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Research paper

A study on the Neighborhood Street characteristics of housing regeneration in original part of Seongnam city
Focused on the Taepyeong 2, 4 Area -

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Abstract

Recently, the plans to revitalize the deteriorated residential districts in the Built-up area of Seongnam have been turned into more sustainable and systematic plans through gradual urban regeneration projects instead of overall pulling down the whole block. This is because paradigm in urban regeneration has been shifted from a uniform reconstruction method for existing deteriorated residential areas to the enhancement in the awareness of these existing areas as familiar settlements and the right of residents. The Built-up area of Seongnam was formed on a hilly area since the early 1970s and has been a major target of reconstruction and redevelopment till now because most of the present residential areas are deteriorated excessively. Due to the sustainable urban regeneration policy which has begun in the late 2000s centering in the capital area, some blocks designated as reconstruction and redevelopment areas were released with sustainable urban regeneration plans so that the residential areas environments are beginning to be improved.
This study judges that the Neighborhood Streets in the Built-up area are the most important planning elements for Housing Re-generation of the deteriorated residential areas in Seongnam. Despite that the walking environments in the built-up area in Seongnam are poor because of being formed in steep hilly areas, however, neighborhood commercial facilities are activated along Neighborhood Streets in the Built-up area of Seongnam. Those commercial facilities were not built as pre-planned but were spontaneously formed along these streets activated in residential areas. In this study, 'Neighborhood Street in the Built-up area' is proposed as main indicator that can be used to maintain and supplement the order of existing urban fabric when deteriorated residential areas are regenerated through gradual improvement plan of residential environments in existing urban areas. Therefore, the existing Neighborhood Streets in the Built-up area are defined as the major community constituent factor in the Built-up area in Seongnam and the usability of the Neighborhood Streets will be grasped.

Keywords: *Housing Regeneration, Built-up area, Deteriorated Residential area, Neighborhood Street, Neighborhood Facilities*

1. Introduction

1.1 Purpose of study

The built-up area in Seongnam was formed through a single residence type new town plan and has an urban structure equipped with hilly terrains and grid-shaped street networks containing many 70 ㎡ wide small lots. Due to the rapid development without systematic urban development conditions, a phenomenon of the lack of urban infrastructures and neighborhood facilities in the residential area appeared. As a way to improve the poor residential environment, Neighborhood Streets, which are 'spontaneously vitalized streets', were formed along some streets and became major community spaces in the residential area.
Hoping that the streets located within the existing deteriorated residential area will be utilized as a major element in housing redevelopment and urban regeneration projects by maintaining and supplementing their functions, the purpose of this study is to find streets where neighborhood commercial facilities are distributed in the residential area, define them as built-up area neighborhood streets, and derive the characteristics of the built-up area neighborhood streets so that they can be utilized as basic data in housing redevelopment and urban regeneration projects.

1.2 Method and procedure of study

This study focuses on the functions of streets, which connect residential areas organically through the neighborhood commercial functions and community functions in the residential areas in the built-up area in the Seongnam. After finding 'spontaneously vitalized streets' where community functions and neighborhood commercial functions are actively implemented from among those streets that exist in the residential living area and are organically connected with each other, the present situation of the streets will be analyzed to present a method to regenerate the deteriorated residential areas utilizing the neighborhood streets in the built-up area in Seongnam.

The spatial range will be the whole area of Taepyeong-dong out of the deteriorated residential areas in the built-up area in Seongnam among the built-up areas in the capital area.
(1) After figuring out the background of selection of Taepyeong-dong in the built-up area in Seongnam, which is the spatial range, and the present situation of Taepyeong-dong, physical standards for neighborhood streets in the built-up area will be derived.
(2) After finding Neighborhood Streets located in the residential areas in the built-up area in the Seongnam based on the physical standards for neighborhood streets in the built-up area in Seongnam, the present situation of the neighborhood streets will be analyzed to derive the characteristics of neighborhood streets by case region.
(3) Through the characteristics of the Neighborhood Streets, plans to utilize the Neighborhood Streets will be presented for regeneration of the urban residences in Taepyeong-dong of the built-up area in Seongnam

2. Present situation of the built-up area in Seongnam and the present situation of Taepyeong-dong

2.1 preliminary research of Neighborhood Street

Research on the neighborhood streets focuses on almost the only planned living transverse planning and characteristics of common houses, and direction of plan direction through case analysis. The neighborhood streets which is the subject of this research is not just the space created by the plan but as the effective side facing the neighbouring commercial facilities spontaneously formed in the single residential area, Physical and spatial standards can differ from each other.

