

# Simple Home Design Prototype Based On Social Communities Of Urban Communities Case Study: Population Settlements In Pademangan North Jakarta

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**Abstract:** A common problem in dense settlements is the problems related to the environment both physically and non-physically. An environment with a high population is not in accordance with the amount of sufficient land for the construction of adequate houses. As a result of limited land that causes a minimum area of houses that can be built by the community in the neighborhood. In addition, this very small house is occupied by 5-9 people, which depends on the social conditions of the residents. The prototype design of houses is very easy to make for the purpose of using space that meets the standard zoning space by using a system suitable for the design of buildings with a 'split level' system. The types of houses in this study are type 18, type 21 and type 27 which discuss broad land not in area buildings. 'Split level' house design in buildings built on construction techniques to create space by changing altitude from one another. Very simple house buildings using a split level consisting of 3 floors with reinforced concrete structures using concrete construction rules for buildings (SNI 03-2847-2013) and planning procedures for earthquake repairs for structures of buildings and non-buildings (03-1726-2012). The research was conducted with qualitative methods through describing conditions in the field.

**Index Terms:** Minimum 7 keywords are mandatory, Keywords should closely reflect the topic and should optimally characterize the paper. Use about four key words or phrases in alphabetical order, separated by commas.

## 1 INTRODUCTION

THE availability of dwellings is not directly proportional to the number of migrants entering urban areas, so migrants build their temporary houses in empty areas in the city legally or illegally. The 'owned' land area of each family head in densely populated settlements cannot increase but the number of family members living in it continues to grow and develop. The density of a dwelling that exceeds the minimum standard of eligibility for a dwelling is believed to affect the social behavior of its residents both individually and in groups. Definition of spatial according to the large dictionary of Indonesian Language by Badudu (1990) is a rule governing space, and in another sense it can be concluded that space is something in which humans can carry out activities, something that allows movement and hence its understanding cannot be separated from place experience (Ridwan Khalkali, 2004). While the magnitude of space is all that concerns the dimensions and size of space, according to Edward T. White in the book *Tata Atur* (1986) the size of space must meet the physical and psychological (physical and psychological) needs of humans. Human physical needs are related to capacity, both in terms of human numbers, users of space and the number and size of furniture that is complementary to human activities in the space. Spatial planning in house buildings is very simple and the beauty factor of building mass composition is not a top priority. The more important thing to pay attention to is in designing a very simple home layout is the function factor and the comfort of the room in terms of lighting and natural ventilation. In densely populated settlements houses are arranged in huddles, intertwined between one wall of a house and the walls of another house. Therefore, the approach in designing the arrangement of spaces in the house is very simple, it can be done with the form of subtraction (subtractive form). With this method it is possible to get fields as a place to place window openings and ventilation more widely. The problem that forms the basis of research in Pademangan, North Jakarta is the relationship between the amount of space in a simple dwelling and the number of residents whether it is

in accordance with the standards, both in terms of function and the level of comfort in terms of lighting and natural ventilation. The purpose of the research is to analyze the arrangement of spaces in simple housing that are flexible in their use, make alternative designs for simple residential spaces according to their use, analysis of building structures. So as to produce prototypes of simple residential spaces for the lower middle class in urban areas.

## 2. METHOD

Perform data collection in the form of:

- number of residents,
- identify occupant activities and the size of the existing room,
- make a questionnaire to get occupant comfort level based on room size, lighting and air conditioning
- analysis of determining the standard amount of spaces in simple occupants.

## 3. RESULTS AND DISCUSSION

Research data in the RT.04 / RW.11 region, with the consideration of having the highest number of households so that they can observe more varied types of occupancy both in terms of area and number of occupants From the observations made, it can be seen that the occupancy of the population is generally permanent housing, where the exterior of the dwelling is covered by plastered brick walls and door and window openings made of wood. For insulating walls between spaces in general use partition walls of plywood. The spaces in a very simple house building in Pademangan area generally consist of 3 to 5 rooms, which consist of a living room, a sleeping room, a bathroom / toilet, a kitchen and a balcony. Each of these spaces has a dual function, especially the living room which is not only used to receive guests but also for family gatherings, an ironing room and at night is also used as a sleeping area. The number of family members who occupy very modest homes ranges from 3 to 7 people and can consist of 1 household - 2 families.

