

Study on an ecological approach to Frank Lloyd Wright's Usonian Series

Youngil, Yun¹ and Snagjun Lee², Hyowon, Lee³

¹Department of Architecture, Chonnam National University, Gwangju, Korea,
smlxlyun@nate.com

² Department of Architecture, Chonnam National University, Gwangju, Korea,
wwwjuncokr5@hanmail.net

³ Department of Architecture, Chonnam National University, Gwangju, Korea,
leehw@jnu.ac.kr

ABSTRACT: The purpose of this study is to inquire into how the ecological concept in Frank Lloyd Wright's Usonian Series was materialized by the 'passive solar design'. Through Usonian Series, Frank Lloyd Wright tried to find a pragmatical American style language which was suitable to the contemporary American society and created a totally new design of housing which was cost-effective and responsive to local weather. Usonian Series is configured horizontally like Prairie Style, not an ascending type like Plinth. The difference is conspicuous outdoors. Usonian Type has an opener plane than Prairie Style which was a trial of 'breaking the box' style. The opener plane was for his passive solar design which is shown in architectural apparatus and detail of Usonian Type. Usonian Type was the result of a trial of what Wright called 'organic architecture' which was not so much a technique of construction as a concept of housing which was natural and responsive to a weather condition.

Keywords : Frank Lloyd Wright, Usonian, ecological, organic architecture, passive solar design

1. INTRODUCTION

Roots of the ecological traces of contemporary construction can be found in the era preceding modern times and most of the trends of contemporary construction have relationship with disconnection or succession of modern construction. The concept of 'environment' continued to be in contrast with the nature but there were architects who were sympathetic to the nature. Among such architects, F. L. Wright was the architect who consistently tried to combine the new architect, which has a

foundation on the genuine value of human, with indoor environments.

He established many architectural principles such as organic architecture which goes along with the nature unlike the mechanical view point of modern science, and made principle and shape, which are excerpted from the nature, as the basis of architectural form. Based on the concept, he had completed the house of the early Prairie style but resumed to form his later concept of Usonian house. The effort reflects his intention that he wanted to make houses for Americans that are economic as well as appropriate to the life in USONIA (United

States of North America). In a broad sense, the Usonian house is economically planned and is an American house for which American people participated in the design by Wright.

The Usonian house keeps and changes and develops the horizontal element which goes along with the land that is the basic architectural characteristics of the Prairie style of Wright. In addition, he uses it as an element for space or a design technique and it is an example of ecological design that is plausible in the contemporary architecture. The Usonian house shows several styles of shape. However, this study shall analyze the plane of L style which shows apparent characteristics of style among the houses of linear shape - a variation of the Prairie style that is the basic style of house by Wright - and have a look at what relation such plane shows with exterior environments so that we can understand the relationship between the architecture of the Usonian house by Wright and exterior environments.

2. GENERAL CHARACTERISTICS OF USONIAN HOUSE

The Prairie house, which belongs to the most important first golden era of Wright's house, is the new style of house that stood independently in the natural environment. In the Prairie house, the architectural characteristics of Wright's organic architecture, emphasis on horizontality and dismantling of box style are clearly presented. And it has the plane composition of cross style based on his early 3 divisional composition.

The Usonian house belongs to the second golden age that begins in 1936. The houses of the two different eras were changed and developed on the basic characteristics of Wright. The Usonian house is not included within the concept of mansion but is the house that presents in space freedom and clarity of American citizens by emphasizing the horizontal element that goes along with the land. And due to the preference for

economic residence and the change of life pattern of Americans, following characteristics are found.

First of all, convenience of construction was pursued by using standardized unit system and grid in consideration of economy. The unit system is marked on wet concrete floor and a house was constructed based on the grid. Grid is used in consideration of standardized plane and convenience of construction and square, rectangle, hexagon and triangle are used as the grid.