Table 1 : Precedent research of Neighborhood Streets

Division		Contents
Research	Korea Land&Housing Corporation (2002)	- Space for everyday life - Space that links with the surrounding environment - Space that can openness, superposition, connection
	Baek Hye Sun (2003)	- Space for everyday life - Spaces where private activities and social activities appear
	Yu Haeyun (2006)	- A daily activity space in the building or in the front yard - Basic environment for residents to participate freely and actively
	Kim Jong-eun and others (2005)	- A function that the apartment complex compensates for the disconnection from the outside - Planning concept to ensure surveillance in the neighborhood streets
	Kim Jin Sung and others (2007)	- Reconstruction of publicity in community housing complex and formation of community - Formation of contact space for formation of relationship between private and public space

2.2 Present situation of the built-up area in Seongnam

The term built-up area means a town in a city that has been already formed. Built-up areas have physical natures such as the insufficiency of infrastructures, deteriorated buildings, and the lack of public spaces.
When seen in terms of urban planning, the housing complexes in the built-up area, which were formed in the land readjustment project in the 1970s, began to deteriorate along with the land price falls from the 1990s. The use of lands in the urban areas began to be reorganized as redevelopment, reconstruction, and refurbishing projects progressed to vitalize the residential areas that were falling behind. In addition, some of the areas were maintained as detached house complexes and the houses in the detached house complexes were rebuilt into multi-household houses and studios leading to increases in the building density of the land in many cases. Some of the detached houses were remodeled to change the general residences into general restaurants or stores thereby changing the functions of the housing complex into multipurpose functions.

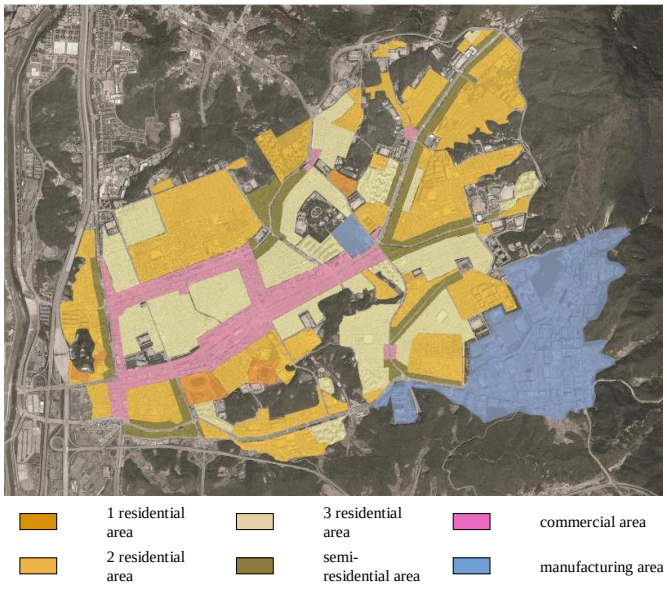

Fig 1: Seongnam city district use

2.3 Lot features

Taepyeong 2, 4 area is a low-rise detached house and multi-household house area where the buildings along the neighborhood streets consist of one or two story buildings accounting for 58.1% and three to five story buildings accounting for 42.9%.
Taepyeong 2, 4 area has a form of a low-rise high density residential area consisting of neighborhood streets and neighborhood living facilities with clear nature, functions, and rank differences of streets in residential areas formed along 6m wide Neighborhood streets.

3. Analysis of the characteristics of Neighborhood Streets in the built-up area in Seongnam

3.1 Frame of the analysis of the characteristics of the neighborhood streets

The Neighborhood Streets in the built-up area in Seongnam were divided into 150 sections and the present situation of the neighborhood streets was divided into the that of the streets, that of the accessibility, and that of buildings for analysis. With regard to the criteria for classification of the neighborhood streets into sections, gradients were used as the first criterion. The sections were set in ranges where the direction of gradients does not change. Secondly, the neighborhood streets were divided based on the units of blocks in the residential area.