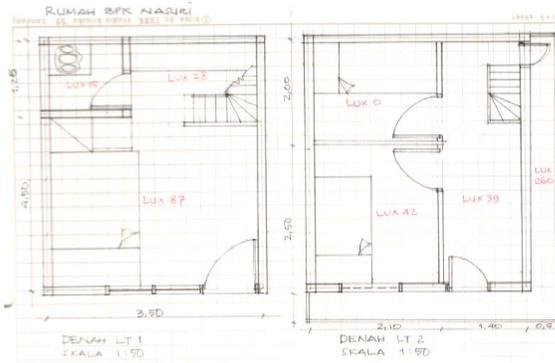


Figure 1. Housing with a building area of 15 m<sup>2</sup>

The current condition of the residents' houses is still not fulfilling the rules of a simple, healthy home planning. Whereas according to the minimum standard healthy simple house is needed: The vent hole is at least 5% (five percent) of the floor area, the air flowing in is the same as the volume of air flowing out of the room, the air coming from the kitchen smoke or bathroom / WC smell .

**1. Application of the concept of home**

**a. Room size module**

Simple Healthy House which is a standard house from the government that is intended for low-income communities, developed from the Core Growing House. Standardizing the amount of space in a Core Growing House using a module size 3 x 3 m<sup>2</sup> based on standard space requirements per person of 9 m<sup>2</sup> with a minimum threshold of 7.2 m<sup>2</sup>

**b. Very Simple House Layout**

Based on the possibility of developing a space scale module to the vertical direction, the addition of space in the house is very simple, it must also be done in a vertical direction. According to Francis DK Ching (2008) a form can be changed by adding, subtracting or changing dimensions. For the design of houses it is very simple the method of adding and subtracting a form (additive and subtractive forms) can be applied both for the purpose of developing buildings in the vertical direction as well as for incorporating natural lighting and ventilation into the house. When developing in a vertical direction, the layout of a very simple house design can be arranged with a split level system, a arrangement that does not increase the full space as high as one floor. This split-level system is to increase the space with a height of 1/2 of the height of the whole space, with the 1/2 position of the upper upper space at 1/2 the height of the upper part of the upper space and 1/2 the upper part of the upper space in the upper half. There are several advantages of adding space with a split level system, including adding more space, clear separation of functions and optimizing lighting and airing in space.

**2. Prototype design of residential buildings**

**a. Activity Analysis**

In this study the type of house designed was type 18, type 21 and type 27 which meant that the land area was 18 m<sup>2</sup>, 21 m<sup>2</sup> and 27 m<sup>2</sup>. While for the area of the building not standardized and designed with the number of floors of the building is 3 floors. The activities in this very simple building are divided

into 5 zones, namely public zone, semi-public, semi-private, private and service. In accordance with Edward T. White's theory of zoning (1986) this zone division is made both horizontally and vertically. This very simple division of zones can be seen in the table below:

Table 1. Distribution of building zones

No	Floor	Zona	Room Function
1	First	Public	Yard
		Semi Public	Living Room
			Dining Room
		Private	Bed Room
		Service	Kitchen
			Toilet
2	Second	Semi Private	Multipurpose Room
		Private	Bed Room
		Service	Toilet
3	Third	Semi Private	Multipurpose Room
		Private	Bed Room
		Service	Drying Room

**b. Space Needs**

From the analysis of activities can be formulated space requirements in the house is very simple as follows: Outer space as a yard; Living room, Bedroom, Family gathering room / function room, Kitchen, Km / wc, Drying room, Backyard The spaces are arranged in horizontal and vertical zoning, in building design consisting of 3 floors.

**c. Space Amount**

Module 3 m<sup>2</sup> is broken down into the smallest module 1 m<sup>2</sup> which is developed from the smallest module the amount of space in the building. The outdoor spaces are designed with a broad size between 1 m<sup>2</sup> - 2 m<sup>2</sup>, while the bedrooms are made with an area of 4 m<sup>2</sup> - 6 m<sup>2</sup>. The proportion of the sleeping area is 2 m x 2 m and 2 m x 3 m taking into account the size of the clean space that can be obtained and the size of the bed that is not optimal but still in accordance with the size of the human body which is 0.8 m x 1.80 m (single bed).

