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by Koespiadi Koespiadi

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TECHNOLOGY MODEL PRECAST FOUNDATION FOR ECO-FRIENDLY SOLUTION

Koespiadi[1)], Fredy Kurniwan [2)], Gede Arimbawa [3)] Sri Wiwoho Mudjanarko [4*)], Nawir Rasidi [5)]

[1)] *Civil Engineering, Narotama University, Surabaya, Indonesia*
E-mail: koespiadi@narotama.ac.id

[2,3,4)] *Narotama University,Arief Rachman Hakim 51 Surabaya, Indonesia*
E-mail: fredy.kurniawan@narotama.ac.id , Gede.Arimbawa @narotama.ac.id , sri.wiwoho@narotama.ac.id

[5)] *Polinema Malang, Jl. Soekarno Hatta No.9, Malang, Indonesia*
E-mail: abunawir@yahoo.co.uk

Abstract. The current usage of foundation stone on some houses in Indonesia are need to be encountered. This usage need to be developed further than the usage of stone foundation. In this research, the foundation made of precast inside is not fully charged but hollowed. Foundation pit portion can be useful as utilized channels and so on. Foundation construction method is very easy to do and practical addition to environmental friendliness. Base models are made in the form of shallow foundation and can be produced outside of the project site is in the fabrication of precast concrete. The purpose of this study was to design a better model foundation to reach the maximum compressive force. The research results in the pressure test of 7 days a foundation capable of receiving compressive load of 8 tons. Based on the results of this research, the foundation model needs to be developed further, so that the foundation can be implemented in a better simple house foundation construction.

Keywords**:** Precast, Foundation, Eco-friendly

I. INTRODUCTION

Currently, the foundation using stone in conventional implementation takes a long time, high cost, requires a lot of labors and area. These problems need to be solved, because market needs simple solutions, for example, the foundation model is easy to handle and does not have to be built on the spot. This can be solved with the construction of a practical foundation that is the foundation to have thickening of the dimensions on the corner and a hole on the inside. Besides the benefits of the use of the foundation is workable outside the location of the construction work, thereby reducing labor costs and equipment, especially in the limited job site area. Modification of the foundation model develop the shape of the foundation. The production needs small-scale business opportunities like SMEs in areas which have the potential of natural resources and human resources. Precast foundation expected to be produced by the fabric and could ultimately contribute to fulfilling the needs of low-income housing foundation.

II. LITERATURE STUDY

2.1 The foundation stone

Various literature review and observation of the use of the foundation stone is often used as the foundation of a small house. Understanding The foundation stone was made whole foundation made of stone material. Stone itself is rock breaks that are often found in Indonesia. The grounds of the ease of use of stone becomes dominant in implementation with establishment of the foundation. (fig.1)

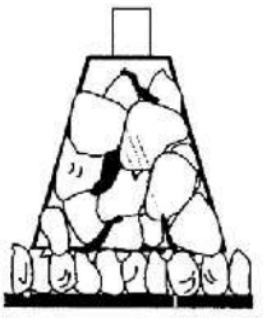

Fig.1 The foundation stone
Source: Nawir Rasidi, 2008

2.2 Precast Concrete Foundation

Precast concrete foundation is a foundation component printing method in mechanization in factory or workshop to give time hardening and gain strength before it is installed. Because the process mixing concrete in a special place (workshop fabrication), the quality can be maintained. But in order to generate profits, the foundation precast concrete will only be produced if the number of typical forms reached a certain minimum, typical form in question is repetitive forms in bulk.