Table 2 : Built-up area Classification of roads

Division			category	
scale	Boulevard	1	70m More	
		2	50m ~ 70m	
		3	40m ~ 50m	
	Road	1	35m ~ 40m	
		2	30m ~ 35m	
		3	25m ~ 30m	
	Street	1	20m ~ 25m	
		2	15m ~ 20m	
		3	12m ~ 15m	Built-up area neighborhood street standard
	Lane	1	10m ~ 12m	
		2	8m ~ 10m	
		3	6m ~ 8m	
	Ally		4m ~ 6m	
			4m Less	
Functional	Major Arter3			
	Minor Arterial			
	Collector Road			
	Local Road			Built-up area neighborhood street standard
	Special Road			

Among the present situations of Neighborhood Streets by section, the present situation of streets includes the present situation of the widths, lengths, and gradients of the neighborhood streets and the present situation of accessibility includes the present situation of elements that can affect street vitalization such as the distance to the adjacent main trunk road, the distances to bus stops, the distances to crosswalks, and functions as through roads.
The analysis of the present situation of buildings figures out the use zoning of the district and the use zoning of the adjacent districts, the number of lots along the neighborhood streets, the number of buildings, the number of neighborhood facilities, and the numbers of stories of buildings for the identification of the densities. Through the present situation of buildings, indicators that will enable the identification of the degrees of vitalization of neighborhood streets by section such as the frequency and ratio of neighborhood facilities, the frequency of buildings, and the density of buildings can be derived.

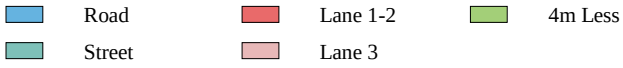

Fig 2 : Seongnam city road system

Table 3 : Neighborhood Street Activation figures

	Rating			
	1	2	3	4
Neighborhood facilities frequency	3 Less	3More~7Less	7More~11Less	11More
Neighbor-hood facilities ratio	25%Less	25%More~50%Less	50%More~75%Less	75%More
Rating criteria	Frequency + Ratio = 1(4+4=8)rating ~7(1+1)rating			

Table 4 : Seongnam city Neighborhood Street Activation analysis

	category	Characteristic				
Road	the width Section	Total	6m	7m	8m	10m
		150	133	3	13	1
	Axis Section	Total		Transverse		Longitudinal
		150		70		80
	length (m)	Total	shortest		longest	Average
		20849	60		368	139
	slope (˚)	Upper average		Lower average		Average
		6.1		9.3		8.3
Accessibility	main road (m)	Direction	Upper average		Lower average	Average
		E-W	145		189	178
		S-N	188		206	197
	Passing function	One-way road		Two-way road		Internal road
		51		66		33
	Crosswalk (m)	Upper average		Lower average		Average
		148		195		181
	Bus stop (m)		Upper average		Lower average	Average
		village bus	131		161	147
		General bus	145		194	180
Architecture	use district	2 residential area			3 residential area	
		50			100	
	Lot	Total	Upper average		Lower average	Average
		3962	24		27	26
	Building	Total	Upper average		Lower average	Average
		3836	23		26	26
	Neighborhood facilities	Total	Upper average		Lower average	Average
		1667	19		3	11
	Neighborhood facilities Frequency	Upper average		Lower average		Average
		14.6		2.9		8.03
	Neighborhood facilities Ratio	Upper average		Lower average		Average
		85.4		14.25		45.58
	Neighborhood Street Activation	Upper average		Lower average		Average
		7.6		2.4		4.8

In the analysis of the present situation of buildings, the values that will enable the identification of the degree of vitalization of neighborhood streets (hereinafter, neighborhood street vitalization value) are found through the sum of the absolute values of the frequency and ratio of neighborhood facilities.

The frequency of neighborhood facilities is the resultant value of the number of neighborhood facilities per 100m of neighborhood streets by section and the ratio of neighborhood facilities is the resultant value of the number of buildings and the number of neighborhood facilities located along neighborhood streets by section. The ratio of neighborhood facilities is a resultant value obtained through comparison of the numbers of neighborhood facilities per lot and can be objective only when the sizes of lots by section are constant. In the case of the built-up area in the residential area of Seongnam, although most lots are around 70 ㎡ in area, due to new constructions

through combinations of lots, the number of uniform lots and the number of buildings in each section cannot be identified. In addition, there were cases where objective resultant values could not be derived due to reductions in the number of buildings when the areas were adjacent to schools or public facilities in neighborhood streets.

