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ANALYSIS AND DETERMINATION OF HARD LAYERS USING GEOELECTRIC METHODS FOR THE BASIS OF CONSTRUCTION OF NEW BUILDINGS AT THE BENGKALIS STATE POLYTECHNIC

Alfauzan Yendra, Abdul Haris Salam
Politeknik Negeri Bengkalis
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Abstract

State Polytechnic of Bengkalis located on the Bengkalis island where the island of Bengkalis consists of a layer of peat. This layer of peat we know is a soft layer so it is dangerous if we build a building on this layer. State Polytechnic of Bengkalis at the moment is intense in the construction phase of the building in State Polytechnic of Bengkalis needs to be reviewed geotechnique as input for the new construction of buildings in the area of State Polytechnic of Bengkalis campus. This research uses the Geo Electrical survey uses Schlumberger configuration method to obtain subsurface resistivity data. From the measurement result of Geo Electrical survey uses Schlumberger configuration method 5 point of measurement in campus area of State Polytechnic of Bengkalis in can resistivity value for peat soil and soft soil is between 5 - 100 ohm with depth 0 m to depth 7 m. As for the hard layer has a resistivity above 100 ohm which is at a depth of 7 meters upwards. The result the authors suggest for the construction of new buildings in the campus area State Polytechnic of Bengkalis is to establish a foundation at a depth of 7 meters and above so that new buildings can be more solid.
Keywords*: Geo Electrical; Geophysics, Schlumberger; State Polytechnic of Bengkalis.*

Abstrak

Politeknik Negeri Bengkalis berada pada pulau Bengkalis yang mana pulau Bengkalis ini terdiri lapisan gambut. Lapisan Gambut ini kita ketahui adalah lapisan yang lunak sehingga berbahaya jika kita membangun gedung pada lapisan ini. Politeknik Negeri Bengkalis pada saat ini tengah gencarnya dalam tahap pembangunan gedung kuliah sehingga pada area Politeknik Negeri Bengkalis ini ini perlu di kaji geotekniknya sebagai masukan untuk pembangunan gedung di area kampus Politeknik Ngeri Bengkalis ini. Penelitian ini menggunakan metode Geolistrik konfigurasi Schlumberger untuk mendapatkan data resistivitas bawah permukaan. Dari hasil pengukuran Geolistrik konfigurasi Schlumberger di 5 titik pengukuran di area kampus Politeknik Ngeri Bengkalis di dapat nilai resistivitas untuk tanah gambut dan tanah lunak (soil) adalah antara 5 – 100 ohm dengan kedalaman kurang lebih antara 0 m sampai kedalaman 7 m. Sedangkan untuk lapisan keras memiliki resistivitas diatas 100 ohm yang berada pada kedalaman 7 meter keatas. Dari penelitian ini penulis menyarankan untuk pembangunan gedung baru di area kampus Politeknik Ngeri Bengkalis ini untuk mendirikan pondasi pada kedalaman 7 meter keatas agar bangunan yang baru bisa lebih kokoh.
Kata Kunci: Geolistrik; Geofisika; Schlumberger; Politeknik Negeri Bengkalis.

I. INTRODUCTION

Soil always plays an important role in a construction work site. Soil is the supporting foundation of a building or the construction material of the building itself. It is necessary to have a deep understanding of the functions and properties of the soil when burdening it. A building standing on the ground will put a load on the underground. The soil will experience tension depending on the load and the area of the foundation. As a result of the occurrence of underground voltage, there will be a change in shape (deformation) which will cause a decrease (settlement) of the building in question (Verhoef, 1994).

The Bengkalis State Polytechnic is the only polytechnic with state status in Riau Province today. The Polytechnic implements a vocational system in its education, which focuses more on practice than theory, with a percentage of 60% practice and 40% theory. The Bengkalis polytechnic is located on the island of Bengkalis where the soil on the island of Bengkalis consists of a layer of peat. Peat soils as we know them have a soft texture and are easy to sink.

