Bearing Capacity Analysis of Helical Pile Foundation on Peat

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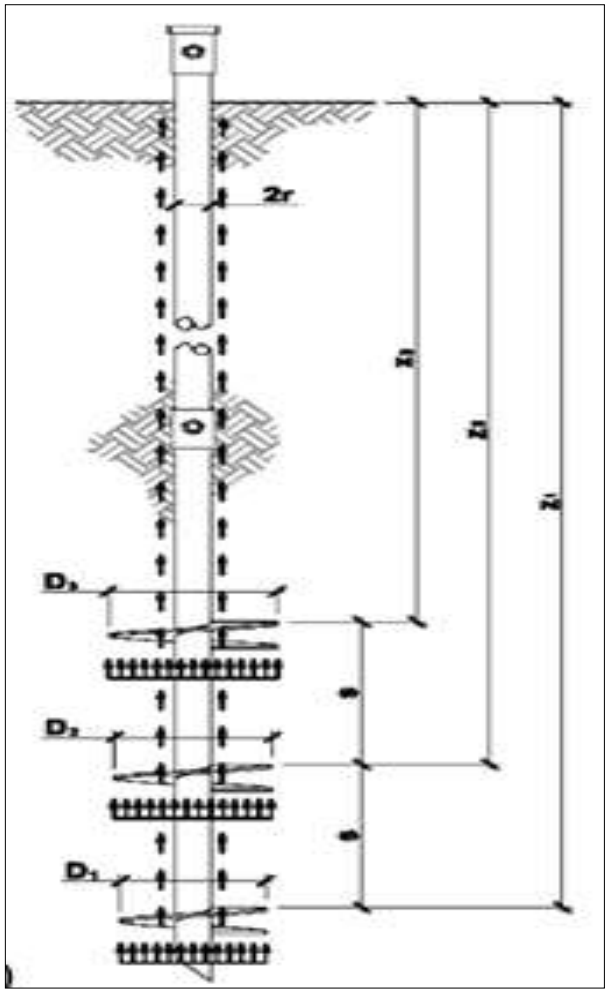
Peat

Dominated by Voids

Large Amount of Water

Low Bearing Capacity

Individual Bearing Method

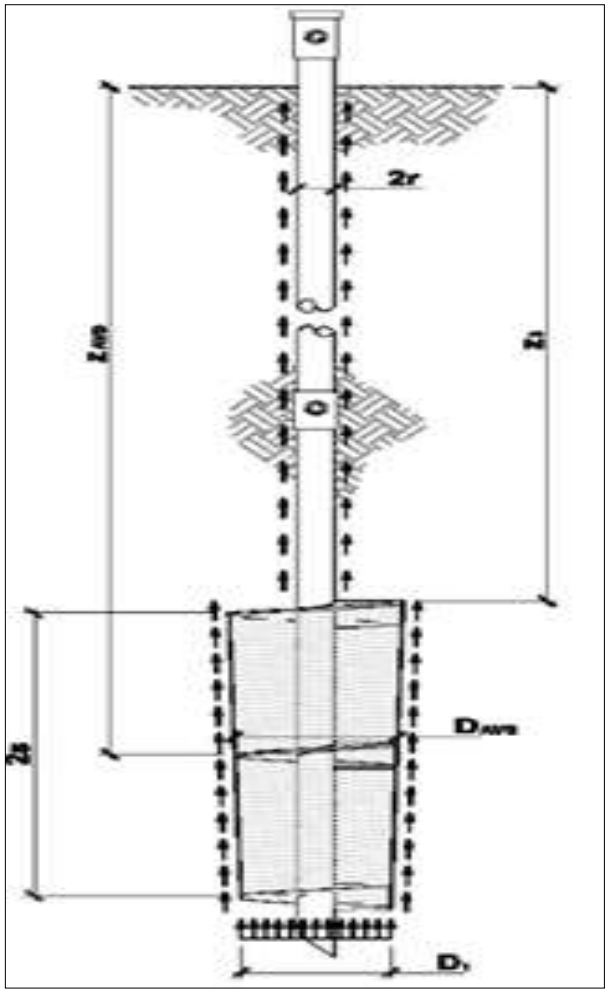


$$P_u = \sum_n q_{ult}\ A_n + \alpha\, H\, (\pi d)$$

With :

