A Typological Comparison of Tri-Form Urban Hanok in Modern Housing Districts in Seoul

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Abstract
This study explores the typology of the Urban Hanok, created as a new housing type from traditional Hanoks, in the process of Seoul’s urbanization since the 1930s. It analyzes and compares the periodic characteristics of building arrangements in divided plots as well as the composition of interior space in buildings arranged when the new urban residential areas were organized. Based on this analysis, the objective is to discuss why a specific Urban Hanok type was selected as an ideal housing standard and how it spread at that time. Case study sites selected for this study include the residential area of Gahoe-dong during the 1930s, Bomun-dong during the 1940s and Yongdu-dong during the 1960s. First, the typological differences between Urban Hanoks formed through urban planning will be examined for each case study. Second, the differences in space composition for tri-form Hanok building areas (body and two separate wings) as well as the differences in building arrangements within their plots will be meticulously analyzed. This study will conclude that the cultural conservativeness of traditional Hanoks was maintained, but at the same time modern rationality was pursued at the early stage of Urban Hanok formation. In addition, the diversity of Hanok forms was secured by differing plot allocations in relation to streets and modifying Hanok types according to site conditions. However, uniform layout and model copies became apparent in the later periods of Urban Hanok development. In other words, Hanok construction modes have changed to improve efficiency through uniform mass production.

Keywords: Urban Hanoks; urban tissue; typology; tri-form Hanoks; plot allocation; plan layout; modern housing district

1. Introduction
In the middle of the 1930s under Japanese colonial rule, Seoul underwent a dramatic change. The Chosun Urban Planning Act, considered as the beginning of modern urban planning laws in Korea, was enacted in 1934, and the existing administrative districts of Seoul were expanded, paving the way for its transformation into a large scale metropolis. As part of the land readjustment process, new residential areas were developed, including the Donam district outside the old city boundaries. Insertional development of existing traditional residential areas was also actively pursued. A case in point is Bukchon, a residential area inhabited by influential families, located east of Gyeongbok Palace. A large number of Hanoks, traditional Korean houses with a wooden structure, were built in reallocated residential areas during this time, but were significantly different from the previous ones in terms of spatial composition, layout, and formal shapes. This newly emergent Hanok was referred to as the Urban Hanok in recognition of its status as a new housing type. These Urban Hanoks ceased to be built after the 1960s however, and were replaced by western style housing. This study attempts to classify and organize representative cases of Urban Hanoks built during this period by focusing on 'housing types', and understanding the changing trends in Urban Hanoks. The hypothesis of this study is as in the following.

First, the Urban Hanok is understood as a cluster of buildings, rather than as an independent unit. In other words, the Urban Hanok as a housing type is formed through its interaction with its surroundings and is constrained within a specific urban tissue. Where Urban Hanoks cluster, one can generalize their types and specify their characteristics.

Second, the Urban Hanoks of Seoul originated from a typical type of Gyeonggi-Provence house and maintained the formal factors of their prototype. A typical Urban Hanok can be described as various combinations of ㄱ-shaped Anchae (inner building) from the local Gyeonggi-Provence house with a

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(Received April 16, 2012; accepted August 20, 2012)
straight Bakatchae (outer building). Accordingly, the ㄷ-shaped plan is the most typical Urban Hanok configuration.

The subjects of this study are Bukchon's Gahoe-dong 31, where an artificial residential district was deliberately inserted into the spontaneously generated residential area, Donam's Bomun-dong 4 ga, and Yongdu's Yongdu-dong 102, created as new urban planning residential areas. Considering the scale, period and location of urban development, the three areas are appropriate representative cases of the 1930s, 1940s, and 1960s selected for this research. The urban conditions for the three cases in this study share similarities in block size, two rows of plots within a block and streets running north to south.

The concrete goal of this study is to determine the most general rules applied when a specific housing type was selected and urban tissue was formed. First, the authors examined the layout of basic types according to urban tissue, and then classified the ㄷ-shaped Hanok typology according to building composition and arrangement within plots. The authors introduced the new term "tri-form plan" for a "ㄷ"-shaped plan, in consideration of the building composition, namely, as it has a body and two wings. This study discussed how the new urban tissue and housing types interacted with conservative cultural attributes in the areas that underwent significant modernization within a short period of time.