At this time, the Bengkalis State Polytechnic is in the stage of building new lectures so that the geotechnical assessment of the soil structure in the Bengkalis State Polytechnic campus area needs to be studied more deeply so that in the development phase there will be no unwanted things.

II. RESEARCH METHOD

Les outils utilisés dans cette étude comprennent:

1. Resistivity meters are used as a tool to measure the size of resistance types.
2. Peg to know the placement of the electrodes to be installed,
3. Current and potential electrodes of 2 pieces each, used to conduct electric current into the ground,
4. Hammers are used to strike potential electrodes and current electrodes at ground level,
5. A meter is used to measure the length of the trajectory to be examined.
6. The connecting cables are used as connecting the electrodes with the resistivity meter
7. The compass is used to determine the measurement location and span in the field,
8. Data table is used as a place to write measurement data.
9. GPS (Global Positioning System) is used to determine the position of the research site.
10. Protective and paying tents
11. Writing tools are used to record results in the field

IV. RESEARCH RESULT

Adapun hasil yang didapat dari pengukuran dan pengolahan data Geolistrik konfigurasi Schlumberger dari 5 titik pengukuran dapat dilihat pada **Tabel 1, Tabel 2, Tabel 3, Tabel 4,** dan **Tabel 5**.

Tabel 1. Data Hasil Olahan Titik VES 1

Resistivitas (ohm)	Ketebalan Lapisan (m)	Kedalaman (m)
20,1	1,35	1,35
8,62	2,63	3,98
22,1	0,851	4,83
136	4,42	9,25
219		

Tabel 2. Data Hasil Olahan Titik VES 2

Resistivitas (ohm)	Ketebalan Lapisan (m)	Kedalaman (m)
20,1	1,34	1,34
9,17	2,63	3,99
22,1	2,17	6,15
188	3,85	10
309		

Tabel 3. Data Hasil Olahan Titik VES 3

Resistivitas (ohm)	Ketebalan Lapisan (m)	Kedalaman (m)
20,3	1,41	1,41
8,45	2,16	3,57
13,6	1,18	4,75
112	3,74	8,49
202		

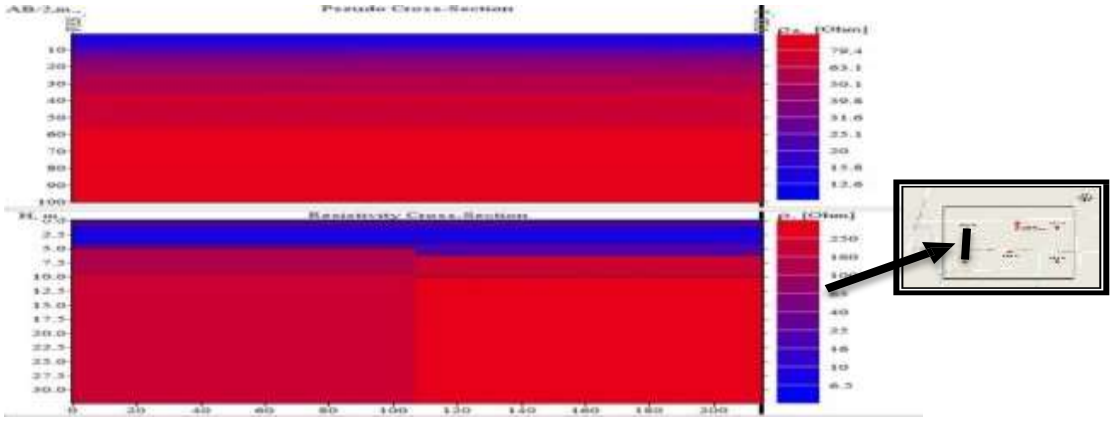
Tabel 4. Data Hasil Olahan Titik VES 4

Resistivitas (ohm)	Ketebalan Lapisan (m)	Kedalaman (m)
20,4	1,42	1,42
10,1	1,12	2,54
5,62	1,13	3,87
116	5,33	9,2
250		