To supplement the shortcomings of the ratio of neighborhood facilities as mentioned above, the frequency of neighborhood facilities is added to derive a neighborhood street vitalization value. The frequency of neighborhood facilities is obtained by deriving the resultant value through comparison of the numbers of neighborhood facilities located in a certain distance (per 100m).
The Neighborhood Street vitalization value is obtained by finding the value that will enable the identification of the degree of vitalization of each Neighborhood Street through the sum of the absolute values of the frequency and ratio of neighborhood facilities (hereinafter, neighborhood street vitalization value). The maximum value is 8 and the minimum value is 2 on the basis of absolute values and the neighborhood street vitalization values divide neighborhood streets in the built-up area in Seongnam into a total of seven classes of vitalization sections.

3.2 Neighborhood Streets in Taepyeong 2· 4 Area

1) Detailed present situation of the Neighborhood Streets
The present situations of the physical environments and accessibility of neighborhood streets in Taepyeong2. 4 area were analyzed to identify the overall present situation of the neighborhood

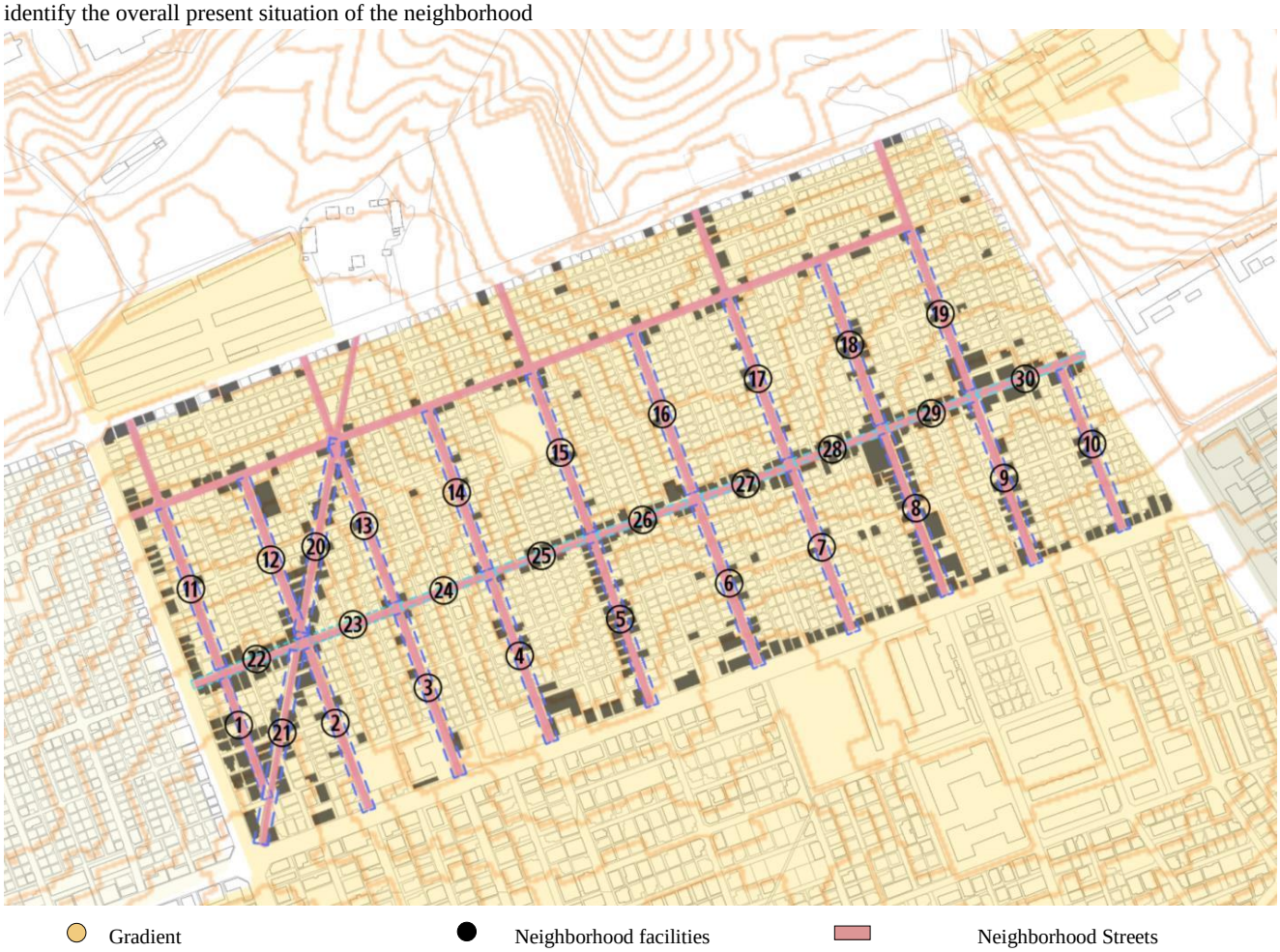

Fig 3 : Taepyeong 2.4 Area of Incline Status

streets in this district and the results were compared with the results of analyses of neighborhood streets by section to derive the characteristics of the Neighborhood streets in Taepyeong2 . 4 Area.

2) Present situation of gradients
On reviewing the present situation of gradients in Taepyeong2 . 4 area, it can be seen that differences are very large as the average gradient is 8.8˚, the smallest gradient is 0.1˚and the largest gradient is 25.3˚.
As for the present situations of Neighborhood Streets according to the gradients in Taepyeong2. 4 area, the neighborhood street vitalization values were shown to be the highest in sections with gradients in a range of 5˚~15˚and were shown to be the lowest in sections with gradients exceeding 15˚. The neighborhood streets in sections with an average gradient of 8.8˚can be regarded to have been the most highly vitalized. Therefore, it can be considered that although differences in gradients affect the frequency of neighborhood facilities, the effect is not very large.

3) Present situation of accessibility

The analysis of the present situation of accessibility examines the characteristics of four different present situations to identify their relationships with neighborhood streets. As with gradients, in addition to the physical present situation, the accessibility levels to neighborhood streets by section are identified through conditions that can affect the degree of utilization of streets such as the relationship with the main trunk road, passing-through function of the street, which is a traffic function among the functions of streets, crosswalk locations, and the locations of bus stops by route.

