condition) are currently inadequate. In addition, although the standards for facility planning considering the physically weak such as the elderly, etc. are in operation, they only present a minimum of physical environmental standards, not taking into consideration relationship-based space construction methodology.

According to statistical data from the Ministry of Health and Welfare, based on the year 2015, the total number of residential welfare facilities for the elderly is 427, and when the increase/decrease in the number of the facilities is observed for 5 years, the number of the facilities increased by about 106% by

2014 compared to 2011, but it decreased to 103% again in 2015. However, despite the decrease in the number of such facilities, since the number of residents increased by about 128% in 2015 compared to 2011, actual users for residential welfare facilities for the elderly have increased, and it is predicted that the demand will also continue to increase in the future.

Meanwhile, among the registered residential welfare facilities for the elderly, 62% were registered as institutions for the elderly, 31% as communal living homes for the elderly, and 7% as welfare houses for the elderly, and it can be seen that most residential welfare facilities for the elderly are operated as institutions for the elderly and communal living homes for the elderly. As a result of examining the physical compositional state based on the legal safety regulations (300 m2 for the installation standards for fire-fighting facilities, 400 m^2, and five floors for the installation standards for evacuation staircases), it was found that over 90% of the institutions for the elderly have an area over 300 m^2, 56% of the communal living homes for the elderly have an area less than 300 m^2 and 70% or more have an area less than 400 m^2. In addition, as a result of examining the size of the facility based on the number of floors (5 floors) which is the standard for installing the evacuation staircases, more than 75% of the institutions for the elderly have 4 floors or less, and 50% of the communal living homes for the elderly have only 1 floor.

Meanwhile, according to observations on the degree of deterioration of facilities based on 10 years which are an inspection period for building maintenance and management, among the total 258 facilities of the institutions for the elderly, about 40% of the facilities had an age of less than 10 years, about 33% had an age of 10 years or more and less than 20 years, and 18% had an age of 20 years or more. Of the total 131 facilities of the communal living homes for the elderly, it was observed that about 46% had an age of less than 10 years, and about 50% had an age between 10 and 20 years old.

According to the survey on the management entity of the residential welfare facilities for the elderly, it was found that individuals manage 45% of the institutions for the elderly and 84% of the communal living homes for the elderly, and the operating conditions of the residential welfare facilities for the elderly are determined to be somewhat unstable, and these matters were confirmed through operator interviews at the time of actual survey. On the

other hand, for large-scale welfare houses for the elderly, the proportion of for-profit corporations was found to be the highest (52%).

The regional status in which residential welfare facilities are located was observed, and about 37 to 40% of both the institutions for the elderly and the communal living homes for the elderly are located in managed areas, which were the highest proportion, and about 15% were located in residential areas, showing a low proportion. On the contrary, about 39% of the welfare houses for the elderly were located in residential areas showing the highest proportion, it was found that the construction and operation of small-sized facilities in the living space of a city are difficult.

Chapter 3. Implications from Policy and System of Overseas Residential Welfare Facilities for the Elderly

The overseas residential welfare policy for the elderly is a housing policy for the low-income elderly of the governments of many foreign countries, and the policy is applied in the forms of public housing construction, rent subsidies, mortgage credit insurances, loans and subsidies for housing repair and improvement, mortgage program, advice and consultation, etc. The recent trend has been to avoid facility-oriented housing for the elderly due to an increase in the expected lifespan, an increase in the elderly population because of the baby-boomer generation, and an increase in the financial burden, and by strengthening local community-based services, aging in place is increasing. The increase in home care services and local community-based services reduces the involuntary migration of the elderly to healthcare facilities, thereby effective for reducing costs.

The overseas legal systems related to residential welfare facilities for the elderly have differences between countries. Basically, however, it is common to operate the legal system and guidelines that regulate the physical environment related to the elderly and disabled, including the concept of

universal design. The residential welfare facilities for the elderly supported by the U.S. government subsidies must comply with mandatory provisions that contain clauses related to the quality and safety of medical and care levels and the physical environment. Japan is similar to South Korea in many actual circumstances. As in the "WELFARE OF OLDER PERSONS ACT" of Korea, residential facilities related to the elderly should be in compliance with basic policies and planning guidelines to ensure safety based on the "Act on Elderly Persons' Housing", and residential welfare facilities for the elderly should be planned in accordance with the applicable standards as well.

In the case of the United States, in addition to the respective state-level regulations required for care facilities (Long-term care/nursing homes), the provisions legislated and required by the federal government in 1989 (42 CFR part 483, subpart B) allowed more consistent and systematic permits, operations, management, maintenance, and monitoring systems to be established, but assisted living residences and independent living residences are regarded as a system and program closer to the concept of housing, and more specific and detailed federal regulations have not been established so far.