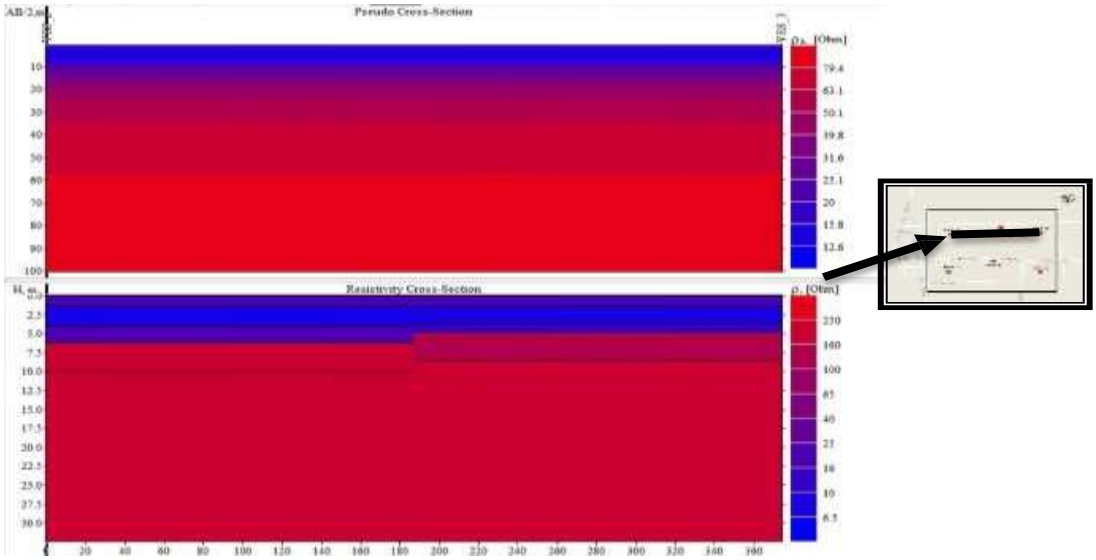
Tabel 5. Data Hasil Olahan Titik VES 5

Resistivitas (ohm)	Ketebalan Lapisan (m)	Kedalaman (m)
20	1,56	1,56
7,49	2,15	3,71
21,2	1,24	4,95
07	4,3	9,25
282		

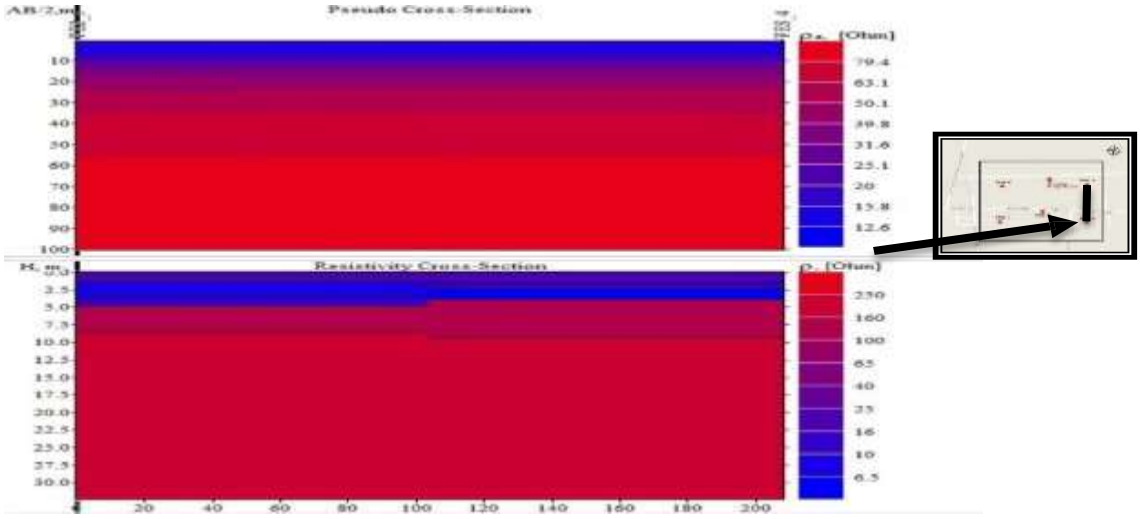
From the processed data, it can be seen that there are 4 layers that make up the underground surface in the Bengkalis State Polytechnic area, with the first 3 layers having a low resistivity value, which is below 100 ohms, this indicates that the first 3 layers are soft rocks or can be called still layers of peat or soft soil (Soil) with a depth from 0 m to approximately 7 m. While the fourth layer has a resistivity value of more than 100 ohms, which indicates that this layer can be said to be a hard layer and has a depth of more than 7 m. From the geoelectric processing data, it can be modeled in pseudo Cross-Section and Resistivity Cross-Section from the correlation of each measurement point in order to get an idea of the subsurface resistivity distribution.