① Distance to the trunk road

The correlation between the general present situation of the trunk roads and the vitalization of neighborhood streets by section should be examined.

Taepyeong2．4 area is a rectangular space with a long horizontal axis. All four sides are surrounded by 15m wide trunk roads and among the trunk roads; the 15m wide trunk road located on the south plays the role of the main trunk road of the region.

On analysis of the frequencies of neighborhood facilities by distance in the east-west direction, it can be seen that rather than those neighborhood streets that are adjacent to the trunk roads, those sections that are at least 100m away from the trunk roads have high neighborhood facilities neighborhood street vitalization values. The sections with the highest neighborhood street vitalization values are 100m~150m away from the trunk roads and this indicates that the trunk road along the vertical axis has less effect on the neighborhood streets in the district.

The frequencies of neighborhood facilities by distance in the south-north direction were divided into two items; those that are less than 100m away from the trunk road and those that are 100m~150m away from the trunk road. The vitalization values of neighborhood streets in sections that are less than 100m away from the trunk roads were shown to be high indicating that distances to the main trunk roads affect neighborhood street vitalization unlike the east-west direction.

Fig 4 : Taepyeong2．4 Neighborhood Street Total Status

② Distances to bus stops

Bus routes operated in the district are two village bus routes and three public bus routes. The village buses are operated one-way along the district trunk road and the public buses are operated two-ways along the southern main trunk road.

Since the vitalization values of neighborhood streets in sections less than 100m away from the trunk roads were shown to be the highest, both the village buses and public buses are judged to have large effects on neighbor-hood street vitalization. In particular, distances to the public buses are judged to have particularly large effects on neighborhood street vitalization.

③ Distances to crosswalks

Neighborhood street vitalization values are shown to be higher than average in sections less than 200m away from crosswalks. Among them, sections that are 150m~200m away from crosswalks show the highest neighborhood street vitalization values. Rather than analyzing crosswalks separately, analyzing crosswalks together with bus stops is judged to be better.

Through analyses of five present situations, sections by present situation that affects neighborhood street vitalization were derived.