All the auxiliary materials are designed including concrete slab over irrigating layer made of lime scraps and sands. Heat insulating pipe of warm water is inserted into the irrigation layer.¹⁾ Windows are fabricated as a part of wall using products ready-made in factory. Other characteristics of this period are found in the use of mainly transparent window glass while making changes in the window frame, and repeatedly using screens and non-rectangular windows.

Protruding corners which has complicated shape of roof, roofing tile or dormer is never used. Flat roof is selected rather than complicated shape of roof in consideration of economy. And parking space is provided by extending roofs since parking lot is considered unnecessary. It can be found that necessary elements are selectively considered in housing while economy is taken into account.

Partition walls are made of insulated plywood and the surface is taken care of with wood board. The partition walls made of such slim board acts like partition rather than solid wall and as few as possible number of wall is used on an open plane in consideration of economy. Wall is composed, in rather expensive way, of woods on both sides of a sheet of paper fixing them by screw nail. These walls are excellent in insulation of heat and can be made to the extent of length up to the height of a window and can be fabricated by connecting them. If necessary, it can be

manufactured in a factory and be transported to a construction site for fabrication.

Leaf, girth, plastering and groove of a door is not necessary for the Usonian house. Life style of American family changed due to the change of living pattern and his interest in the change was reflected in the house. And the house is replaced by consecutive spaces that are integrated rather than dividing them into separated parts. Accordingly, living room, kitchen, dining room is integrated in the house design and the number of program elements is reduced.²⁾

As explained above, the Usonian house is an independent house of a small scale, and is completely constructed as a house of one story so that every activities are horizontally linked. Also it uses least facilities necessary for everyday life, simple grid and ready-made furniture that go along with the concept.³⁾ The Usonian house is composed of more open plane than the Prairie house and has the characteristics that unnecessary spaces are integrated due to the change of American family.

In this study, the Usonian houses between 1936-1959, which is part of the second golden era of Wright, are selected and 45 houses are selected based on ;Frank Lloyd Wright's Usonian house: the case for organic architecture; (Whitney Library of Design: New York, 1976) written by John Sergeant and ;The Seven Ages of Frank Lloyd Wright; (Dover Publication, Inc : New York, 1993) written by Donald W. Hoppen and the list of works of the Usonian house are shown in the following [Table 1].

3. TYPES AND CHARACTERISTICS OF THE PLANE OF USONIAN HOUSE

If we classify the plane of the Usonian house in geometric terms, it can be classified into linear type, slanting type and circle type. More specically, it can be classified into linear type which uses horizontal and perpendicular lattice and geometrical order by grid, slanting type which is formed by slanting line, and circle

type which has circular order. The linear houses which are considered as a variation of the existing houses of the Prairie style are selected for comparision with the existing houses.

Linear type refers to the type in which the basic composition forming a plaine is either horizontal or perpendicular. Depending upon the order of basic lattice forming a plane, the walls forming outer walls and the walls forming inner walls make perpendicular or horizontal connections and gardens forming exterior space also are influenced by elements that affects exterior designs and vice versa, and all of them are composed of similar straight lines forming a unified shape. Linear plane is specifically classified into L type plane and straight type plane. Specifically on L type plane, living room is located perpendicular to bed room which is space of privacy, while on straight type plane, living room is located on the same straight line with bed room.

4. CHARACTERISTICS OF THE PLANE OF L TYPE USONIAN HOUSE

The basic L type plane of the Usonian house is a new variation for Wright. However, eventually it is the one that is developed within the composition principle of 9 divisions. In other words, the cross type plane is found in the composition principle of the Prairie house while the L type plane is newly found in the Usonian house. Consequently, the Usonian house means a recovery as a new prototype.⁴⁾ While Wright consistently kept the two basic principles of ;individual form appropriate for each individual; and ;formative language appropriate for each reason;, he abandoned the composition of inner space in L type around the hearth to realize more liberal and economical plane composition.⁵⁾

For the Usonian house of L type, Wright usually insisted on L type plane to provide silent bed room for houses that were adjacent to noisy streets, and said as follows. ;What should I start to think fundamentally

next? For example, here is a small land of about 1-2 acres open south west. Decent garden can be planned. Building will surround the garden from two directions. Open and large living room is necessary and a clock as large as possible is appropriate, and the garden and living room should be connected on a straight line.⁶ As in the sample, L type plane is connected with the garden and is understood as a concept to introduce the natural environment into house.