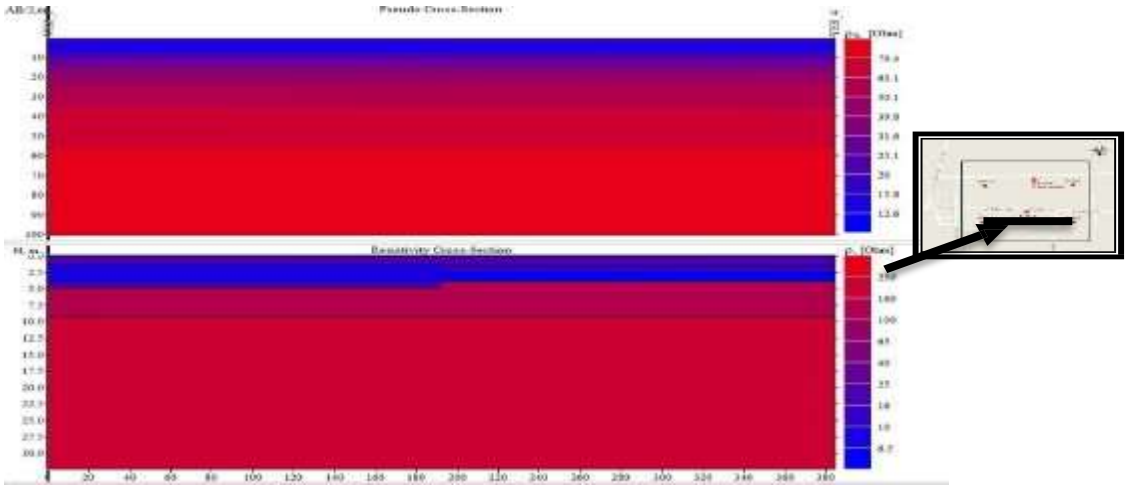
Gambar 3 Persebaran Resistivitas Bawah Permukaan Lintasan VES 1 Ke VES 2