2. Prototype of the Local Houses of Gyeonggi-Province and the Urban Hanoks of Bukchon

The shape of a Hanok is determined through a combination of 'spatial order' and 'structural frame'. The basic Hanok module is the Kan (space unit) due to its post and lintel structure. Generally, the Kan is connected following a grid system to form a 'Chae' (building) and various Chaes and fences encircle several yards to form a Hanok compound. In the vernacular houses of Gyeonggi-Province, most of their Anchae (inner building with a wives' room) designs are ㄱ-shaped with a single row of rooms. The typical layout is a linear arrangement of kitchen, Anbang (inner room), Daechung (wood floored great hall) and Gunnonbang, which is bent a right angle centered on the Anbang. In the local houses of Gyeonggi-Province, another ㄱ-shaped building, namely, the Sarangchae (outer building with a husbands' room) connected to the main gate, is arranged to face the Anchae. The basic requirements for the ideal house (Yangtaek) are that its Daechung faces south while its main gate faces east, and that the kitchen is placed to face the main gate across the inner court.

In the process of urbanization in Seoul in the latter Chosun dynasty, Hanoks began to be modernized. Most Hanoks in Bukchon were made in the open-rectangle or tri-form plan according to plot and dwelling size. The open-rectangle plan Hanok consists of a ㄱ-shaped inner building and a ㄴ-shaped outer building facing one another. Although this type of Hanok existed in Bukchon prior to the modern era, the tri-form Hanoks became a widespread type of housing in the 1930s with the establishment of modern residential areas. Open-rectangular Hanoks still maintained the characteristic Gyeonggi-Province local house plan, featuring small scattered yards. One of the distinctive characteristics of the tri-form plan is that the outer building's function was reduced and served only as a Munganchae (gate building), while connected with the Anchae. The dwelling space boundaries of both the open-rectangle and tri-form plan of Urban Hanoks are secured by the building areas, not by fences. But the open-rectangle plan differs from the tri-form plan in that the former plan includes scattered small yards.

The Urban Hanok has an introverted plan according to the courtyard house layout, which became known as a 'conventional house' in the 1930s. The counterpart is the extroverted plan which was called a 'reformed house' at the time. The square shape of modern plots effectively embraced the introverted plan with a central courtyard and post and lintel structure which unfolds a modular system of space grids. Therefore, the courtyard layout corresponds to the crowded modern urban structure yet simultaneously accords with the cultural characteristics by reflecting the tradition of the local Gyeonggi-Province houses. One of the most important features of Urban Hanoks is the arrangement of the Anchae. If the Anchae is placed
in the north facing south, the location of the gate building can vary depending on the road system, the direction of the access road and the location of the main gate. According to ideal house principles, a good house should have its courtyard opening toward the south while the main gate opens to the east. Access to the house from the north side should be prevented. However, where a street runs east to west, Urban Hanoks on the south side of the street inevitably have north entrances. Thus, people preferred an access street running north to south in the newly established Urban Hanok residential areas.

3. Typological Analysis of Urban Hanoks
3.1 Housing Blocks of the Gahoe-dong, Donam and Yongdu Districts

The urban structure of Bukchon went through a dramatic change during the Japanese colonial era. Large sites for housing and public buildings which remained until the late 1920s were newly developed as urban residential areas, divided into small uniform plots by private building companies. This was an innovative transformation inserting a new urban tissue into existing Hanok residential areas. Through this method, the residential area covering 31 Gahoe-dong was transformed into a land plot of about 18,200m² filled with new Urban Hanok housing in just three years between 1936 and 1939. The existing Bukchon street system had been a branch-like organic structure, but a new network of straight streets was introduced along with this modern transformation of residential areas. The width of the approaching road was about 4.5~5.5m. The land plot was regular with the plot size about 50-150m². (Kim, S. W. and Yoon, D. G. (1977))

In particular, the average plot size adjoining both sides of the approaching Street 1 was about 120m². While the average plot adjoining the west side of the street was about 124m², the average plot adjoining the east side of the street was smaller at about 112m². In addition, the plots accessible from the south, due to their locations on the street corner were relatively larger than the others.