In Japan, the private sector participates in self-home use for the elderly and supply of rental housing for the elderly, and the government provides maintenance supports for nursing care services. The residential welfare facilities for the elderly in Japan can be classified according to the respective relevant laws and regulations and are largely distinguished as facility-based services and home-based services, but the number of residents, the size of facilities, and operational guidelines are separately defined for each facility. For regulations related to securing safety of the residential welfare facilities for the elderly, there are insurance and welfare system based on legislations, standard operation of elderly housing with service, fire safety standards, barrier-free, universal design standards, housing performance indication system, regulations related to obligation for earthquake-resistant diagnosis, etc.

In order to prevent fire accidents, the Ministry of Health, Labour and Welfare has established a budget to strengthen sprinkler installation regulations at nursing care facilities and medical facilities and to expand support for maintenance expenses, and targets for support have been expanded to include

small-sized for-pay clinics as well. In addition, the Ministry of Land, Infrastructure, Transport and Tourism has proposed amendments to the "Building Standards Act" to include the introduction of structures in which buildings, etc. that are used by unspecified majority or the elderly are subject to periodic survey and inspection and must be inspected by persons with expert knowledge and skills for fire prevention equipment.

☐ Derivation of items for facility planning standards to secure the safety of residential welfare facilities for the elderly

Based on the installation standards of residential welfare facilities for the elderly prescribed by the domestic "WELFARE OF OLDER PERSONS ACT", as well as the space where safety accidents of the elderly occur and the risk factors for the occurrence of safety accidents, etc., the current institutional states of domestic and foreign countries were compared. The comparison items are 20 items including indoor space and space factors, etc., and, not all applicable provisions exist for each item in both domestic and foreign countries, and the relevant provisions were compared to derive more appropriate regulations.

As a result of comparison, differentiation of the regulations for the number of bedroom users per unit and the area was conspicuous. In South Korea, less than four people are common, while the United States is limited to single and double rooms, and Japan allows up to four people according to some local governments, but recent trends are changing to single rooms. As for the area standard, it is 5㎡ per person in South Korea, and there is no specific regulation in the United States. In Japan, it is 7.43㎡ excluding storage facilities in the case of urban low-cost housing for the elderly, and 14.85㎡ in care houses, which shows that the domestic standard is relatively and significantly small. Although medical and nursing rooms do not take a large proportion in the residential welfare facilities for the elderly, proper space planning is required when the various functions for providing practical care services and the availability as mixed space are considered, but the domestic regulations specify only pharmaceuticals, materials, and installation of equipment, and there is no special facility provision. On the other hand, the United States provides detailed regulations such as detailed facilities (bathroom, etc.), area (9.29 m2), etc. that must be included in such relevant rooms. There is no separate provision in Japan.

Chapter 4. Survey on Safety Management of Residential Welfare Facilities for the Elderly

A factual survey was conducted for residential welfare facilities for the elderly currently in operation in order to understand the current state of safety management in terms of the physical environment for each facility. Subjects for the factual survey were selected from nine facilities (4 institutions for the elderly, 4 communal living homes for the elderly, and 1 welfare housing for the elderly) based obtained data for the present status of local facilities for each region provided by the Ministry of Health and Welfare every year.

After preparing a checklist draft by reviewing criteria related to safety management for establishing items for the factual survey, a preliminary survey was carried out to supplement the items of the checklist. Before an actual field survey for each facility, a literature search was performed to compile matters related to facility information, location, placement, and surrounding environment, and by conducting field survey and staff interviews, omitted information was supplemented. The factual survey was conducted in a manner in which field investigation was conducted after staff interviews.

Through the collected drawing data, the plane and cross-sectional space configuration was understood in parallel with the field survey, and after reviewing matters related to safety management, horizontal and vertical movement lines, evacuation space, and emergency evacuation routes in living spaces such as residents' bedrooms, living rooms, etc. were examined. The result of this factual survey is a compilation of the field survey, photographs, drawings, and interview materials, which summarizes as the part for deriving items for the design guidelines of residential welfare facilities for the elderly and the part for providing improvement directions for the related system.

Problems derived as a result of the factual survey and necessary improvement items are firstly, the deterioration of the durability of indoor and outdoor finishing materials, cracks in walls and floors, roof leaks, etc. are problems caused by the aging of facility, which are matters directly connected to safety management. While the demand for facility renovation is increasing, professional consultation and support systems suited to each facility situation

are inadequate. In addition, it is difficult for the elderly to evacuate to the elevator and stairway paths in a short amount of time by walking, and it is necessary to propose evacuation facilities considering various physical conditions.