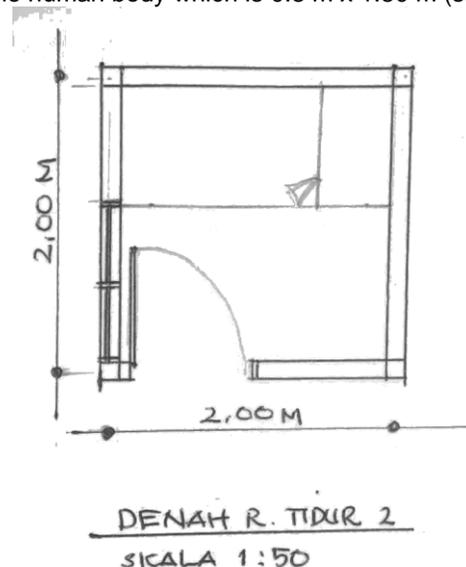


Figure 2: Sleeping space measuring 2 x 2

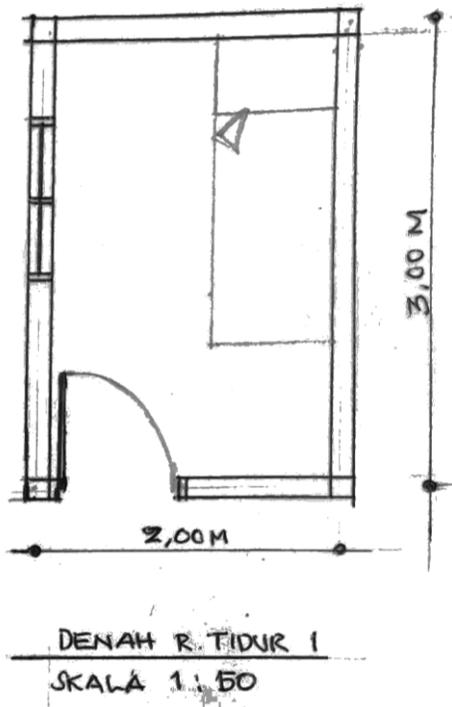


Figure 3. 2 x 3 size bedrooms

For semi-public and semi-private spaces, where both spaces can be used communally and also cover the circulation area, the size of the space is made between 6 m<sup>2</sup> - 9 m<sup>2</sup>. The spaces that can be used communally are the living room and family gathering room / multipurpose room. The extent of service spaces such as kitchens, km / wc is designed with a size of 2 m<sup>2</sup> with a proportion of 1 m x 2 m. To strive for the entry of light and natural air into the building, the spaces are arranged by making empty space (void) which is the application of Francis DK Ching's reduction theory form (2008).

#### d. Very Simple Spatial House Prototype

Spatial planning in all three types (18, 21, 27) emphasizes the pursuit of a clear separation of activities, especially in the private zone. The zone defined by Rapoport (Anisa, 2014) as a zone where users both individually and in groups are able to control the type and conditions of the desired interaction. In addition to the separation of home prototype design activities it is very simple to apply the theory of subtraction (form reduction) which is applied in the form of empty space (void) to strive for more light and natural air that can enter into space. Vertical circulation in the form of a main ladder that connects one floor to another floor is placed outside of the house unit but still in the area of land owned by the occupants. The purpose of laddering outside is to expand the effective space that can be used and to maintain the privacy of residents when they want to increase the income (income) of residents by renting space on the 2nd and 3rd floor, if there are children who are married and no longer live with people old age. Possibility of getting additional income from leasing space, especially from homes with type 27, which is relatively more than two other types of space. The outer space located at the front is intended as a space that can function as a communal space where residents can interact with neighbors in their

immediate environment. Houses are very simple in densely populated neighborhoods arranged in rows and without front or back yard. The house terrace in each residential unit only has a width of 0.5 m along the width of the house that is only 3 m. The terraces of this house are directly faced with a road that only has a width of 2 m, and is used as a place to interact with neighbors around them. This condition is of course very uncomfortable besides because there is no privacy for residents, this condition is also quite dangerous especially for children because the road in front of a very narrow house is not only passed by pedestrians but also by vehicles such as bicycles and motorbikes. By entering the outer space into the interior of the land, the conditions mentioned above will be minimized. In comparison, the terrace size of the existing house is 0.5 m x 3 m = 1.5 m<sup>2</sup> and the outer space of the design is 1 m<sup>2</sup> with the possibility of expansion (if desired) for houses with types 21 and 27. The outer space at the back is used in addition to the washing area to also include natural light and air into the spaces inside the residential unit.