Pu	= Limit Bearing Capacity
Qult	= Limit Bearing Capacity below Helical Plate
A_n	= n-Area of Helical Plate
α	= Friction angle between foundation and soil
H	= Length of Foundation Shaft
πd	= Perimeter of Helical Foundation

Cylindrical Shear Method



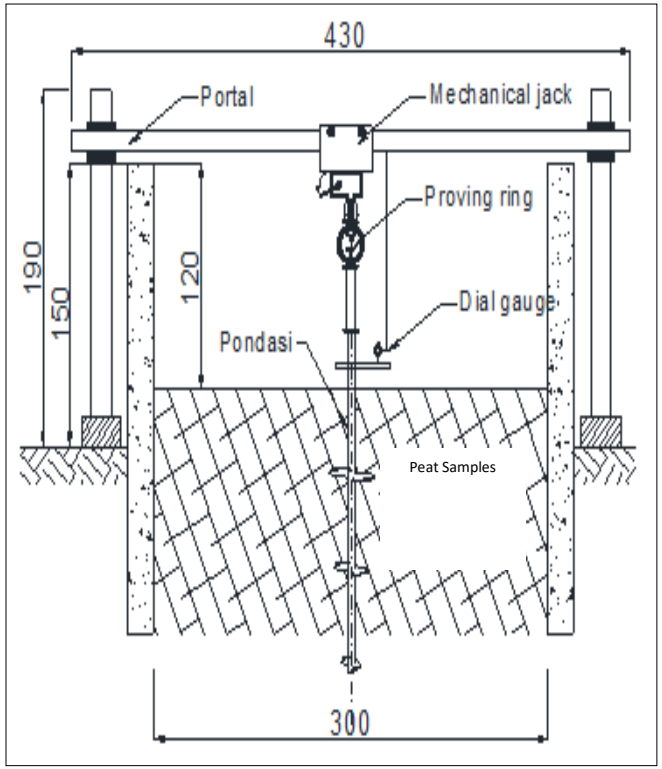
$$P_u = q_{ult}\ A_1 + T(n-1)s\,\pi\,D_{avg} + \alpha\,H(\pi D)$$

With :

Pu	= Limit Bearing Capacity
Qult	= Limit Bearing Capacity below Helical Plate
A_1	= Area of Lowermost Helical Plate
T	= Soil`s Shear Strength
n	= Number of Helical Plates
s	= Soil Space between Helical Plates
D_{avg}	= Average Diameter of Helical Plates
α	= Friction angle between foundation and soil
H	= Length of Foundation Shaft
πd	= Perimeter of Helical Foundation

Research Methodology

Peat materials were taken from Rimbo Panjang, District of Kampar. Physical and mechanical properties tests of peat were done in Soil Mechanics Laboratory, Department of Civil Engineering, University of Riau.



