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# Analysis of The Model of the Use of Hollow Type A Foundation for Small Houses

Sri Wiwoho Mudjanarko*[1], Nawir Rasidi[2], Hendro Sutowijoyo[3], Koespiadi[4], Ari Sunantiyo[5], Arthur Daniel Limantara[6], Mohd Haziman Wan Ibrahim[7], Firdaus Pratama Wiwoho[8], Irwan Mulyadi[9]

*[3,4]Department of Civil Engineering, Narotama University, Indonesia*

*[2] Department of Civil Engineering, Politeknik Negeri Malang, Indonesia*

*6Department of Informatics, STT Cahaya Surya, Indonesia*

*[7] Department of Engineering, Universiti Tun Hussein Onn, Malaysia*

*[8] Department of Environmental Engineering, Institut Teknologi Sepuluh Nopember, Indonesia*

*[9] Department of Chemical Engineering, Pamulang University, Indonesia*

**sri.wiwoho@narotama.ac.id*

***Abstract***

*The Indonesian government needs people's homes by implementing the 1,000,000 Houses Program. One of the national strategic projects based on interest in houses with 11.6 million units Construction of houses requires structural components in the form of foundations. The goal of this study is to analyze the foundation of hollow model A as a part of the house's structure. This research methodology was using SAP 2000 software. Based on the analysis of the test results of the hollow type A foundation model, the results were the most significant axial force was 1,700 kg, the moment had no effect on the most significant shear force of 576 kg, and torsi occurred ring balk T max  571kgm. This shows that the foundation structure of a type A model can be used / feasible for a simple type 36 house.*

**Keywords:** *The Foundation of Hollow Type A; SAP 2000; Feasible; Type 36*

## 1. Introduction

Simple home needs increase with the increasing population. More and more low-income people live in urban areas. Communities with middle or even high income have no difficulty in obtaining a house. The country of Indonesia is a developing country towards a modern country that cannot be separated from housing needs, especially for marginalized people. The construction of vertical directions is still affordable for middle and high-income people. Whereas on the contrary vertical buildings are not affordable for marginal communities. Government policy programs through the Million Houses Program will run to meet those needs. Based on data from the Minister of Public Works and Public Housing (Menpupera) BasukiHadimuljono in 2019, the construction of a million home programs will begin to reach 805,169 units. The policy of this program is one of the national strategic projects based on housing demand of 11.6 million housing units.

Housing is a very important need for the community (Harminingtayas, 2012). In the process of building a building, in particular, must have principles that are strong, economical, and easy to implement. The construction of this house requires one structural component in the form of a foundation.

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## 2. Literature Review

The foundation is the lower structure that receives loads from the upper structure to be passed to the ground. There are two types of foundations, namely shallow and deep foundations. The shallow is the foundation that directly accepts the upper structural loads such as the stone foundation, site foundation, continuous foundation, and precast foundation. Meanwhile, the deep foundation is the foundation that continues the upper structure load to hard soil or rocks that are located relatively far from the surface, such as the foundation of the pile.

**Figure 1. Stone Foundation**

Various ways to innovate in building structural components. One way to build building structural components is to use precast concrete structures. Precast concrete is easy to use. RafalSzydlowski, 2017, innovated the construction of houses. Josef Novak et al., 2017, repaired the sidewalk by observing precast concrete curing. It aims to accelerate the sidewalk so that traffic can be traversed and avoid structural failures. Foundation is one of the basic structural components needed in-home development and is widely used in Indonesia (Koespiadi et al., 2018), writing that making conventional types of stone foundations takes time, costs a lot, is labor-intensive and is done with great care in its implementation ( Figure 1). Besides that, making foundation times requires a large volume of stone, not economical and not environmentally friendly. (Koespiadi, Fredy Kurniwan, Gede Arimbawa, Sri Wiwoho Mudjanarko, Nawir Rasidi, 2016).

Therefore, it is necessary to make a simple foundation making method that is easy to do, not done in the foundry and can be made practically. This type of foundation comes from precast concrete.

The need and limitations of stone materials as the basic ingredients of foundation building need innovative thinking of its development (Wiwoho Mudjanarko et al., 2018). Precast concrete foundation model developed with varied models.

Prefabricated foundations can be produced in factories to provide convenience and strength before installation. The quality of concrete can be maintained (Figure 2).