#### d.1. House type 18

It has been explained above that the spaces in all very simple house prototype designs in Pademangan have the same 3 aspects, namely the outer space at the front and at the back, voids and the main stairs outside the housing unit but it is still within the boundaries of the occupants' land. These three aspects can be seen in type 18 home design as shown in Figure 4.

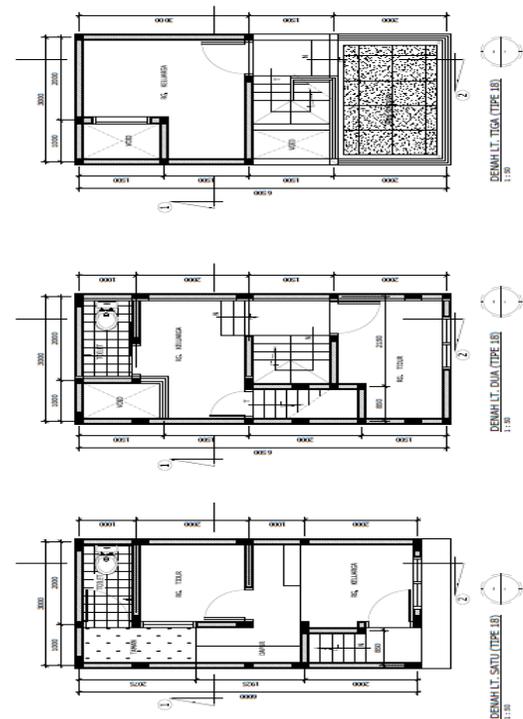


Figure 4. Floor plan 1, 2nd floor, 3rd floor, type 18 house  
Source: Research team design

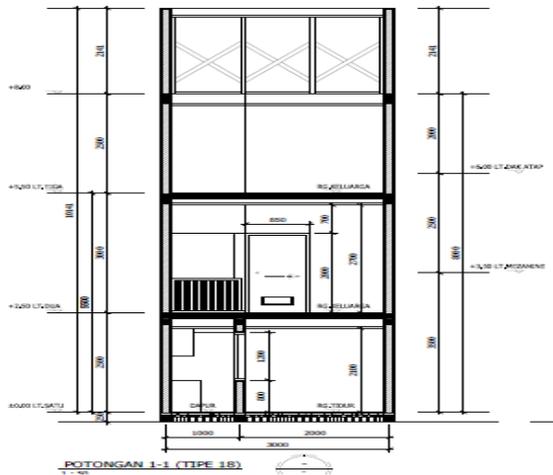


Figure 5. Cut-1 type 18 house



Figure 6. Cut-2 type 18 houses

Table 2. Type 18 house spaces

No	Floor	Room	Size
1	First	R. Outside the front	1m <sup>2</sup>
2		Living Room	6 m <sup>2</sup>
3		Bed Room	4 m <sup>2</sup>
4		Kitchen	2 m <sup>2</sup>
5		Toilet	2 m <sup>2</sup>
6		Garden	2 m <sup>2</sup>
1	Split 1	Void	1,5 m <sup>2</sup>
2		Multipurpose Room	5,5 m <sup>2</sup>
3		Toilet	2 m <sup>2</sup>
1	Second	Stairs	3 m <sup>2</sup>
2		Bed Room	6 m <sup>2</sup>
1	Split 2	Void	1,5 m <sup>2</sup>
2		Bed Room	7,5 m <sup>2</sup>
1	Third	Stairs	1,5 m <sup>2</sup>
2		Drying Area	6 m <sup>2</sup>

Sumber: Hasil perhitungan

**d.2. House Type 21**

The design of type 21 houses can be said to be the same as type 18 houses, both from the side of the spaces, vertical circulation and the extent of the outer spaces. What distinguishes it is the size of the larger family room. This is

possible because of the relatively larger land area. Type 21 home design can be seen in Figure 7