4. 1. Basic Types of the Usonian House of L Type

The plane of Wright's house is composed of private space, official space and functional space. As shown in [Figure 1], living room which is an official space forms the head of the house and bed room which is a private space forms the tail of the house while functional space such as kitchen, bath room, dining room, entrance and stairway is located at the adjoining part where minimum space is allowed to provide the functions.

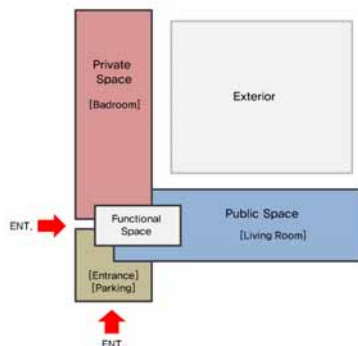


Figure 1. Basic Types of the Usonian House of L Type

L type decides locations of all the room including bed room under the continuous composition of house. On the plane of [Figure 1], bed room is located under the wing which is extended from living room so that the bed room should be located close to bath room. And usually a hearth is located between living room and the main bed room while bath room is often located close to kitchen. Such arrangement around kitchen is

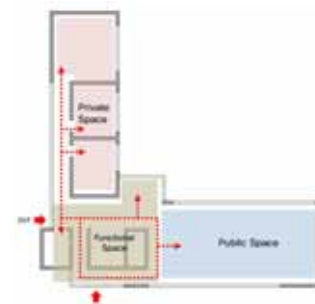
due to the improvement of female status, and is liberal while forming a reasonable order of space.

In the L type of [Figure 1], the main entrance is directly connected to the living room via the wall within the space of kitchen and the auxiliary entrance is located at the most appropriate location for actual convenience of passer-by.

Basic Types of L Type



Composition of Space



Relation of Exterior space

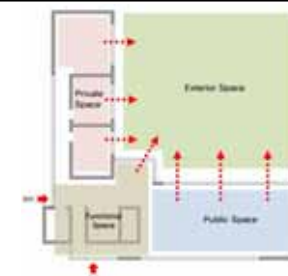


Figure 2. Composition of L type

The living room is the largest space and the bed room is the smallest space. With the largest space of living room being the center, the small space of bed room is located perpendicular to it and the inner space is connected to the outer space through the

arrangement of such L type. Through this arrangement, the living room is naturally connected to the outer space. The living room which is official space has more delicate touch of design than the Prairie house. On the other hand, the bed room which is private space is located on the second floor in the early Prairie house while it is located on the 1st floor in the Usonian house. Wright made work space within house by connecting then traditionally closed kitchen to the living room. Through this method, close connection not only within building but also with the land was realized and the plane of L type was simplified to make design principle obvious.

4. 2. Example of L Type Plane of the Usonian House

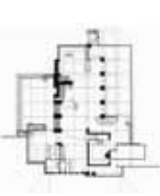
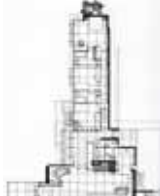
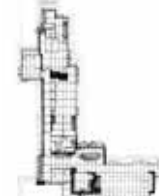
Building	Jacobs, Herbert, #1 (1936)	Rosenbaum, Stanley (1939)	Pope, Loren (1939)
Plan			
Image			
Building	Schwartz, Bernard	Affleck, Gregor (1941)	Zimmerman (1950)
Plan			
Image			

Figure 3. Usonian L type House

The basic L type plane can be classified into Jacobs, Herbert, #1 House, Rosenbaum, Stanley House, Pope, Loren House, Schwartz, Bernard House, Affleck, Gregor House, and Zimmerman House.