Bomun-dong 4-ga in Donam district is a residential area that was newly created on the fringe of the downtown area according to the Land Readjustment Project of 1940. Yongdu-dong was also a residential area where most Hanoks were built since the establishment of the 'Building Act' and 'Urban Planning Acts, of 1962.' The residential area of Bomun-dong 4-ga features a repetitive distribution of rectangular plots divided by grid-streets running south to north of 6 or 8m in width. Inside the residential block, two or three rows of plots are arranged. The plot size in the housing block B was about 116m².

The main road in 102 Yongdu-dong runs west to east and is 6 or 8m in width. There are south-north alleys however, of about 5m in width between the west-east main roads, resulting in smaller housing blocks. They are formed with two rows of rectangular plots and have an urban tissue similar to that of the Bomun-dong area. The housing blocks in Yongdu-dong are more homogeneously divided than in other areas. The Yongdu-dong area exhibits the features of modern residential development as streets intersecting at right angles form the block boundary and plots are divided homogeneously within the block boundary. All the plot sizes are about 124m².

3.2 Layout of Basic Types According to Urban Tissue
1) 31 Gahoe-dong

The left and right sides of Street 1 and Street 2 which run north to south in the 31 Gahoe-dong Urban Hanok area are arranged with regular square plots in the shape of integrated bands. However, the plot band widths differ from each other. For instance, the width of the plot band adjoining the west side of Street 1 is about 11.8m², while that of the plot bordering the east side is about 10.8m. The widths of plots adjoining the west side of Street 2 are about 17.4m. The following principles are applied to these plots.

First, plots adjoining roads with relatively high hierarchies are divided into larger portions. Street 2 is a main road, while Street 1 is an approaching road. Since Street 2 is higher in rank than Street 1 hierarchically, the widths of plots adjoining Street 2 are broader. Second, people's tendency to prefer having the main building facing south and creating a main gate in the east was also maintained. Thus given that the plots adjoining the west of a south-north street are more advantageous than plots bordering the east of the street, nicer and bigger houses with better conditions were placed on these plots.

In addition, the shapes and proportions of each plot are slightly different from one another, even if they belong to the same band of plots. Moreover, the width of the 'plot band' adjoining the west side of Street 1 is reduced in the south part and converts the point into a curved shape, with the plot being divided as the boundaries of existing residential areas along the waterway met up with the modern block structure. The proportion of the plot thus changed as well. Five rectangular plots have wider width, while four rectangular plots in the south have a longer length.

Various floor plans exist in 31 Gahoe-dong including the tri-form plan, depending on scale, location and shape of plot. In the blocks of the research subject, plots bordering straight streets are filled primarily with tri-form plans, along with a few open-rectangular plan Hanoks. The 'γ' -shaped or 'ξ' -shaped plans are apparent in part of the outer block, in a plot created when the block meets an existing curved street. Here, the 'tri-form' indicates a floor plan irrelevant to the points of the compass. Even identical tri-form plans can be classified into the following three types depending on the yard opening direction.

• ☐ -shape: tri-form plan with the courtyard open to the east
• □-shape: tri-form plan with the courtyard open to the west
• △-shape: tri-form plan with the courtyard open to the south

1) Tri-form cases: located on the east and west sides of Street 1

Usually □-shape or △-shape plans are arranged in wide rectangular plots, while △-shape plans are arranged in narrow rectangular plots. In addition, △-shape plans are arranged where plots are accessed from the east, while □-shape plans are arranged where plots are accessed from the west. In these cases, all Daechungs face south and the kitchens face east. Most typical types are as in the following.

- Plots accessed from the east (located to the west of street): the plot band width is broad, the plan is △-shaped and the plot is horizontally long.
- Plots accessed from the west (located to the east of street): the plot band width is narrow, the plan is □-shaped and the plot is vertically long.

2) Modified type: ⌒-shaped Hanok in a block boundary and special cases

Plots where '⌒'-shaped Hanoks are located are smaller than those having 'tri-form' ones. This is because they are triangular remnant plots created when curved streets meet straight streets according to geopolitical characteristics. The '⌒'-shaped Hanoks can be understood as types adapted to restricted plots. In addition, the Hanok located in 31-48 Gahoe-dong is very unique. It is a so-called ⌒-shaped Hanok, a combination of the general tri-form Urban Hanok with a straight independent building in the west. The 'tri-form' section in the east can access the courtyard through Munganchae in the south, while the straight section in the west can be directly accessed from the street. This plot is large in scale as it is located in the corner of a non-rectangular block boundary and is trapezoidal in shape, with the west side longer than the east side. In response to this peculiar plot shape, a combination type was created, modified from the general tri-form plan.

