

**CORRELATION BETWEEN STANDARD
PENETRATION RESISTANCE (SPT N) AND CONE
RESISTANCE (Q_c) IN CONE PENETRATION TEST
(CPT) FOR RESIDUAL SOILS**

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Master of Engineering in Geotechnical Engineering

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Dissertation submitted in partial fulfillment of the requirements for
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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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The above candidate has carried out research for the Master thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Prof. L. I. N. De Silva

Signature of the Supervisor:

Date: 05/03/2024

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J.R. Manel Sashikala

ABSTRACT

Correlation between Standard Penetration Resistance (SPT N) and Cone resistance (q_c) in Cone Penetration Test (CPT) for Residual Soils

"Corelation between Standard Penetration Resistance (SPT N) and Cone resistance (q_c) in Cone Penetration Test (CPT) for Residual Soils" examines the complex relationship between these two key geotechnical engineering parameters.

The basis of the research is a set of in-depth field tests carried out on residual soils, which are remarkable for their specific qualities and common occurrence. This study's main goal is to establish the numerical relationship between SPT N and CPT q_c values, which is useful for foundation design and soil characterization.

The study begins by providing a thorough analysis of the existing literature of research on the topic, which is followed by a thorough justification of the approach used for the field experiments. Cone Penetration Test (CPT), an appreciated in-situ testing method, is used to quantify q_c , and Standard Penetration Test (SPT) is used to compute SPT N values.

Statistical techniques are then employed to examine the test findings and determine if SPT N and q_c are correlated. The results show that these parameters for residual soils have a high association, which gives geotechnical engineers important information.

A correlation between SPT N and q_c is then determined by statistically analysing the test data. Geotechnical engineers may learn a great deal from the results, which show a high link between these parameters for residual soils. For the planning and building of foundations on residual soils, the findings have important contributions.

Finally, this study has identified a solid framework on further research which can be performed to and emphasizes the importance of comprehending the link between SPT N and q_c in residual soils.

Key words: standard penetration resistance (SPT N), cone resistance (q_c), cone penetration test (CPT), residual soils, correlation

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LIST OF ABBREVIATIONS

Abbreviation	Description
Af	Rod Length
SPT	Standard Penetration Test
BH	Borehole
CPT	Cone Penetration Test
CPT _u	Cone Penetration Test with Pore Pressure
C _u	Undrain Cohesion
D ₅₀	50% of fines passing percentage.
Dr	relative Density
F _s	Sleeve Friction
<i>i</i>	Inclination
I _c	Normalized SBT Index
N ₆₀	SPT N corrected to 60% of hammer efficiency.
N' ₇₀	SPT N corrected to 70% of hammer efficiency.
OCR	Over Consolidation Ratio
P _a	Atmospheric pressure
q _c	Tip resistance
q _t	Corrected Cone Resistance
R _f	Friction ratio
SBT	Soil Behaviour Type
U	Pore pressure