The use of precast foundations advantages compared with conventional structures:

a) Simplification of the construction.
b) Fast execution time.
c) The timing of the structure is a major consideration in development of the project because it is closely associated with Project cost. Structural precast elements can be carried out in the factory Concurrently with the foundation in the field.
d) The optimum use of material and good quality materials.
e) One of the reasons why structural precast elements are very economical compared with the structure held in place (Cast in-situ) is the use of concrete molds are not many variations and used repeatedly, the quality of material resulting in generally very good because it was done with Raw standards, monitoring the computer system thorough and rigorous.
f) Completion finishing easy.
g) Variation for surface finishing on the structure of precast elements can be easily carried out concurrently with the making The elements in the plant, such as: color and surface models can be formed in accordance with the draft.
h) Not required extensive project area, reducing noise, cleaner and more environmentally friendly.
i) With a system of precast elements, in addition to reduce time in terms of implementation, the project also does not require land that is too broad as well as the project's land cleaner for the implementation. The precast element can be done in the factory.
j) Planning following testing at the factory.
k) The resulting precast element always through testing laboratory at the factory to get the structure meets requirements, both in terms of strength and in terms of efficiency.
l) Certification to gain international recognition. If production of precast elements meet standardization has been set, it can be submitted for certification ISO internationally recognized.
m) This will reduce costs due to reductions in consumption supporting tools, such as scaffolding and others.
n) The needs of the workforce can be tailored to the needs production.

Limitations of precast foundation is

a) Not economical when it is done in limited production.
b) Need a high accuracy in order to avoid large deviations between a single element with other elements, so it is not difficult installation in the field.
c) The length and shape of the precast elements are limited, according to capacity lifting equipment and means of conveyance.
d) The maximum distance transportation is economical to use the truck is between 150 to 350 km, but this also depends on the type products. As for sea transport, the maximum distance can transport up to over 1000 km.

Fig. 2 Precast foundations
Source: http://www.vroom.nl/en/products/5-precast-foundation-beams

III. METHODOLOGY

Methodology conducted in this study as follows:

3.1 Materials and implementation time

Materials used are cast Ready Mix Concrete K175, concrete compressive test equipment, hydraulic pump tests of concrete, plywood, iron wiremesh, machine mix concrete, material trolleys, trowel, vibrator and hammer. The time needed in the implementation of precast foundation with the pressure test period 7-day concrete is 2 weeks.

Tests conducted in the laboratory precast foundation Polinema Malang and direct loading of the foundations of a concentrated load

Fig. 3 Hydraulics Pumps tests of concrete ex Enerpac
Source: http://sigma.octopart.com/29552363/image/Enerpac-SCL502H.jpg

3.2 Implementation methodology as follows:

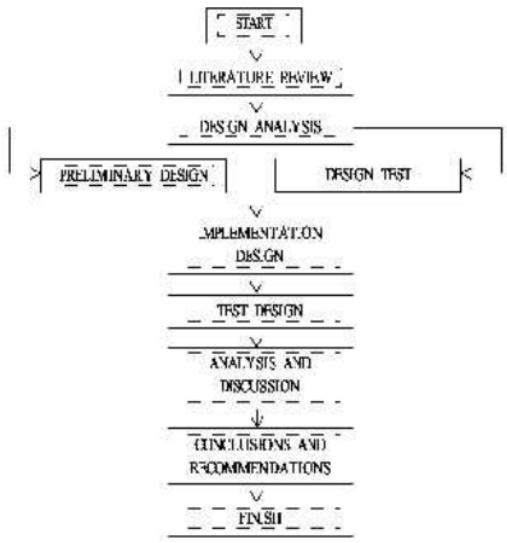

Fig. 4 Flow Chart Methodology

IV. RESULTS AND DISCUSSION

From the result of the design of this model acquired the foundations of today using reinforced concrete with concrete quality K-175, reinforcing rebar diameter 8 mm with quality steel U - 28 (BJTP - 28). Reinforcement is made one double with distances varying between 14-19 cm for vertical and horizontal reinforcement. Precast foundation model including foundation segment lengthwise direction form connection segments foundation width dimension above 30cm, height 80 cm, width tread foundation 80 and 10cm extra wide tread left or the right side. Fig.5

