

**ANALISA KESTABILAN PONDASI DI ATAS TANAH
PASIR SAAT MENGALAMI PENINGKATAN TEKANAN
AIR PORI**

TESIS

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PADANG
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ANALISA KESTABILAN PONDASI DI ATAS TANAH PASIR SAAT MENGALAMI PENINGKATAN TEKANAN AIR PORI

TESIS

*Diajukan Sebagai Salah Satu Syarat Penyelesaian Studi di Program Studi Magister
Teknik Sipil, Jurusan Teknik Sipil, Fakultas Teknik Universitas Andalas*

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ABSTRAK

Pondasi merupakan bagian yang paling penting dalam suatu struktur konstruksi karena fungsinya sebagai penopang serta menyalurkan beban struktur di atasnya ke tanah yang ada dibawahnya. Kestabilan suatu pondasi dipengaruhi oleh banyak faktor, salah satunya adalah tekanan air pori yang ada didalam tanah yang akan berpengaruh pada daya dukung tanah terutama pada tanah pasir. Penelitian dilakukan di laboratorium dengan cara pemodelan. Sampel pasir diambil dari daerah Siteba Padang yang lolos saringan no. 40, model pondasi telapak yang memiliki ukuran 15 cm x 15 cm x 6 cm yang perhitungan ketebalannya sesuai dengan daya dukung menurut Terzaghi. Dilakukan pengujian propertis tanah terlebih dahulu untuk mengidentifikasi jenis sampel, kemudian sampel disusun dalam container kaca dan diidentifikasi kerapatan relatif yang dimiliki yakni sebesar 22,203% dimana sampel termasuk dalam kriteria pasir lepas. Sampel yang telah tersusun dalam kontainer kaca dijenuhkan dengan metode rembesan keatas lalu model pondasi dan beban tambahan diletakkan di permukaan sampel. Peningkatan tekanan air pori dilakukan dalam beberapa step, pada step 1 tekanan pada masing-masing piezometer tercatat masih cukup rendah, penurunan yang terjadi adalah sebesar 2 mm dan terhenti di detik ke 30, pada step 2 tekanan pada piezometer tercatat lebih besar dari step sebelumnya dan penurunan yang terjadi sebesar 15 mm dan berhenti pada detik ke 37, dan pada step 3 tekanan pada piezometer tercatat sangat besar dan penurunan terus terjadi. Pada step 3 ini pasir mengalami sand boil dimana tanah benar-benar kehilangan daya dukungnya yang berarti tanah mengalami peristiwa likuifaksi. Keruntuhan yang terjadi pada step 1 masih berupa keruntuhan setempat, pada step 2 dan 3 mulai terjadi keruntuhan menyeluruh pada sampel yang dapat dianalisa melalui diagram Mohr.

Keyword : Tekanan air pori, kerapatan relatif, daya dukung, stabilitas pondasi

ABSTRACT

Foundations are the most important part in structures since they support and distribute the upper structures' load to the soil beneath. Foundation stability is influenced by many factors, one of them is pore water pressure. The increase pore water pressure in the soil mass may effect bearing capacity of the foundation, especially on sandy soil. This study investigate the stability of soil-foundation system due to the incensement of pore pressure in laboratory using scaled model. The sands were taken from Siteba Padang and sieved pass through sieve no. 40. The dimensions of the foundation model are 15 cm x 15 cm with 6 cm of the thickness. The soil properties were tested to identify the soil type. The model is arranged in a glass container. The relative density of 22.203% is obtained which indicated the loose sand criterion. The model is then saturated by water flow upwards method. The foundation is then carefully placed, followed by the additional load on it. The foundation stability is the investigated by increasing the pore water pressure in soil mass. The increased pore water pressure was performed in several step, which are monitored through piezometer pipes. The piezometer tips are placed in some certain depths where becomes the point of view of the sample. At the 1st step the pore pressure read from each piezometer pipe is still on low level. At this step the settlement of 2 mm in 30 secondsis occurred on the foundation. At the 2nd step, the pressure is increased so that the foundation settlement is 15 mm within 37 seconds. At the 3rd step, the increase of the pore water pressure is continued and the settlement is keep on. The 3rd step becomes the last step since the foundation settlement is never stopped. It indicates the loss of bearing capacity due to the loss of effective stress in the soil mass. At this last step the sand boil has happened on the soil surface. In order to investigate the foundation stability theoretically, the Mohr circles at the certain depths beneath foundation then were plotted. The stresses happened in the soil mass than can be explained using the Mohr graphs. The Mohr circles at the first step indicate that the stresses in the soil mass are still under the failure line. Mean while at the second step, the circles of stresses in the soil mass have crossed the failure line. The pore pressure have increased to excess the failure limit. It proofs that the failure condition has happened in the soil mass. The sand boil observed in the last step is figured by the negative effective stresses which can be seen in the Mohr circle graphs.

Keywords: pore water pressure ; relative density ; bearing capacity ; foundation stability