2) Bomun-dong 4-ga and 102 Yongdu-dong

A block surrounded with a grid-pattern street system in the middle between a traffic road and a stream is located in the residential area of Bomun-dong 4-ga. Like the 31 Gahoe-dong area, regular plots form an integrated band and Hanoks are arranged along this. For Block A adjoining a traffic road, the plot band width facing the traffic road is widest and that of the rear plot is narrow. For Block B located in the east, the widths of the two-row plot are identical. The principle that a plot bordering a street of higher hierarchy receives a larger portion is also applied in this case. For example, the plot band width facing the east side of Street 1, the 17m traffic road, is about 20.7m, while that of plot band facing the west side of Street 2 is smaller at 14.0m. In particular, the side of Street 1 where the widest plot band width is allocated features two storey Hanok shop houses. However, unlike the Gahoe-dong areas, the preference for having the main gate between the east and west was not applied. Thus, the widths of the plot band within the Block B are identical at 12.4m. The size and shape of the plots are regular and homogenous. Most plots are rectangles elongated in the west-east direction.

The plots in the blocks of the research subject are filled largely with tri-form Hanoks. ⌒-shaped Hanoks are arranged on the southern and northern edges of the blocks. Among the tri-form Hanoks, there were few □-shaped or △-shaped floor plans, with most being △-shaped ones. The courtyard opens to the south and the Daechung faces south, but the kitchens face either west or east. The Yongdu-dong residential area also features a regular urban tissue within the grid-pattern street system, but it is more regular than the Bomun-dong area. Modified plots do not appear in this area.
the widths of the plot band within Block A are identical at 13.8m and within Block B are 12.3m, respectively. All plots are rectangular and elongated in the east-west direction. Among the tri-form Urban Hanoks, there are no □-shaped or △-shaped tri-forms, with all instead being △-shaped.

3) Result

Following are comparisons of the urban tissue and plot band allocations of the three case study areas. For an urban tissue comprising a road system and blocks, all three areas have modern structures. The creation of plots in a band shape of a uniform width along a straight street is one of the main characteristics of modern urban residential areas. However, the specific features differ from one another by region and period.

For the Gahoe-dong area in the 1930s, modern urban tissue was inserted into the area, while an organic street network complying to existing geographic features was retained. As a result, numerous block boundaries were created in non-rectangular patterns. Thus, irregular plots were generated in the corners and the shapes of Hanoks built in those plots were also peculiar. When it came to allocating the plot band widths, various widths were created by adopting the principles of broadening the width adjoining a boulevard, and allocating a broader plot band width advantageous to the principles of conservative Hanok allocation. When the plot band widths were settled, various plot proportions and the building types created within the plots were determined considering the intrinsic properties of Urban Hanok plan allocation, particularly direction and access.

Diverse plot shapes were created according to these principles, including rectangles, squares, east-west elongated rectangles and north-south elongated rectangles. They were designed to meet consumer demand while pursuing financial profit through these measures. The plots adjoining the west side of the street were more suitable for cultural preferences towards having the Daechung facing south with the main gate in the east. For this reason, private building companies attempted to earn more profit by dividing favored plots into broader plot band widths. The Gahoe-dong urban tissue and blocks were determined in consideration of the various expected housing types and their arrangement.

In the Bomun-dong and Yongdu-dong areas, there was little modification of blocks and streets arising from the creation of artificial streets, constituting the small possibility of generating different types of plots. Thus, the types of Hanoks were uniformly of the □-shaped plan among tri-form Hanoks. This is different from the Gahoe-dong area where □-shaped tri-form plans were arranged when Munganchaes was created to the west of the land. The homogeneity of plots can be understood as having the repetitive production and arrangement of the standardized 'Hanok model' in mind. Blocks were automatically determined under the presumption that uniform plans were duplicated and arranged in a row.