Fig 5 : Taepyeong2, 4 Neighborhood Street Total analysis

Table 5 : Taepyeong2, 4 Neighborhood Street Activation analysis

	Section no.	Gradient (˚)	Distance to the trunk road(m)		Distance to bus stops(m)		Distance to crosswalks	Neighborhood street vitalization value
			E-W	S-N	Village	Public		
1	28	**5.3**	233	141	173	162	**151**	8
2	8	**6.7**	185	**70**	**93**	**81**	78	8
3	29	11.6	150	141	157	142	**159**	8
4	22	**5.6**	43	143	**59**	143	**154**	8
5	26	4.3	386	141	156	161	**154**	8
6	20	15.3	45	**71**	**63**	**72**	251	8
7	27	4.3	314	141	181	215	**153**	8
8	5	11.2	340	**70**	**94**	**77**	104	7
9	1	**6.9**	23	**90**	**38**	**91**	98	7
10	9	0.7	**109**	**70**	**94**	**78**	101	7
11	21	**8.6**	**131**	147	160	233	86	7
12	30	3.6	34	142	**75**	115	**151**	7
					~			
23	7	15.8	265	**70**	145	140	104	3
24	13	0.1	175	145	163	255	224	3
25	23	25.3	**139**	143	155	175	**154**	3
26	24	21.9	213	143	160	171	**159**	3
27	3	3.6	174	**70**	**86**	150	79	2
28	11	12.4	24	146	**75**	215	223	2
29	14	1.7	253	145	166	222	224	2
30	16	11.8	321	145	174	248	224	2
○	Upper classes 1 and 2				○	Lower classes 6 and 7		

5) Analyses by section

Through analyses of the six different present situations of Taepyeong2, 4 area, the values of individual present situations that affect neighborhood street vitalization could be identified.

Among the neighborhood streets, upper 12 sections and lower 8 selections were selected based on the frequencies of neighborhood facilities to identify the degrees of neighborhood street vitalization according to the characteristics of individual present situations.

6) Comprehensive analysis

The 12 sections consist of six horizontal axis sections and six vertical axis sections. The neighborhood streets along the horizontal axis show high neighborhood street vitalization values despite that they are scored low according to the criteria for characteristics. Among them, sections #26, 28, and 29 are located between the sections # 5 and 8, which are vertical axis sections and it can be seen that thanks to the effects of vertical axis neighborhood streets, sections #26~28 were included in the upper sections despite that they satisfied two or fewer criteria for characteristics.

The neighborhood streets in Taepyeong2, 4 area can be said to be a spontaneous neighborhood street district formed because the vitalization of the vertical axis neighborhood streets affected by the public bus stops along the southern main trunk road affected the horizontal axis neighborhood streets that pass the center of the district.

4. Plan to regenerate the deteriorated residential area in Taepyeong 2, 4 area

After Taepyeong2, 4 area was lifted from the designation as a prearranged district for housing redevelopment and maintenance in January 2014, the necessity of a customized residential area regeneration method that fits the present situation of the region was felt and according to changes in the urban regeneration paradigm such as regional community vitalization and preservation, an integrated and systematic urban regeneration plan has been implemented pursuant to the 'Special Act on Promotion of and Support for Urban Regeneration' that came into effect on December 5, 2013.

Customized refurbishing project district 2 and urban regeneration project (general type) district 1, which are included in the Taepyeong2. 4 area residential environment management project, are districts where the project is in progress. Not only plans for individual projects but also an integrative plan for entire districts is judged to be necessary. The Neighborhood street that that passes the center of Taepyeong2,4 area can act as an important element in the integrative plan for the urban regeneration of the area. It can play the role of a central community that links individual project districts with each other and can serve the function as a major moving line of the area.

Customized refurbishing project (residential environment management project)

Urban regeneration project(general type)

Through the analysis of the characteristics of the neighborhood street in Taepyeong2, 4 area, based on the neighborhood street activation values after deteriorated residential area regeneration and improvement, continuous maintenance and development can be induced for the upper neighborhood street section through architectural guideline plans. Some districts adjacent to the lower neighborhood street section can be combined into one district later when medium scale apartment complexes are developed so that they can be utilized for residential area improvement plans.

In the neighborhood street that goes through the center of Taepyeong2, 4 area, all seven sections except for sections no. 23 and 24, which are highly steep, are included in upper classes. The horizontal axis neighbor-hood street is judged to be capable of playing a central role in the integrated urban regeneration plan for Taepyeong2, 4 and enabling the establishment of residential and urban regeneration vitalization plans through neighborhood living facility plans. If a plan to vitalize sections #23 and 24, which are highly steep, is established, a central Neighborhood street section that will organically connect Taepyeong2, 4 area can be formed.