(1) Jacobs, Herbert, #1 House
The Jacobs, Herbert, #1 can be classified as the first Usonian house² located in Madison, Wisconsin, USA in 1936. Jacobs houses were required so that the garden can be seen from the kitchen, two bed rooms and the work room. To realize the requirements, Wright composed L type by connecting the official space perpendicular to the private space. In such composition of L type plane, the adjoining part has the characteristics of functional distribution. Taking a look at [Figure 4], core is placed on the service space and the hearth for the adjoining part. Block of the bed room which lies perpendicular to the block of the living room is located in L type around the core and the kitchen is placed in the small alcove in front of the core. Around the vicinity of the core, space of each room is connected to each other and the path of user is focused around the core. Access to the house is allowed along the wall of the parking garage and connected to the core and such method also allows main connection to the outer space. Both sides of the wing make connection to the centralized garden so that the garden is the symbolic center of the house.

A. Plan	B. Composition of Space	C. Relationship
		

Figure 4. Jacobs, Herbert, #1 House

(2) Rosenbaum, Stanley House
Rosenbaum, Stanley House was located in Florence, Alabama, U.S.A. in 1939. In 1948 major parts - larger kitchen, playing room and guest room - were added to the house. To have a look at [Figure 4], L type plane was planned on a basis of 2ft; 4ft grid. The large living room has a hearth and a alcove

for meal at one end of the room, and a book shelf of 100ft at the other end of the room. There were large living room and small bed room while the bed room provides passage to three rooms along the long and narrow corridor. And on the other hand of the corridor, a book shelf and a warehouse was located. To come into the cantilever of the parking lot through the wall of the road, the entrance can be found. The Rosenbaum house also was formed around the garden.

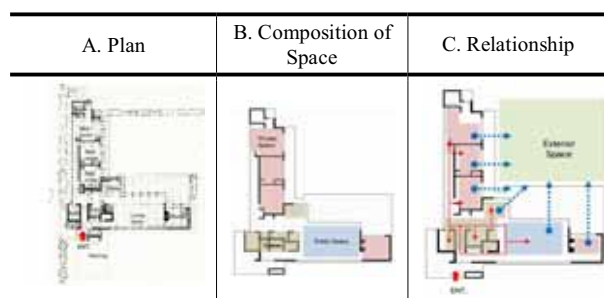


Figure 5. Rosenbaum, Stanley House

(3) Pope, Loren House

This is the house located in Lorenpoff, Alexandria, Virginia, U.S.A. in 1939. Wright designed the house on a land of 1,200 square feet for the wife of Pope who was a journalist in Washington. Accessories of the house represent those of 1940s and a constructor of Pope completed the house based on the specifications of Wright. The house, which nearly evaded the risk of demolition by the State Highway Authority, was contributed by Mrs. Robert, the second owner, to the Commission for Preservation of National History in 1963.

Wright designed the Pope house in an economic style appropriate for the need of the average American middle class family as was the case in the Usonian house. Even if it is an ordinary building, the indoor space is surprisingly large. Consistent characteristics ? the flat roof with cantilever for parking lot, concrete floor slab for heating, lighting apparatus pulled inside and the same treatment of the inner and outer walls - are found as were the cases in other Usonian houses.

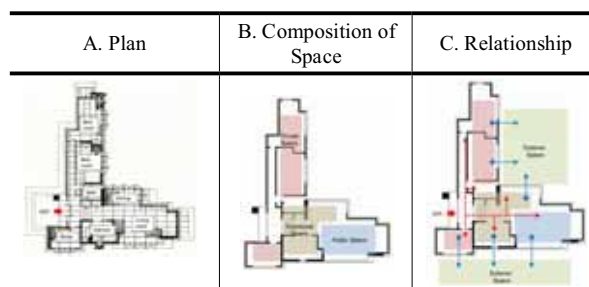


Figure 6. Pope, Loren House

(4) Schwartz, Bernard House

It is the house located in Manitowoc, Two River in 1936.