For the Bomun-dong area, although the plot band widths are varied, only the principle of broadening the plot band width facing a main street, rather than the rear side width, was applied. In this case, plots were determined regardless of the direction facing the street, and the conservative Hanok arrangement principle was not considered when allocating plot bands. In the Yongdu-dong area, the geopolitical locations of plots with the block were disregarded and the urban tissue was thus more uniformly fixed.

3.3 Tri-form Hanok Typology according to Chae composition and arrangement within plots

In this section, Hanok types are classified in a detailed manner considering the relationship between the tri-form Urban Hanok courtyard, the inner building and the gate building. The inner building comprises two or three rooms, a Daechung and a kitchen. The gate building has fewer than two rooms, the main gate and a toilet. To precisely understand Urban Hanok characteristics, the inner building must be divided into a 'principal body' encompassing the Daechung and a 'major wing' including the kitchens.

In this way, the △-shaped inner building is divided into a connection of straight buildings. In general, the principal body is a five purlin structure while the major wing is a three or five purlin structure. Therefore, the principal body width is usually broader than the major wing. Even if they have an identical three purlin structure, the width of the 'minor wing' comprising the gate building is narrower than that of the major wing. Thus, each Chae is basically different in shape. The main gate is usually located in the minor wing, and sometimes in the major wing, but never in the principal body.

The bundling structures can be divided into cases where the major and minor wings are connected with both ends of the principal body and cases where the major and the minor wings are combined with the principal body side by side. The reason for breaking down tri-form Hanoks is that it makes analysis of Urban Hanok arrangement easy by shape relationships, rather than by spatial function. Moreover, it is easy to observe the Chae arrangement status by considering locations, streets, plot shape, and internal spaces in a balanced manner. When taking all factors into account, Hanok types can be classified by region as follows.

1) Gahoe-dong

Various types of tri-form Urban Hanok exist for plots facing a street running south to north. Where a plot is located to the west of a street running south-north (1), it can be divided into one of three types of Urban Hanok. First, the most typical arrangement has the minor wing with the main gate located in the east, and the principal body located to face south and the major wing located west of the courtyard (1-□). In this case, the courtyard is open to the south. Next, the major wing with the kitchens and main gate is located
in the east, the principal body placed in the north to face south and the minor wing placed south of the courtyard (1-①). In this case, the courtyard is open to the west. Finally, differing from these two typical cases, a plot can be located in a corner and accessed from the south. In this case, the courtyard is open to the east (1-②). The principal body is placed in the north to face south, the major wing with the kitchen is located in the west and the minor wing with the main gate is located in the south.

Urban Hanoks in plots facing east of streets running south to north (2) can also be divided into three types. The most typical arrangement is with the major wing including the main gate and kitchen located in the west, the principal body placed to face south, and the minor wing located south of the courtyard (2-①). In this case, the courtyard is open to the east. The second type has the minor wing with the main gate placed in the west, the principal body located in the north to face south and the major wing with the kitchen placed east of the courtyard. In this case, the courtyard is open to the south (2-②). In addition, where the plot can be accessed from the south due to its location in a corner it constitutes an identical □-shaped tri-form plan (2-③). It differs from type 2-① in that the main gate is located in the minor wing. A summary follows (Fig.4., Table 1): When emphasizing the Munganchae (gate building) concept, Hanok types can be divided in two, with either the main gate allocated in the minor wing or in the major wing. In the former case, the minor wing is clearly recognized as a straight gate building, but the gate building structure is not easily distinguishable in the latter case. The reason for this is that two gate building properties, spatial 'street directionality' and structural and typological 'depth of Kan' conflict with each other. Although the gate building should face a street and the spatial depth should be shallow for the minor wing in principle, the minor wing is not facing a street in this case. Moreover, although the major wing acts as a gate building, its spatial depth is greater as it has a kitchen. In this case, the authors define the 'L-shaped gate building' with the main gate, as part of the major wing, attached at a right angle to the straight minor wing. In the typical tri-form Urban Hanok, a 'straight gate building' is more common than a 'L-shaped gate building.' However, the Gahoe-dong area exhibits special cases wherein a 'L-shaped gate building' is integrated with a 'ㄱ' shaped inner building' as seen in 1-① and 2-①.