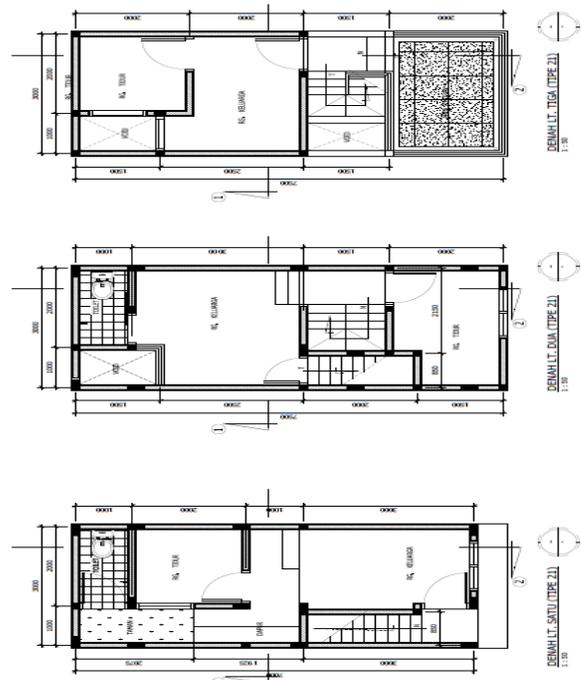
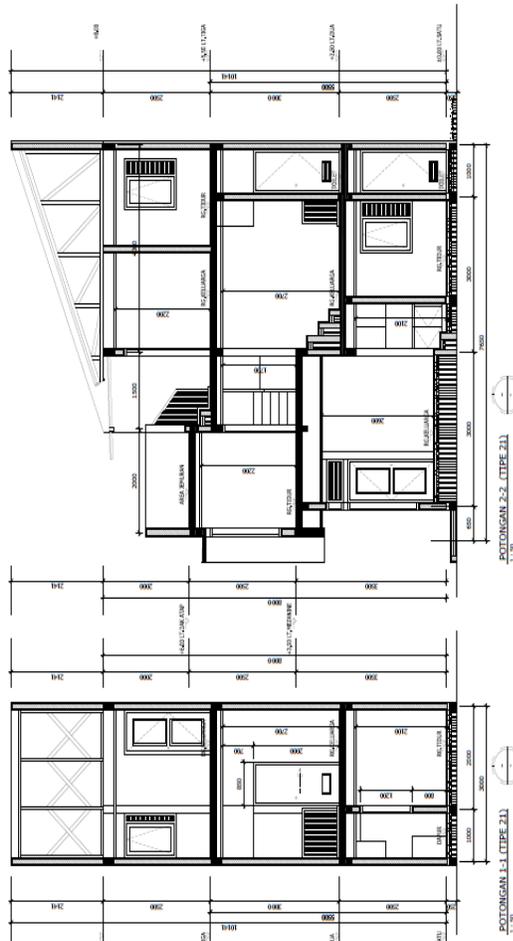


Figure 7. Floor plan 1, 2nd floor, 3rd floor, type 21 house  
Source: Research team design

Table 3. Size of rooms in type 21 houses

No	Floor	Room	Size
1	First	R. Outside the front	1m <sup>2</sup>
2		Living Room-Dining Room	6 m <sup>2</sup>
3		Bed Room	4 m <sup>2</sup>
4		Kitchen	2 m <sup>2</sup>
5		Toilet	2 m <sup>2</sup>
6		Backyard	2 m <sup>2</sup>
1	Split 1	Void	1,5 m <sup>2</sup>
2		Multipurpose Room	8,5 m <sup>2</sup>
3		Toilet	2 m <sup>2</sup>
1	Second	Stairs	3 m <sup>2</sup>
2		Bed Room	6 m <sup>2</sup>
1	Split 2	Void	1,5 m <sup>2</sup>
2		Bed Room	6 m <sup>2</sup>
1	Third	Stairs	1,5 m <sup>2</sup>
2		Drying Area	6 m <sup>2</sup>