As a plan to improve the deteriorated houses adjacent to the activated neighborhood street, small scale joint development should be promoted through combinations of lots. It can overcome the shortcoming of low business value appearing when single lots are developed while resolving the problem of deteriorated houses in the district through voluntary improvement by owners.

Since the neighborhood street in Taepyeong2,4 area is 6m wide and used by both pedestrians and vehicles currently, the walking environment in the neighborhood street should be improved. First, vehicle parking restrictions and one-way traffic can be applied to the Neighborhood street section and second, the expansion of the width of the street, which is 6m now, can be induced by designating retreated building lines when the deteriorated houses adjacent to the neighborhood street are reconstructed to improve the walking environment.

In the customized Taepyeong2, district 4 refurbishing projects, at least 4m wide roads in the district that were not city planning roads were newly designated as city planning facilities to facilitate the street and house refurbishing project and "street and the house refurbishing project inducing districts" were set centering on neighborhood streets to establish diverse plans to improve deteriorated houses in the district such as the construction of small apartments through combinations of lots and street and house refurbishing projects in block units

The Taepyeong2. district 4 deteriorated residential area vitalization plan utilizing Neighborhood streets can be summarized as follows.

In the case of the horizontal axis neighborhood street that plays a central role in the district, if a medium scale street and house refurbishing project is planned for sections #23 and 24 with poor neighborhood street functions due to the severe gradient to

Neighborhood Street activation section

Area for which the development of apartments by units of households is proposed

Class1,2 street

Class 3 street

Class 4,5 street

Class 6,7 street

improve the walking environment utilizing the elevators of the apartments, the connectivity of the Neighborhood street can be improved. In particular, for the Neighborhood street currently vitalized to be continuously maintained and developed, multiple simultaneous developments should be avoided when residential environments and urban regeneration are planned and gradual urban residence regeneration should be induced through circulating plans.

In the case of vitalized neighborhood street sections, to maintain the nature of the existing street and improve walking environments, the expansion of the existing 6m wide streets into 8m wide streets should be induced through the designation of 1m retreated building lines when deteriorated houses are reconstructed so that the streets can be used for both walking and driving while being walking friendly streets. Related building guideline plans should be established.

As plans to improve deteriorated houses in the district including non-vitalized neighborhood streets, small/medium sized household unit apartment refurbishing plans such as street and house refurbishing plans can be implemented centering on the 'street and house refurbishing project inducing districts and household unit apartment development proposing district sections' in the customized Taepyeong 2, 4 dong refurbishing plan of Seongnam government to improve residential environments in other districts than the Neighborhood Street.

For convergence of individual urban regeneration related projects such as the residential environment management project district, which is in progress, and the urban regeneration project (general type), which is being planned, the neighborhood street can be developed into a central community space through activation so that the area can be changed into a regenerated residential area where project districts can communicate with each other instead of severance between project districts.

5. Conclusion

The results of this study are meaningful as basic data for the urban residence regeneration plans which can be utilized in possible gradual urban regeneration utilizing the Neighborhood Street in the built-up area of Seongnam and urban residential maintenance plans. The vitalization of the Neighborhood Street that has existed in the deteriorated residential area in the built-up area where an urban regeneration project is needed now can transform the deteriorated area into the central community space.

For refurbishment of the deteriorated residential area in the built-up area of Seongnam, the existing Neighborhood Streets and spatial structures should be analyzed and studied first and urban planning,

Street and house refurbishing project inducing district

Household unit apartment development proposing district

Neighborhood Streets in upper classes 1 and 2

Neighborhood Streets in upper class 3

※Data source: Seongnam City Hall (2016), Taepyeong2, 4 customized refurbishing project refurbishing plan report book, reorganized

residential and architectural planning should be carried out based on these results. In addition, if additional studies on the integrated characteristics of the Neighborhood Streets including the present situation in the humanity, society and urban context as well as the present social situation, the daily life of the regional residents, and physical present situation are conducted as follow-up studies, the results can be essentially applied to the analysis of regional conditions and vitalization plans as a basic element of urban residential regeneration plan so that they can be gradually utilized as key guidelines.

Table 6 : Built-up area of Seongnam city Neighborhood Street standard

①	use district	1,2,3 General Residential area
②	area	Area surrounded by local distribution road
③	Street width	6m ~ 10m
④	system of circulation	Mixed Traffic Street, No public transportation routes
⑤	support facility	Neighborhood Facilities
⑥	Street Characteristics	A map of the area within the area activated by the main arterial road

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