2) Bomun-dong 4-ga and 102 Yongdu-dong

Compared to the diversity of Gahoe-dong, however, Bomun-dong 4-ga and 102 Yongdu-dong areas feature only two types of tri-form Urban Hanoks. In the most typical arrangement, the plot is located to the west of the street (1). In this case, the minor wing with the main gate is placed in the east, the principal body is placed to face south and the major wing is located west of the courtyard (1-①). The courtyard is open to the south. When the plot adjoined east of the street (2), housing types were integrated into just one type. The 'major wing - principal body - minor wing' connection is basically identical to 1-①, but arranged symmetrically as a mirror image. The only difference from the 1-① type is that the minor wing with the main gate is located in the west of the courtyard. In this □-shaped tri-form, the minor wing always constitutes the gate building. The plots are rectangular and elongated in the east-west direction. A summary follows (Fig.5., Table 2):

Table 1. Tri-form Hanok Typology According to Chae Composition and Arrangement within Plots in 31 Gahoe-dong

<table>
<thead>
<tr>
<th>Plot adjoining a street</th>
<th>Type</th>
<th>Building Shape</th>
<th>Main Gate Location</th>
<th>Munganchea (Gate building) Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Plot is facing west of a street</td>
<td>1-①</td>
<td>□ - shaped</td>
<td>minor wing</td>
<td>Straight</td>
</tr>
<tr>
<td></td>
<td>1-②</td>
<td>□ - shaped</td>
<td>major wing</td>
<td>L - shaped (Special type)</td>
</tr>
<tr>
<td></td>
<td>1-③</td>
<td>□ - shaped</td>
<td>minor wing</td>
<td>Munganchea</td>
</tr>
<tr>
<td>(2) Plot is facing east of a street</td>
<td>2-①</td>
<td>□ - shaped</td>
<td>major wing</td>
<td>L - shaped (Special type)</td>
</tr>
<tr>
<td></td>
<td>2-②</td>
<td>□ - shaped</td>
<td>minor wing</td>
<td>Straight</td>
</tr>
</tbody>
</table>

Table 2. Tri-form Hanok Typology According to Chae Composition and Arrangement within Plots in Bomun-dong and Yongdu-dong

<table>
<thead>
<tr>
<th>Plot adjoining a street</th>
<th>Building Shape</th>
<th>Main Gate Location</th>
<th>Munganchea (Gate building) Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Plot is facing west of a street</td>
<td>1-①</td>
<td>□ - shaped</td>
<td>minor wing</td>
</tr>
<tr>
<td>(2) Plot is facing east of a street</td>
<td>2-①</td>
<td>□ - shaped</td>
<td>minor wing</td>
</tr>
</tbody>
</table>
3) Result

The following figures indicate the results of a comparison of plot allocation types in Urban Hanok plots exhibited in the three areas. With regard to Chae layout types within the plot, the types of Urban Hanok in the 31 Gahoe-dong are more diverse than those in the Bomun-dong and Yongdu-dong areas. This can be interpreted as stemming from the fact that the diversity was created by various plot sizes and shapes within the urban tissue and various combinations of the principal body, major wing and minor wing. The reasons for this diversity lie in the regionality that prefers the conventional 廊 -shaped inner building, the relationship between the main gate and kitchen, and the building direction. Such preferences are in accordance with the principles of the ideal house, regarded as a tri-form opening to the south with accessibility from the east, or a tri-form open to the east with accessibility from the south. If finding the optimal arrangement was not possible, due to the urban fabric, the second best option was adopted to attain a diverse arrangement.

The □-shaped tri-form in a 'major wing - principal body - minor wing' structure facing west of a street corresponds with the arrangement favored by the traditional principles of the ideal house, having the main gate in the east, facing the kitchen after passing through the courtyard. In addition, no building faces north. In contrast, with the ⊙-shaped tri-form in a 'principal body - major wing - minor wing' structure, which is the typical plot facing east of the street, the Daechung and kitchen face south and east, respectively. This structure is disadvantageous however, because the minor wing should face north. Nevertheless, the reason that this type was adopted for the Gahoe-dong area was that it was otherwise impossible to have □-shaped tri-forms if the plot band width was narrow. It seems that people attempted to have at least the kitchen face the preferred direction in accordance with the principle of the ideal house. These special types were generated due to cultural conservatism. This specific case is not apparent in the Bomun-dong and Yongdu-dong areas, however. The conflict between spatial and typological
properties prevented the specific type from being sustained.