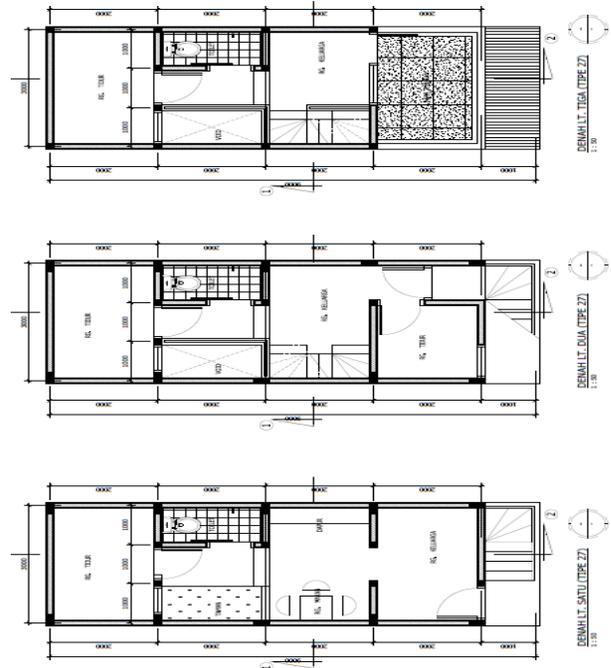
Source: Processing Results



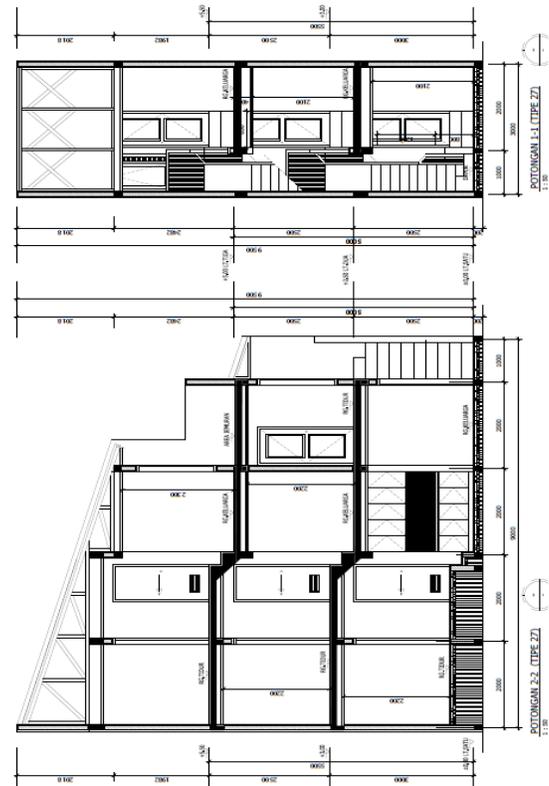
**Figure 8.** Cut-1, Cut-2 type 21 houses  
 Source: Research Team Design (2018)

**d.3. House Type 27**

Type 27 home design in this study was made somewhat different from the previous 2 types, namely in terms of the amount of space and the layout of the vertical circulation. This type 27 house has a width of 3 m and a length of 9 m, so that the amount of space in it becomes more and the excess space is allocated to increase the amount of sleeping space. The position of the main ladder is placed on the front side of the frontier boundary, with the aim that the spaces inside can be arranged as effectively and efficiently as possible. Whereas in terms of space size in general it is the same as the other two types. Type 27 home design can be seen in figure 9.



**Figure 9.** Floor plan 1, 2nd floor, 3rd floor, Type 27 house  
 Source: Research Team Design (2018)



**Figure 10.** Cut-1, Cut-2, Type 27 House  
 Source: Research Team Design (2018)

**Table 4.** Spaces in type 27 houses

No	Floor	Room	Size
1	First	R. Outside the front	1 m <sup>2</sup>
2		Living Room	6 m <sup>2</sup>
3		Bed Room	6 m <sup>2</sup>
4		Kitchen and Dining Room	6 m <sup>2</sup>
5		Toilet	2 m <sup>2</sup>
6		R. Outside the back	2 m <sup>2</sup>
1	Split 1	Void	2 m <sup>2</sup>
2		Bed Room	6 m <sup>2</sup>
3		Toilet	2 m <sup>2</sup>
1	Second	Hall stairs / R. Family	4 m <sup>2</sup>
2		Bed Room	4 m <sup>2</sup>
1	Split 2	Void	2 m <sup>2</sup>
2		Bed Room	6 m <sup>2</sup>
3		Toilet	2 m <sup>2</sup>
1	Third	Hall stairs / R. Family	4 m <sup>2</sup>
2		Drying area	6 m <sup>2</sup>

