CORRELATION BETWEEN POINT LOAD STRENGTH INDEX AND UNIAXIAL COMPRESSIVE STRENGTH FOR HARD CRYSTALLINE ROCK

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Degree of Master in Engineering

Department of Civil Engineering

University of Moratuwa

Sri Lanka

September 2020

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DECLARATION OF THE CANDIDATE

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DECLARATION OF THE SUPERVISORS

We have supervised and accepted this thesis for submission for the degree.

..... Date: .....

Prof. U. G. A. Puswewala

..... Date: .....

Eng. Mahinda Rathnasiri

ABSTRACT

Large scale constructions such as highways, bridges, high rise buildings, jetties etc. are designed to withstand heavy loads depending on the dead loads and imposed loads on the structure. For this purpose, loads from these super structures are to be transferred to competent rock by adopting pile foundations. For end bearing piles, rock socketing has to be done to the competent rock. To identify competent rock, generally, the Point Load Strength (PLS) index ($I_{s(50)}$) of a rock sample collected during the rock drilling work is determined and the Unconfined Compressive Strength value of the same sample is estimated. If the Unconfined Compressive Strength value is acceptable, the pile can be terminated. For estimating the Unconfined Compressive Strength value from the Point Load Strength value, there are some correlations which are generally used in the Sri Lankan construction practice. All of these correlations are outcomes of research work done in overseas countries. Therefore, this research is an effort of finding an acceptable correlation between the Point Load Strength value and the Unconfined Compressive Strength value for crystalline metamorphic rocks found in Sri Lanka to be used as a guideline for pile termination criteria. More than 130 rock samples were collected from different rock types and both the Unconfined Compressive Strength value and the Point Load Strength index of the same rock were determined by conducting laboratory tests. In addition to these two tests, the Specific Gravity (SG) value of the same rock was determined and the rock type was also identified visually to group/ classify the data according to the rock type. After analyzing the test data gathered, a correlation between the Unconfined Compressive Strength value and the Point Load Strength index was established for different rock types. Few samples from each rock type were used for validating the correlations established.

Key Words: Crystalline Metamorphic Rocks**,** Unconfined Compressive Strength**,** Point Load Strength index

DEDICATION

I dedicate this research project report to,

My supervisors, Prof. U. G. A. Puswewala and Eng. Mahinda Rathnasiri,

Research project coordinator, Prof. S. A. S. Kulathilake and other staff members of the Civil Engineering department.

To all the students, authorities and researchers who are having an interest in the field of Geotechnical Engineering and who will be benefited from the findings of this research.

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LIST OF ABBREVIATIONS

Abbreviation	Description
UCS	Unconfined Compressive Strength
PLS	Point Load Strength
SG	Specific Gravity
PLT	Point Load Test
D_e	Standard Equivalent Diameter
P_u	Failure Load
PLI	Point Load Strength Index
ASTM	American Society for Testing and Materials
UCT	Unconfined Compression Test
BS	British Standard

LIST OF ANNEXTURES