**Figure 2. Trapezoid A Model Foundation in Progress**

The type and form of the Foundation expressed above is a prefabricated concrete foundation with a trapezoid shape (Figure 3). The advantage of using this type is, it can also be used for the installation of the utility facility.

**Figure 3. Trapezoid Hollow Model Foundation**

Source: (Koespiadi, Koespiadi; Mudjanarko, Sri Wiwoho; Rasidi, 2018)

## 3. Methodology/Materials

This study aims to analyze the foundation of trapezoid Amodel as part of the structure of the house. The research methodology was used to analyze the trapezoid A type of foundation data using the Structural Analysis Program (SAP 2000). The reason for using this program as a tool for analysis because SAP 2000 is an extremely versatile and powerful program with many features and functions (KHALAF & KUMAR, 2016).

The steps are as follows:

### 3.1. Draw the element

The first step to do is drawing a floor plan of the foundation and the ring balk, whether unaccompanied with the help of the program AutoCAD to ease in understanding the condition of the house structure.

### 3.2. Loads planning

The second step does making planning loads especially uniform load averages that will work at home type 36 i.e.

Portable water container and solar water heater amounted to 788 kg/m2, consist of concrete (288 kg/m2), water container (200 kg/m2), finishing load (150 kg/m2), and the living load (150 kg/m2) ;

Concrete roof load of 400 kg/m2, consist of a load of concrete roof tiles (100 kg/m2), wind load (100 kg/m2), rain water load (50 kg/m2) and live load (150 kg/m2) ; and also the load of owenroofamounted to 100 kg/m2

The dakload of 388 kg/m2, consist of concrete (288 kg/m2), and a load of finishing (100 kg/m2) ;

Pair of brick walls loadamounted to 150 kg/m2 and also glass load 150 kg/m2 ;

The floor load is of 638 kg/m2, consist of concrete (288 kg/m2), live load (200 kg/m2), and finishing load (150 kg/m2) ;

Dak load/water closet of 588 kg/m2, consistof concrete (288 kg/m2), live load (200 kg/m2), and finishing load (100 kg/m2) ;

### 3.3. The process of computing

The last step for next step is done the calculations with the help of computing processes program SAP 2000.

## 4. Results and Findings

Based on the analysis of the test results of the trapezoid A type foundation model, the results were the largest axial force was 1,700 kg, the moment had no effect on the largest shear force of 576 kg, and torsi (T) occurred on ring balk T max = 571 Kgm. This shows that the foundation structure of a type model can be used / feasible for a simple type 36 house.

## 5. Conclusion

From the results of the calculations that have been done through the SAP 2000 program, it can be concluded that the use of precast Foundation trapezium can be used even very feasible at home type 36

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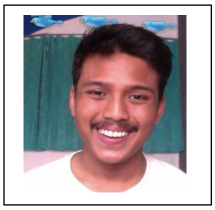
## Authors

is a Lecturer, Departement of Civil Engineering, Narotama University, Surabaya Indonesia. Sri Wiwoho Mudjanarko holds a Bachelor of Civil Engineeering degree in Civil Engineering from Narotama University, a Master of Civil Engineering degree in Institut Teknologi Sepuluh Nopember dan a Doctor of Civil Engineering degree in University of Brawijaya, Indonesia. He has been recognized as a professional engineer with more than 27 years of experience working with closely held businesses. He is a member of the Indonesian Railway Society (MASKA) Indonesia.

is a Lecturer / Supervisor, Departement of Civil Engineering, Narotama University, Surabaya Indonesia. Mr. Koespiadi holds a Bachelor of Civil Engineeering degree in Civil Engineering from Institut Teknologi Sepuluh Nopember, a Master of Construction Management degree in Universitas 17 Agustus 1945 Surabaya dan a Doctor of Construction Management degree in Tarumanegara University, Indonesia. He has been recognized as a professional construction management consultant with more than 18 years of experience working with closely held businesses. He is member of the INTAKINDO Consultant Indonesia.

is a Bachelor of Civil Engineeering, Narotama University. He is an Lecturer at STT Cahaya Surya, Indonesia and student master degree in Narotama University.



is an Bachelor Student of Environmental Engineering, Institut Teknologi Sepuluh Nopember. Surabaya, Indonesia



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