Gambar 4 Persebaran Resistivitas Bawah Permukaan Lintasan VES 2 ke VES 3



Gambar 5 Persebaran Resistivitas Bawah Permukaan Lintasan VES 3 ke VES 4



Gambar 6 Persebaran Resistivitas Bawah Permukaan Lintasan VES 1 ke VES 4

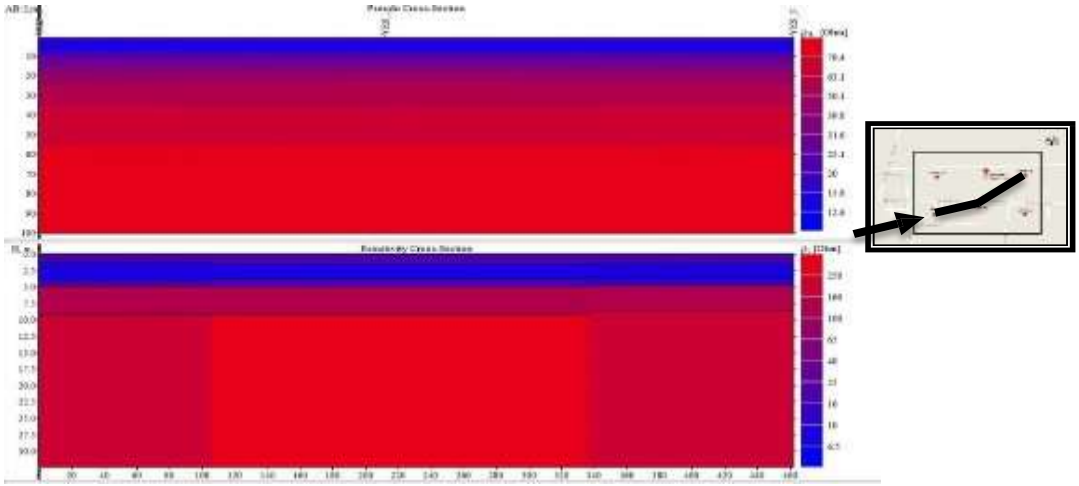


Figure 7 Distribution of Subsurface Resistivity of the Passage of VES 1 to VES 5 to VES 3

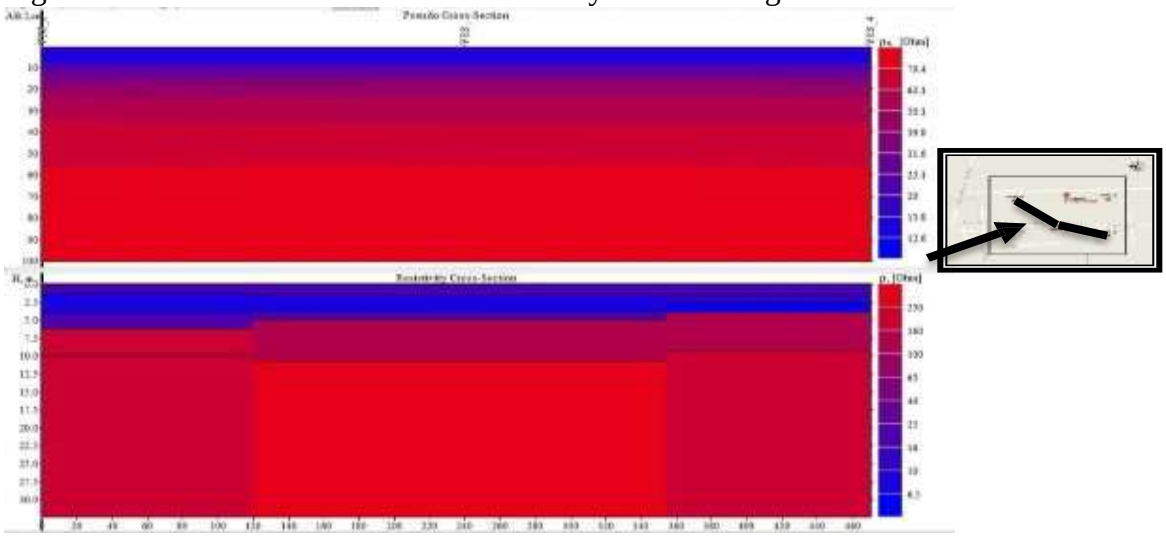


Figure 8 Distribution of Subsurface Resistivity of the Passage of VES 2 to VES 5 to VES 4 From the description of the subsurface resistivity distribution shown Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8 can be seen from the change in color gradients that show the resistivity of each depth. This change in color gradient indicates a difference in rock marked by a difference in resistivity

V. CONCLUSSIONS

Based on the results of measurements using the Geoelectric Method, several measurement points at the Bengkalis State Polytechnic have resistivity values obtained for peat/soft soil layers (Soil) have resistivity values in the range of 5-100 ohms which are at a depth of 0-7 meters. And for the hard layer is in the resistivity range of 100 and above which is at a depth of 7 meters and above.

In the future, it is necessary to conduct research with other methods in determining the hard layer in the Bengal-kalis State Polytechnic campus area in order to compare and validate this research.

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