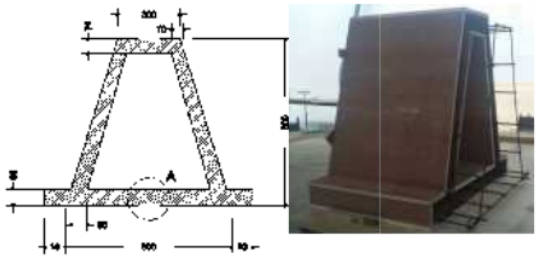

Fig. 5 Design Model Foundation

In Figure 6 visible results precast foundation has been successfully performed and then performed the preparation of the pressure test with the pressure test equipment available in the laboratory Polinema Malang, Figure 7.

Fig 6 foundation Precast

Fig. 7 Prepare Test

Fig. 8 Loading Test

Precast foundation after 7 days are placed in the pressure test tools with hydraulic pump pressure results obtained 8 tons. Fig 8

Seen in the picture 9 precast foundation cracks as a result of centralized prevalent on the side wall of the bottom and the soles of the precast foundation. The maximum crack width of 0.002 centimeters.

Fig. 9 Crack Wall Fondation

V. CONCLUSION & RECOMMENDATION

5.1 CONCLUSION

It can be concluded that the precast concrete foundation model K-175 at 7day test period able to withstand the compressive load of 8 tons. This alternative design of precast foundation has economic value that is less than the foundation stone. On the side of the foundation can be used for other utilities. Foundation precast fabrication can be produced so as to suppress the price per unit foundation especially in terms of labor costs. Labor needs little use craftsman. The use of heavy equipment, enables application of precast foundation.

5.2 RECOMMENDATION

Research Foundations precast require further study design, in particular the manufacture of a full scale model. Precast foundation can be modified such that after going through the test results, the vast amount of iron reinforcement is minimized and the shape and size changed in accordance with the designation.

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REMARKS FROM DIRECTOR

AssalammualaikumWaRahmatullahiWaBrakatuh,
In the Name of Allah, the Most Beneficent, the Most Merciful
May the peace, the mercy, and the blessing of Allah be upon you.

Distinguished Participants, Ladies and Gentlemen
On the behalf of State Polytechnic of Sriwijaya, I would like to welcome you all to the International Conference FIRST 2016 on Renewable Energy for Sustainable Development

Forum in Research, Science, and Technology(FIRST)is a meeting organised to accomodate researchers, academics, businessman, and government to follow up research results, to identify industry needs and to keep updated with the government policies. This forum has moved from national scale into an international conference which is conducted annually by State Polytechnic of Sriwijaya. This year, FIRST brings a theme "Renewable Energy for Sustainable Development". It is realised that efforts to solve environmental problems that we are facing today need long term potential actions for sustainable development; And renewable energy resources is one of the most appropriate solutions. Therefore discussing about renewable energy automatically deals with sustainable development.

All papers presented in the conference are documented in proceedings. The proceeding features 71 papers divided into several fields including Environment, Biomass to Energy, Renewable Energy, Audit Energy, Technology for Energy, Design/Modelling, Economic Sustainability and Management. In brief, the relations between renewable energy and sustainable development are described with practical cases and several issues relating to renewable energy, environment and sustainable development from both current and future perspectives.

Our thanks are conveyed to the Governor of South Sumaterafor providing us direction and views related to the importance of renewable energy resources. Also appreciation and gratitude to the keynote speakers, H. Alex Nurdin, Governor of South Sumatera Province, Prof. TjandraSetiadi, Ph.D., ITB, Indonesia, and Prof. Dr. Werner Rammensee, Cologne University, Germany. Also to invited speakers,Prof. Dr. ErryYulianTriblasAdesta, International Islamic University, Malaysia, Christian Overfeld, Lucas Nuelle, Germany, Dr. Sonny Zulhuda, International Islamic University, Malaysia,Ir. Tri Mumpuni, Kementerian ESDM dan IBEKA, Indonesia, Ir. Fahrurrozi, M.Si., Business Head Chemicals Group, PT. BASF Indonesia and Head of Business Development, FederasiIndustri Kimia Indonesia ontheirpresentation related to renewable energy for sustainable development.