In front of the house facing the road, a parking lot with cantilever is located. It has 2 stories and has the L type formation facing the road. The bed room and corridor is located higher and the living room on the first floor has the height of the two stories. To have a look at [Figure 6], the living room and the kitchen face the noisy road while the south of the house is surrounded by terrace in L type. The narrow stairway spirals around the living room, and are extended to the corridors leading to bed rooms.

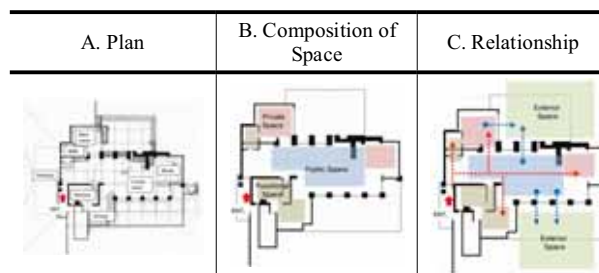


Figure 7. Schwartz, Bernard House

(5) Affleck, Gregor House

Affleck, Gregor house is located in Bloomsfield Hills, Michigan, U.S.A. in 1940.

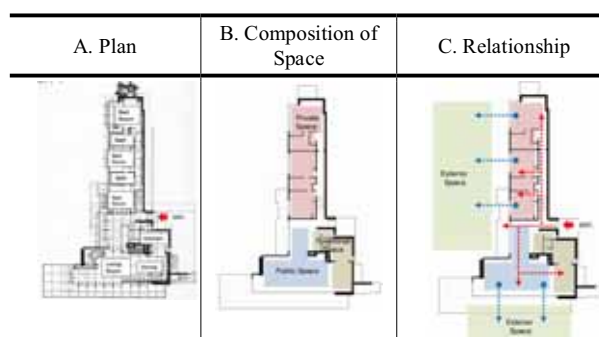


Figure 8. Affleck, Gregor House

To have a look at [Figure 7], it is a L type and an entrance is found at the adjoining part. Passage is made through loggia with roof window to major living room space and lower level of the passage leads to the garden and valley which is shaped like open pond. Living room, kitchen and work room are located in the integrated space which is located over the 40ft valley. Balcony surrounds both sides of the living room that stood out with cantilever and bed rooms are fixed on the hill while the main bed room is located on the ground.

(6) Zimmerman House

In the Zimmerman house, Wright connected the official space perpendicular to the private space, forming a L type plane. In such plane composition of L type, the adjoining part has the characteristics of functional distribution. To have a look at [Figure 8], the adjoining part places core at the service space and hearth. And block of the bed room of one lane corridor type which is placed perpendicular to the block of the living room are placed around the core in L type and a kitchen is located in the small alcove in front of the core. Around the vicinity of core, space of each room is connected and a path of user is focused around the core. Unlike the above planes, bed rooms at the tail of the house are more extended and living room which is official space looks quite contracted.

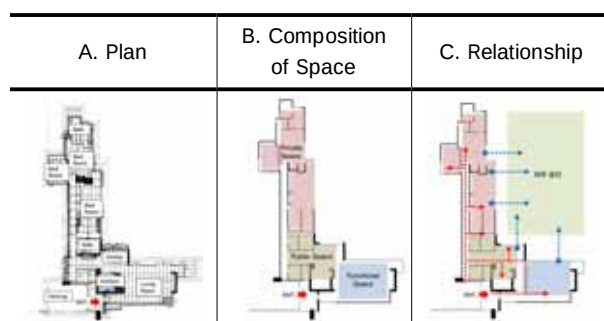


Figure 8. Zimmerman House

This resulted in contraction of the official space to enlarge the bed room. To have an access to the house, walking through the wall of the parking lot leads to the core and

this method allows substantial connection to the outer space. Both sides of the wing make connection to the centralized garden so that a garden is symbolized as the center of the house.