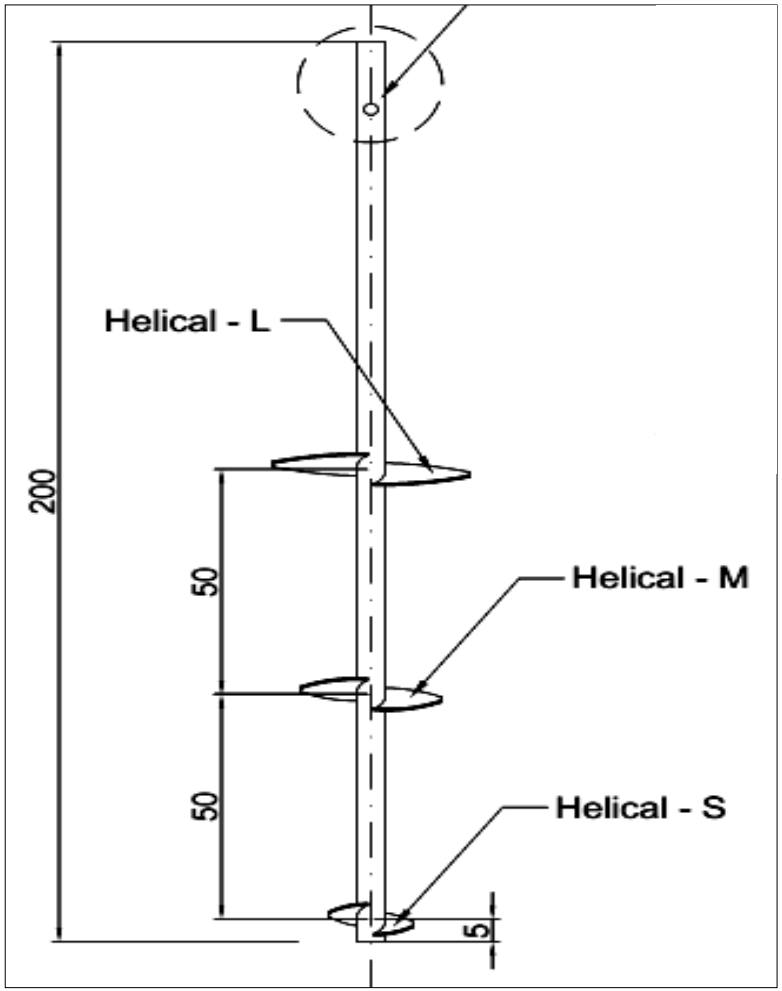
Peat`s Properties

Test(s)	Unit	Value
Water content	%	24,39
Wet density	gr/cm^3	0,82
Dry density	gr/cm^3	0,24
Specific gravity	-	1,58
Ash content	%	32,80
Fiber content	%	9,58
Void ratio	-	5,61

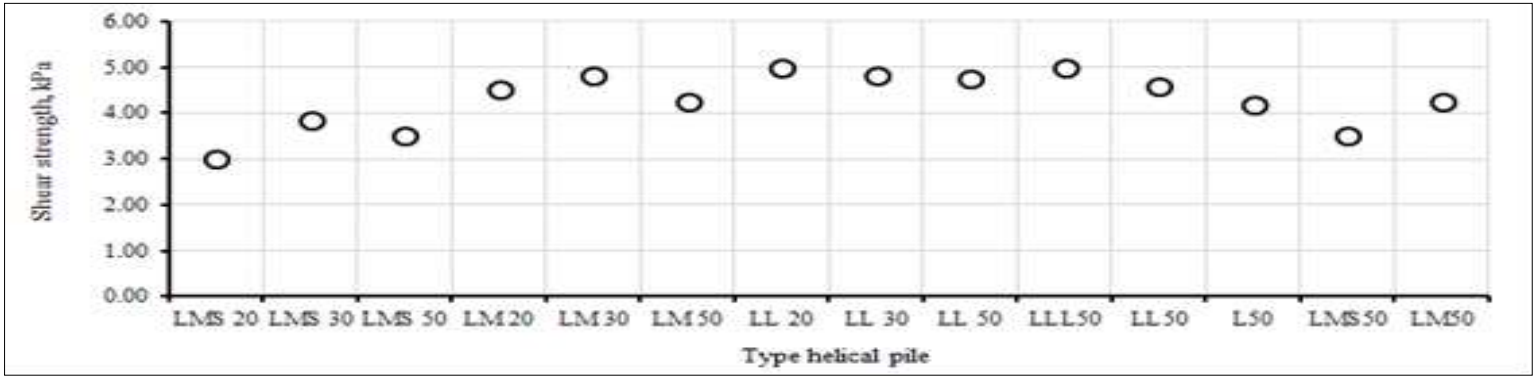
Nomenclature Naming of
Helical Pile Foundation

No	Name	No	Name
1	M	9	LMS50
2	L	10	LL20
3	LM20	11	LL30
4	LM30	12	LL50
5	LM50	13	LLL20
6	LMS20	14	LLL30
7	LMS30	15	LLL50
8	LMS50		