In the Bomun-dong and Yongdu-dong areas, a plan composition identical with Gahoe-dong was naturally selected in plots suitable for cultural characteristics, namely those facing west of a street running south to north. It differed for plots facing east of a street, however. The \( \ominus \)-shaped tri-form of the 'principal body - major wing - minor wing' form (2-\( \ominus \)-\( \ominus \)) did not appear. Instead, the \( \triangledown \)-shaped tri-form composition of the rarely seen 'minor wing - principal body - major wing' plan was selected as the exclusive standard. This was possible since the widths of the plot bands located on both ends of the block were identical and plots were rectangular and elongated in the west-east direction enabling only \( \triangledown \)-shaped tri-forms. Thus, the Bomun-dong and Yongdu-dong areas feature no special \( \mathbf{L} \)-shaped gate buildings like those visible in the Gahoe-dong area, rather showing only straight gate buildings. Thanks to this, the disadvantage of having the minor wing facing north was removed. Only the cultural preference of having the Daechung face south was preserved.

4. Conclusion

The Urban Hanok residential areas are significantly different in their urban tissue, building arrangements, and types, depending on the development period during the process of modernization. In particular, the unique properties created by each Urban Hanok building, their similarity and disparity with the traditional Hanok and their modern characteristics are portrayed in the urban tissue. When organizing residential areas and arranging Hanoks, types can vary depending on how priorities are set among the social, cultural, economic and technological factors.

The individual Urban Hanoks in 31 Gahoe-dong clearly contained the conservative characteristics of the traditional Hanok. They responded to cultural needs by changing the arrangement of the separated building wings according to their bearing and geopolitical location. They thus attempted to adapt to urbanization during the modern era, pursue profit through mass production, and rationally resolve traditional features resulting from cultural convention through urban and architectural methods. The housing types here are somewhat repetitive, but this is not the result of a pursuit of uniformity, rather the product of efforts to combine modern rationality with cultural characteristics in an optimal manner.

Tri-form Urban Hanoks show an optimized method for concentrating Hanoks in a residential area. In addition, tri-form Hanoks possess the potential to be changed in accordance with differing urban conditions. In this sense, the Urban Hanoks of Gahoe-dong which embraces change and difference can more flexibly interact with social and cultural properties than the Urban Hanoks of Bomun-dong and Yongdu-dong, which is more suitable for duplicated reproduction. The Urban Hanoks in Bomun-dong in the 1940s and Yongdu-dong in the 1960s were constructed in a restricted manner. Although it is difficult to distinguish the 'time of origin' of individual Urban Hanoks by period, it is possible to discern their 'expansion period' by period. This is because a certain Urban Hanok unit can become dominant as time passes. In fact, the Yongdu-dong residential area shows the uniform features of simplified Urban Hanoks. This can be also understood from the context that Urban Hanok units with improved productivity spread in general.

Changes in the time period of Urban Hanoks can be regarded as part of the idea that the social will to pursue repetitive effectiveness gradually generalized. The changes and improvements to Urban Hanoks in the three areas over three different periods were created as a balance of urban context and buildings. Moreover, they were the result of the combination and occasional conflict between the traditional and the modern during the transitional period of modernization. In conclusion, changes in Urban Hanoks can be summed up as a process whereby Hanoks absorbed social demands during modernization and urbanization, and sought urban and architectural alternatives.

Notes
1) For more detail, see paragraph 3.3 in p.5.
2) Yongdu-dong was also included in the Land Readjustment Project according to the Chosun Planning Ordinance for Urban Areas, but the actual point at which a residential area was created was in 1963.
3) The width of the plot facing west of Street 1 is not specific since a change is made in the width due to geographical issues. The plot band width suggested in this study is the mean value of the widths of plots.

References
9) Kim, H. S. et al. (1988), The Study about the method of house lay out, according to Korean traditional theory, Journal of the architectural institute of Korea, pp.93-106.
12) de Quincy, Q. (1977), "Type", Opposition 8, pp.147-150.