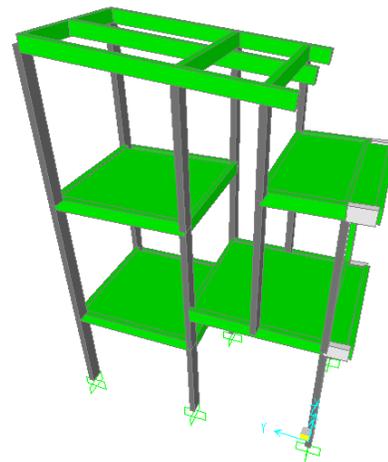
**Source:** Processing Results

From the third design of the house types mentioned above, it can be seen that the separation of private functions in the form of bedrooms is very clear. Separation of sleeping rooms is very important in designing a very simple house, because based on observations in the field there is no clear separation between sleeping rooms for parents and children. The use of space together as a sleeping room generally occurs in the living room. In the room, grandparents had to sleep together with children and grandchildren because of the limited amount of space available. Even if there is a sleeping room for children who are already married, the bedroom must be used together with their children. Mixing users in one room with the function of sleeping space not only in terms of age but also in terms of sex. These differences are feared to lead to deviant behavior from family members of the householder. This is related to the function of the bedroom as a private space where the privacy of users can be protected. Deviant behavior that generally occurs in people living in densely populated settlements is one of juvenile delinquency related to sexual problems. As said by the Clinard (Khudori, 2002) that one of the dominant characteristics of slum dwellers is the deviant behavior such as crime, juvenile delinquency, prostitution and so on. The wrong understanding of children and adolescents about sex can start from the condition of mixing the user in a room that functions as a bedroom. Children of different sexes and ages who are still early are forced by circumstances to see things that should be the privacy of adults who in this case are their parents. Separation of sleeping space, especially in terms of gender differences, has become a provision in religion, especially Islamic religion, which is written in the Qur'an. Efforts to prevent sexual misconduct must be carried out by all members of the community. Although the emergence of problems of sexual crime can be caused by various factors, the spatial factors in the design of residential buildings can contribute to the occurrence of these deviations. Spatial planning in accordance with architectural rules and user needs is the responsibility of the architects designing the house. In designing very simple houses in densely populated settlements, efforts to separate sleeping spaces are done by placing them on separate floors. Bedrooms for parents (grandparents) are placed on the first floor with consideration of advanced age. The sleeping space for both family and

unmarried children is placed on the floors of split 1, split 2 and floor 2, where the use can be adjusted to the needs and agreement between family members. The design of this very simple home prototype is kept as optimal as possible to become healthy houses, in accordance with the provisions of the Ministry of Health of the Republic of Indonesia (Anisa, 2016) which sets 7 criteria for healthy homes, namely ceiling, permanent wall (wall / board), the type of floor is not soil, there are windows, adequate ventilation, sufficient natural lighting and not densely populated. Specifically for the criteria for "not crowded" in this design, it is dealt with by building 3-story buildings equipped with semi-public communal spaces (front yard) and semi-private (family rooms) so that residents are not concentrated in one point (living room) and in one floor (first floor). Floor design is made with a split level system for the purpose of further optimizing the entry of light and natural air into the room and avoiding excessive building height.

### 3. Building Structure Aspects

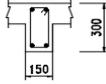
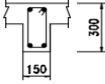
The structure of a simple house is analyzed by considering the seismic zone of the Jakarta area, the structural system used is the Special Moment Resisting Frame System (SRPMK), which is a method of planning a momentary frame bearing system that emphasizes alertness to structural failure due to shear failure. Modeling this structure (can be seen in Figure 15) is done to study the behavior of the structure if it is subjected to a planned earthquake load. Therefore, it is necessary to know in advance about earthquake resistance planning standards in building structures.



**Figure 11.** Modeling of House Structures with a "Split Level" System

From the results of structural analysis using the help of the SAP V.14 program. the inner forces are obtained as Ultimate (Mu) and ultimate Shear (Vu). For beam planning, calculations are made due to positive moments (M+) in the beam field area and negative moments (M-) in the beam support area, which are then obtained by tensile reinforcement and press reinforcement. The beam calculation analysis refers to the Procedure for Calculating Reinforced Concrete Structures for SNI Building Buildings 2847-2013.

**Table 5. Beam reinforcement**

TYPE	B1	
	TUMPUAN	LAPANGAN
POTONGAN		
DIMENSI B x H	150 X 400	150 X 400
TUL. ATAS	2 D13	2 D13
TUL. BAWAH	2 D13	2 D13
SENGKANG	D10-100	D10-200
EXTRA BAR	-	-

#### 4. Economic aspects

The construction of houses in densely populated areas such as Pademangan is generally done using funds from each building owner. To be able to build a house that is either semi-permanent or permanent, building owners must do it gradually and in a long time. This is not surprising because if traced from its settled history, most of the population of densely populated settlements are immigrants from outside the city of Jakarta who want to try their luck in a big city. Some of these migrants bought land from the original inhabitants and did not rule out the possibility that some people did occupy areas of land that were considered as no man's land. To start their business in a big city like Jakarta, of course they must have a place to live, so it can be understood if these settlements are built from the results of the efforts of each of their owners who build their homes gradually. From homes that are only simple beds, develop into semi-permanent homes and then become permanent homes take decades to even have children and grandchildren.