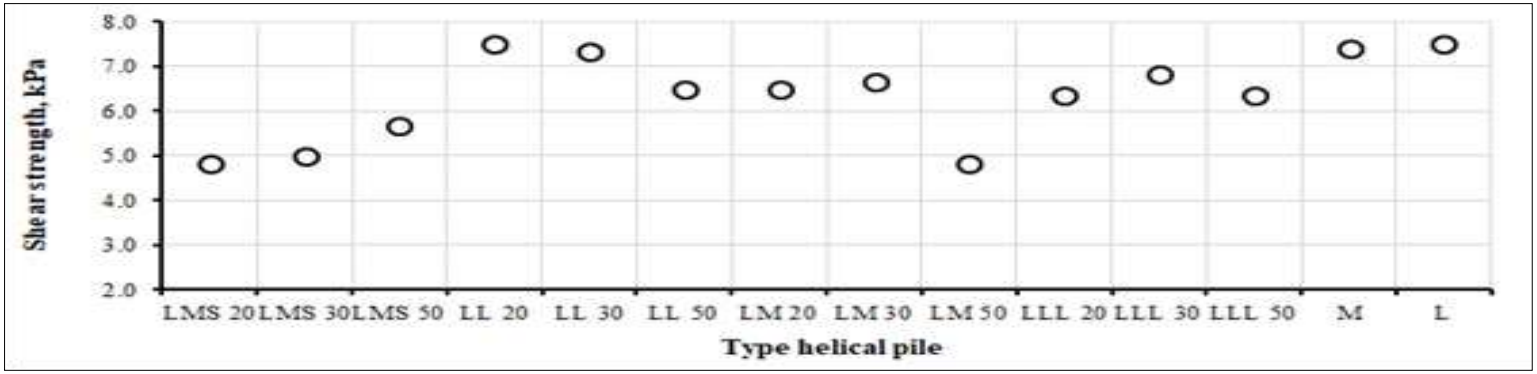
LMS 50



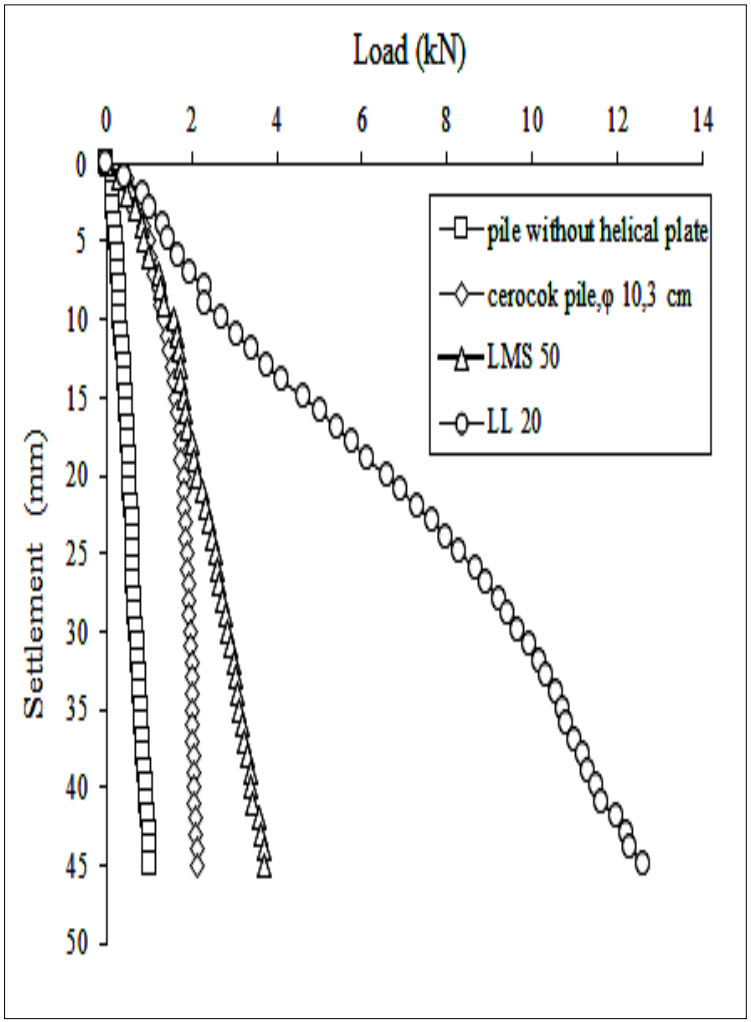
Results and Discussion



Shear Strength of Peat on Compressive Test

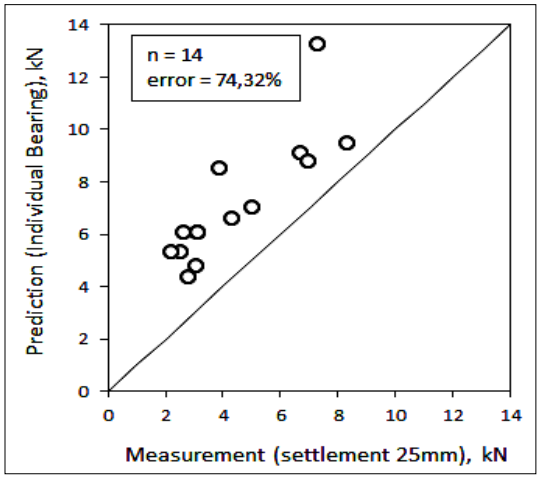


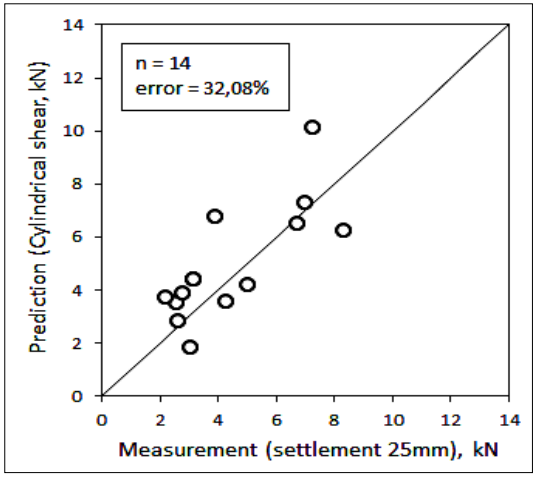
Shear Strength of Peat on Tensile Test

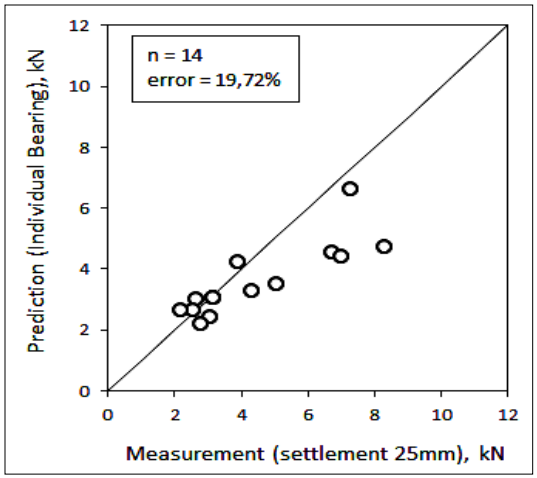


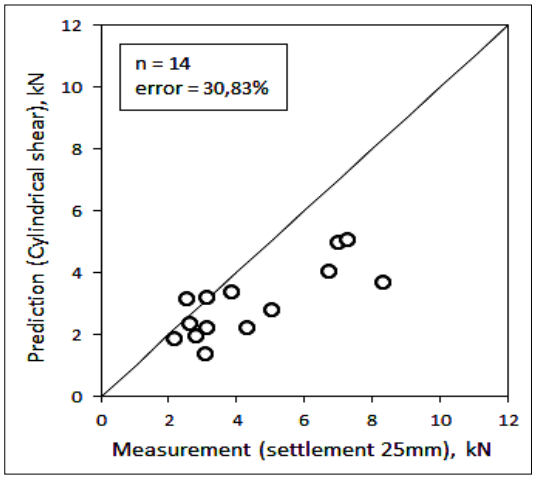
It shown the installation of helical plate was significantly able to enhance the bearing capacity of foundation. Pile foundation LMS 50 had a greater bearing capacity compared to wooden pile and non helical pile foundation, but this type had the lowest bearing capacity among the others helical piles. Followed by wooden pile, with the coarser surface. Lastly, non helical pile foundation gained the lowest bearing capacity.