4. 3. Analysis

The characteristics of the Usonian house can be referred to the extension of the part that is taken out partially from the bed room. The relationship between the main bed room and the bath room can be formed for any size of family. The wing of bed room can be extended as much as necessary for family members and the extension of the main bed room is enough for the entire family. Even if number of family members increases, bed room can be expanded partially for the increased accommodation. In a case in which there are two bed rooms and a work room for probable use of bed room, one bath room is not directly connected to any bed room to secure privacy.

For the characteristics of the extension of the house of Wright, ; The Usonian house, to accommodate the increasing number of family members for young married couples, it can be normally extended. The Usonian house has the shape of tadpole as can be seen on a design. It has either a long tail or a short tail. In the body of the tadpole, there are living room, kitchen ? which are called work spaces ? and other necessary parts. From the body, to an appropriate direction, there are tails of 1, 2, or up to 5 bed rooms. A bath room is located between 2 bed rooms. Once in a while, this part of tail is separated from the body to loggia. It is for the purpose of silence and other reasons, but is especially for the purpose of elegance and the size of the tail depends on the number of children and budget. If the tail gets too long, the plane gets bent. The tail gets longer as the number of children gets larger.⁸⁾ To have a look at types of the plane, types of [3 bed rooms, 1 bath room], [4 bed rooms, 3 bath rooms], [1 bed room, 1 bath room], [2 bed room, 1 bath room] are found. Like

these cases, the tail can be extended or contracted according to circumstances.

There are little difference in planning L type plane according to the size of family, circumstances of the land or environments for access, but usually it shows complete separation between official and private space at the functional space. However, despite the separation, it shows a space composition that is completely open with the garden ? which is open space - at the center of the house and it represents the space system that Wright pursued for the connection to the outer natural environment.

5. CONCLUSION

Frank Llyod Wright, one of the great master of modern architect, has a view of organic architecture that is represented by integration through establishment of connection of inner and outer space, horizontal and perpendicular interrelation and relationship of continuity and extension. Especially, such architectural view is well reflected in his later works of the Usonian houses.

The characteristics of L type plane, which typically represent the plane characteristics of the Usonian house, present the variation of the 9 divisional compositions of the Prairie house and the horizontal characteristics. In addition to that, it uses techniques that introduce the natural environment of the ourter space and bed rooms are placed perpendicular to the living room and this arrangement makes harmony with the nature. All the spaces of the house that are consistently organized on the L type plane introduce outer natural environment into the inner space of the house through physical and visual approach.

While the organic architecture of the Prairie houses of Wright shows organic flow only inside the houses, the later works of Wright, the Usonian houses, introduces even the outer natural enviromment into the inner space of the houses in an organic flow.

ACKNOWLEDGEMENT

¡ This work was supported by the Korea Research Foundation Grant funded by the Korean Government(MOEHRD)" (The Regional Research Universities Program/Biohousing Research Institute)

REFERENCES

- 1) William J. R. Curtis, translated by Byung Keun Kang, ¡Mordern architecture since 1900, 2000¡, published by Hwa Young Sa
- 2) Tae Young Kim, ¡Construction Cube¡, Published by Daewoo Publication, 1998, p.189
- 3) Kyo Jin Kim, ¡Frank Lloyd Wright and Modern Times¡, published by Jip Boon Sa, p.216
- 4) Jae Woong Kim, ¡Study on the Plane Composition of House by Frank Lloyd Wright¡, Thesis for Master¡s Degree at Hongik University, 1992, p.47
- 5) Written by M. Lampugnani and translated by Jae Hae Yoon, ¡Modern Construction¡, published by Se Jin Sa, p.118
- 6) Translated by Jeong Seop Yoon, ¡House of Wright¡, Kun Woo Sa, 1986, p.98
- 7) Written by David Gebard and Deborah Nevinson, translated by Jeong Hee Lee, ¡American Construction, 200 Years of History¡, Keon Woo Sa, p.258
- 8) Translated by Jeong Seop Yoon, op. cit, pp149-150