Further we extend deepest gratitude and high appreciation to all presenters and contributors to make this conference possible and these proceedings published. It is realised that publication of these proceedings are still far rom being perfect; however, hopefully it will be useful for energy scientist, engineers, policy makers and any other readers as references for enriching their knowledge .

May God bless us all with the health to make this event a successful and enjoyable one!

Thank you.

Dr. Ing. Ahmad Taqwa, M.T.
Director of State Polytechnic of Sriwijaya

MESSAGE FROM THE CHAIRMAN

BISMILLAHIROHMANIRROHIM,
ASSALAMUALAIKUM WW.,
Good Morning Everyone
May the peace, the mercy, and the blessing of Allah be upon you.

The honorable governor of South Sumatra Province, Bapak H. Alex Noerdin
The honorable Director of State Polytechnic of Sriwijaya, Bapak Dr. Ahmad Taqwa
Distinguishedspeakers, Presenter, Guests, and Participants,

It is my great pleasure to welcome and thank you very much for your contributions to this renewable energy conference. This conference which will take place on 18 up to 19 of October 2016, is conducted firstly this year through the initiation of Chemical Engineering Department, State Polytechnic of Sriwijaya,aims toexchange the ideas from governments, non-governmental organizations, research and academic institutions, international organizations, and industries, to learn from each other and build on successes that advance renewable energy for sustainable development.

I am very happy to inform that the committee is very lucky to have 3 keynote speakers, i.e Bapak H. Alex Noerdin, the governor of SS province, Prof. Chandra Setiady from ITB Bandung and Prof Werner Ramensee from Cologne University of Germany, who supported us from the very beginning with their capabilities to present, sharing kowledge and experiences with us here as well as the invited speaker i.e Prof. Dr. Erry Yulian Triblas Adesta, International Islamic University, Malaysia, Christian Overfeld, Lucas Nuelle, Germany, Dr. Sonny Zulhuda, International Islamic University, Malaysia, Ir. Tri Mumpuni, Kementerian ESDM dan IBEKA, Indonesia, Ir. Fahrurrozi, M.Si., Business Head Chemicals Group, PT. BASF Indonesia and Head of Business Development, Federasi Industri Kimia Indonesia.

Distinguished Guests, Presenter, and Participants,
On this special occasion, I would like to report that the conference manage to succesfully attract more than 71 academician to present their abstract, i.e from Kuwait, Germany, Algeria, Malaysia, Cambodia and of course Indonesia. Amongs others there 69abstract to be presented in this seminar under professional selective review. And for that reason, I personally would congratulate you all as distinguished speaker to this event.

This conference has collaborated with two international journal i.e Journal of Engineering and Technological Science, ITB and Gadjah Mada International Journal of Business.All selected papers are then peer-reviewed to meet the publication standard. The peer reviewer of each manuscript is rigorous and concentrates on objective and technical concern to determine whether the research has been sufficiently well conceived, executed and described.

Excellencies, Distinguished Guests, Ladies And Gentlemen

I would also like to give special welcome to Lucas Nuelle, PT. Merck Chemicals and Life Sciences, CV. BestariSetiaAbadi, PT. BangunEnergi, PT. Ditek Jaya, PT. Bank MandiriTbk., PT. Indofood SuksesMakmurand individual who support this conference through sponsorship. I believe that we could never thanks you enough for that.

Finally, I expect all participants have memorable moment through this conference and enjoy your stay in Palembang, South Sumatra Province, Indonesia. Thank you.

Sincerely
Chairman of Organizing Committee
H. Firdaus

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