Prediction and Compressive Bearing Capacity Test



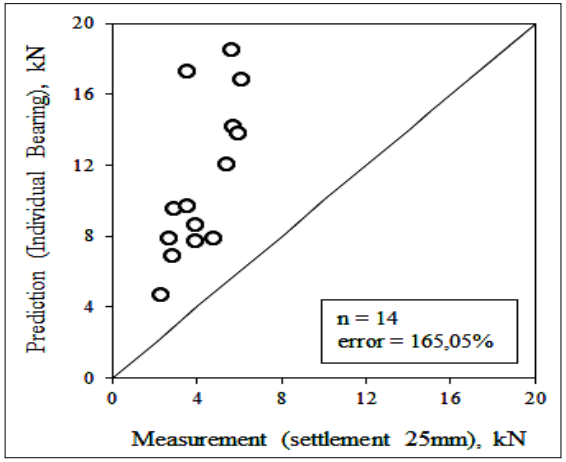


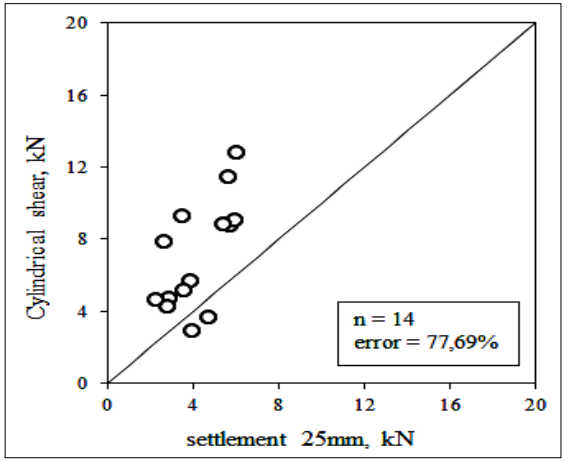


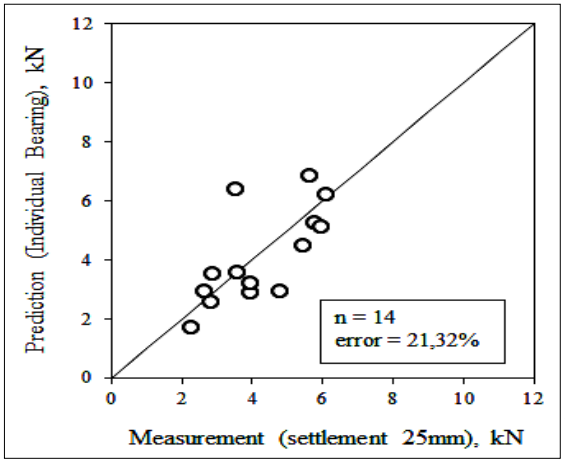


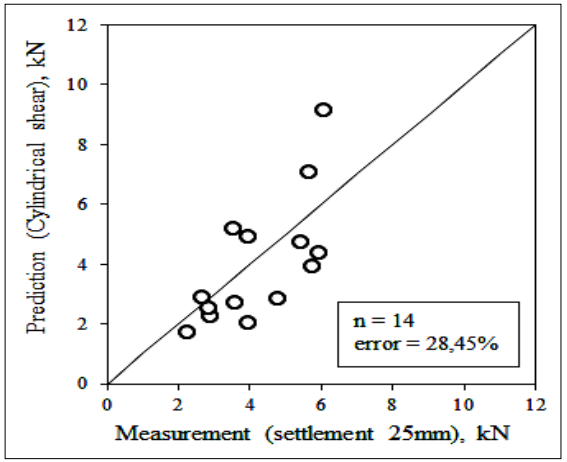
Reduction Factor = 0,37

Prediction and Tensile Bearing Capacity Test









Reduction Factor = 0,37

Conclusions

From the discussion results, it could be concluded that:

1. Helical pile foundation has shown a greater bearing capacity on peat, compared to wooden pile and non helical pile foundation.
2. Correspond to error rate value, the prediction of compressive bearing capacity on helical pile foundation was more suitable by using individual bearing method. The same thing goes for prediction of tensile bearing capacity. They produced the lowest error rate value. At this paper, the lowest error rate could be reached by using reduction factor of 0,37.

Thank You