Secondly, it is important for residential welfare facilities for the elderly to secure a safe evacuation route in preparation for disasters such as fire, etc. by installation of evacuation equipment and recognition of the evacuation route. In most facilities, fire extinguishers and powdered fire extinguishers are installed by default, but it was found that familiarity with utilization methods was insufficient. In particular, in small-sized facilities, there were cases in which both the staff members and the elderly were not experienced in the demonstration training, and it was found that educational support related thereto was absent. Several evacuation devices were presented in the relevant criteria, but there were many "escape chutes" actually installed in the facility. Installation of effective evacuation equipment capable of evacuating the elderly is required.

Thirdly, among the institutions for the elderly, communal living homes for the elderly, and welfare housing for the elderly, the small-sized facilities such as communal living homes for the elderly have many vulnerable points in terms of facility safety and life safety due to the aging of the facility, personnel shortage, and a decrease in the number of residents. In particular, safety-related information, education, equipment supplementation, etc. are inadequate overall. As a result of the factual survey, most senior citizens living in communal living homes for the elderly have inconveniences when moving, which can lead to great damage at the time of the accident occurrence. Therefore, the development of response measures for emergency situations (personnel reinforcement) in small-sized facilities should be considered first.

In the factual survey of this research, investigation items were established based on the existing regulations and guidelines, and after reviewing cases for each item, in the viewpoint of the planning, the items were classified into outdoor space, indoor space, factors in indoor space, equipment facilities, etc., to be reflected in the main items and content constitutions of the guidelines for facility planning that enables stepwise planning.

Chapter 5. Institutional Improvement Plan for Securing the Safety of Residential Welfare Facilities for the Elderly

☐ Improvement plan for the legal system for securing the safety of residential welfare facilities for the elderly

In the "BUILDING ACT", three types of residential welfare facilities for the elderly, namely, institutions for the elderly (facilities for the elderly and the infants), communal living homes for the elderly (independent house and apartment house), and welfare housing for the elderly (facilities for the elderly and the infants) are classified according to different use, respectively, and it is difficult to apply consistent legal standards considering user specificity. As a result, structure and fire safety standards should only be applied according to the use of buildings and the scale of the total floor area in accordance with the "BUILDING ACT". Particularly in the case of welfare housing for the elderly, it corresponds to the facility for the elderly and the infants according to the use of buildings, but the substantial architectural form and the method of utilization are close to an apartment house (public rental housing), and in this case, it is necessary to consider compliance with equipment safety standards prescribed in the "HOUSING ACT". However, according to the current law, welfare housing for the elderly is excluded from apartment houses, and the provisions related to securing safety as a residential facility are excluded. On the contrary, communal living homes for the elderly are classified as independent houses or apartment houses so that building structure and finishing, fire-fighting equipment, evacuation provisions, etc. which should be secured at residential welfare facilities for the elderly are more relaxed and applied. Therefore, in this research, the expansion of universal standards was proposed to secure the safety at the residential welfare facilities for the elderly according to the "WELFARE OF OLDER PERSONS ACT".

Matters that should be corrected and supplemented the most in the legislations related to construction and fire prevention are matters related to the prevention of fire spread and evacuation at the time of the occurrence of fire. As described in previous studies, matters related to initial responses to the

occurrence of fire and rescue, and evacuation are most important in facilities where the elderly are the main users. Therefore, it is necessary to strengthen regulations for facility installation standards related to existing construction and fire prevention. Basically, it is first necessary to strengthen the fire resistance capability in rooms that are prone to fire occurrence and establish fire zones. As observed in the case of Japan where all of the welfare facilities for the elderly are required to install fire detection devices, alarms, and sprinklers, it is necessary to reconsider the regulations on installation obligation for the expansion of related facility installation targets subject to relevant facilities in South Korea. In this regard, in this study, three improvement plans for the legal system were proposed to drastically strengthen the fire prevention capability and fire protection compartment, strengthen the installation standards of the evacuation facility, and strengthen installation regulations for fire-fighting equipment.

☐ Safety standards (draft) for residential welfare facilities for the elderly and simulation

Facility planning guidelines (draft) were prepared to secure the safety of residential welfare facilities for the elderly based on regulations related to residential welfare facilities for elderly, various planning standards, related detailed foreign regulations, and the results of the field survey. This focuses on the prevention and response of safety accidents at residential welfare facilities for the elderly and takes into consideration the physical and psychological specificity of the elderly, and thus it is different from the facility standards for persons with general physical vulnerability. These guidelines are utilized at the initial stage of the planning of a residential welfare facility for the elderly, and by preliminarily reflecting the installation of the safety facility for temporary measures frequently occurring during the maintenance process in the initial planning stage, the economic effect of eliminating unreasonable wasteful elements in facility, the construction process can be achieved.