- Local governments have not been able to meet the needs of all communities, especially low income people. FC Turner (Khudori, 2002), promotes the construction of housing by self-help housing in which there are main ideas, among others, that "housing" should be seen more as a verb "not a" noun ". "Housing" is more of a "process" than "finished goods" so that housing must be seen as a continuous process, in accordance with the needs and capabilities of its inhabitants. Turner further said that the government is not a builder, designer, supplier of standard housing and evictors but must act more as a facilitator through 3 actions, namely:
  - Provision of public infrastructure (road network, electricity, telephone, clean water, drainage)
  - Establish legal rules that are more legislative than executive, determine what should not be done and nothing that should be done by residents
  - Providing and protecting people's access to sources of housing development processes, such as law, land, main building materials, basic engineering knowledge.

#### 4. CONCLUSIONS AND SUGGESTIONS

1. In identifying the magnitude of a very simple residential space this study uses a standard space Module reference for Core Growing Houses, namely module 3 x 3. The development of the module is applied first to determine the land area, as the place for the construction of Healthy Simple Houses, so that the module the Simple Healthy

House building will be in accordance with the land area module. From the observations in the field of very simple houses in the Pademangan area of the west, the size of the land area ranged from 15 m<sup>2</sup> - 50 m<sup>2</sup> with a size of land width between 3 - 3.5 m and a length of 4.5 - 13 m. With the size of the land area so narrow and the position that lined up almost without distance, the house development was carried out vertically. The smallest module of module 3 x 3 m<sup>2</sup> is 1 x 1 m<sup>2</sup> with the possibility of developing a size of ½ - 1 module from the smallest module in the horizontal direction and ½; 1; 2 and 3 modules from the smallest module 1 x 1 m<sup>2</sup> to the vertical direction

2. Identification of space needs and functions can be seen based on the amount of space in a very simple space which is very limited, which is between 3 - 5, which includes service spaces (bathroom / toilet and kitchen), so that functions and uses need to be optimized. The space requirements and functions for the house are very simple as follows:
  - The living room can be used as a multipurpose room. Where this guest room besides functioning as a place to receive guests can also be used as a family room and dining room. As a dining room because of its location adjacent to the kitchen. So in this very simple house design there is no special design for the dining room.
  - The bedroom functions as a room for sleep.
  - Family gathering room / multipurpose room. family room is on 2 floors, namely
    - o Family rooms on It 2 can be used for various activities. The family room on 2nd floor can be used as a place for children to learn while at the same time gathering for family watching TV, or can also be used for sleeping at night.
    - o The It 3 family room can be used as a children's playground, ironing place, etc.
    - o Kitchen
    - o Toilet
    - o Drying room
    - o Backyard, backyard means a small garden inside the back of the house that functions as air circulation. The location is parallel to the voids.
3. Convenience identification in this study is seen from the lighting and natural ventilation factors. The results of identification of home lighting are very simple in the existing conditions that rooms that still do not meet the average lighting standards include bedrooms, kitchens and bathrooms. Whereas from the airing factor, the condition of the house has not yet fully obtained the air freshness in the room by means of natural airing, especially in certain spaces which openings cannot be made because of one house and another house attached. The approach that can be taken to achieve space comfort in terms of utilization of space functions is through spatial planning in the building of a house. Spatial planning is done by separating the spaces for women and men firmly, arranging spaces vertically with a split level system so that the separation of space becomes more pronounced. Space comfort in terms of lighting and natural ventilation is pursued through spatial planning with split-level systems and form reduction methods. Arrangement with this system will allow the formation of spaces and empty fields between one space

with other spaces both in the vertical direction and in the horizontal direction on the top floor. With such arrangement, it will open the possibility of increasing the number of openings in empty fields and if it is successful in forming empty space it can also be used for green open spaces on the upper floors.

4. The design of the house is very simple following the design of the core house growing. This research produced 3 types of designs, namely very simple house design with type 18, type 21 and type 27.

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