The guidelines consisted of two chapters, "General Provisions" stipulating general matters and "Planning Standards for Residential Welfare Facilities for the Elderly" clearly specifying detailed regulations. In the General Provisions, the purpose of using the Guidelines, application subjects and application methods, definition of terms, and reference provisions were

presented, and for the safety standards, by compiling the above-mentioned survey analysis framework and survey results, safety items for each space of the residential welfare facilities for the elderly were specified. The safety standards were divided into 30 general items and 62 detailed items by classifying them into general principles that can be integrally applied to both facilities and matters considering each specificity, respectively.

Finally, a facility planning simulation was carried out based on this guideline. In the simulation, two sites were selected among the target sites in the factual survey to proceed in the direction for preparing a new plan, and the simulation placed a greater emphasis on the application of the planning standards to secure safety than on suggesting a creative design proposal. Therefore, examples of space configuration centering on plane and the volume and function of the space through 3D image were analyzed. In addition, the appropriate unit space that was examined the possibility of planning the equipment accordingly was investigated. The results will be used as a resource to help understand the main contents of the guidelines.

Chapter 6. Conclusion

In the conclusion of Chapter 6, the main results of the detailed tasks conducted through this research are summarized overall, and the future issues that require examinations in the mid-to-long term and preparations for alternatives in the future are presented as follows.

☐ Multilateral efforts to improve social perception

The point that must be treated particularly important in improving social perception can be social discrimination against the elderly and improvement of inequality treatment. This is not merely limited to the problems of local residents, and for both family members and facility staff members, cooperation that matches their respective roles must be a prerequisite. Local residents and family members must participate in various programs promoted by the residential welfare facilities for the elderly and carry out roles as basic

members of the social safety network cooperating at various events and accidents. The facility staff members, as direct care providers for the elderly, must provide appropriate services based on the understanding of their lives, life patterns, and physical and mental conditions, which is the most important part among some of the future tasks proposed in this study.

☐ Expansion of aging-in-place facilities and small-sized facilities

An increase in the elderly population and a decrease in the producing population will lead to shortage problems of national welfare resources. This again results in a reduction in the extent of direct support such as construction and operation of social welfare facilities, etc., and as a result, it is possible to raise the necessity of expanding aging-in-place welfare. Foreign countries of the advanced age society have already converted to aging-in-place welfare, and future tasks may be proposed to find ways to expand various types of small-sized welfare service facilities that combine the efficiency of facilities such as systematic operation, cost reduction, and immediate safety problem response, etc., in addition to the comfortable atmosphere similar to one's own home.

☐ Differentiation of planning standards for residential welfare facilities for the elderly according to location

The residential welfare facilities for the elderly can be distinguished into the city center type and the city suburban type. It is easy to secure premises for facilities located in the suburbs due to relatively low land prices, and therefore, it is possible to assume horizontal expansion for demanded space at the initial stage of planning. In this case, securing the safety of the moving line for horizontal movement is the key point to facility planning. On the other hand, the facilities located in the city center are vertically constructed within 5 floors or more due to the limit on the size of the premises, and therefore, a planning with an emphasis on safe evacuation and rescue in case of various accidents and disasters is required. Particularly in the case of city center type-vertical buildings, space should be efficiently utilized, while development of various evacuation facilities securing safety and efforts to seek practical use measures at the levels of the private sector, the government, and the academia are required.

☐ Operation and management systematization for residential welfare facilities for the elderly

Space planning for small-unit groups premises the possibility of forming a daily and friendly community and can guarantee a stable life within. Based on this, philosophy, detailed strategies, and various operation manuals for the management of facility operation must be developed. Based on thorough information construction of detailed daily schedule records of the residents, history records of various accidents, etc. the direction of medium- to long-term facility management should be continuously revised. This is possible in the situation where personnel for performing related work is secured, and considering the problem of the services personnel shortage presently raised in the residential welfare facilities for the elderly in South Korea, it is necessary to approach with a medium- to long-term strategy, but at the same time, it is also an urgent matter. The first strategy is to secure safety, which is a fundamental condition, and to provide educational opportunities for related users, service providers, and local residents, and in particular, it is necessary to search for measures to establish an organizational system in connection with local safety management facilities and organizations, and to improve its practical use.

Based on various problems regarding the elderly raised as such, the guidelines proposed in this research need to supplement and improve contents such as multifaceted ideas, operations, and management methods of user activities, in addition to the standards for physical environmental planning.