

**LOW STRAIN PILE INTEGRITY TESTING FOR ROCK
SOCKETED BORED PILES IN SRI LANKA**

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Degree of Master of Engineering

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Sri Lanka

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Thesis submitted in partial fulfilment of the requirements for the degree

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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 believe it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Master's thesis under our supervision.

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Prof. H.S Thilakasiri

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Dr. L.I.N De Silva

ABSTRACT

Low strain pile integrity testing has been available over several decades. It is the widely used method of pile testing to detect serious defects in piles. The transient dynamic response (TDR) method of low strain pile integrity testing needs pile top velocity and pile top force generated by a small handheld hammer hit. The velocity and force details are useful to estimate the pile condition near the top and the stiffness of pile-soil system

Researchers have proposed that dynamic stiffness at low frequencies associates to the static stiffness of pile head. The linear region of load-settlement behaviour of a pile is described by the static stiffness. However, little attention has been paid to developing a relationship between static stiffness and dynamic stiffness. The carrying capacity of pile is considered as the most important issue in pile foundations. Load Testing is the most reliable approach to evaluate the carrying capacity of piles. However, load tests are rarely performed as it is costly, labour intensive and time dependent, but all the piles are subjected to low strain integrity tests.

Following the testing results, this research proposes a relationship between dynamic stiffness and static stiffness of bored piles. It is intended to evaluate the allowable carrying capacity of piles with results of low strain pile integrity testing and high strength dynamic load testing. Finally, this research presents a simple methodology to estimate the allowable carrying capacity of piles using instrumented low strain pile integrity testing. The developed methodology will be verified using field load testing results. In addition to that, the success of implementing the TDR method on bored piles is proved by case studies.

Key Words: low strain pile integrity testing, high strain dynamic load testing, dynamic stiffness, transient dynamic response method, static stiffness, allowable carrying capacity, settlement, working load, mobilized load, PIT, PDA

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TABLE OF CONTENTS

DECLARATION	I
ABSTRACT	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS	IV
LIST OF FIGURES	V
LIST OF TABLES	VII
CHAPTER 1. INTRODUCTION	1
1.1 Introduction	1
1.2 Objectives of the research	3
CHAPTER 2. REVIEW OF LITERATURE	4
2.1 Types of defects in piles.....	4
2.1.1 Geotechnical carrying capacity of piles.....	4
2.1.2 Structural carrying capacity of piles	5
2.2 Pile testing methods	6
2.2.1 Pile Integrity Test (Low Strain Integrity Test)	6
2.3 ASTM Guidelines on interpretation and testing (Designation: D 5882 – 07)	
10	
2.3.1 Procedure	10
2.3.2 Signal treatment	10
2.4 Low strain pile integrity test - Interpretation	11
2.4.1 Pulse echo method	11
2.4.2 Transient Dynamic Response [TDR] method.....	17
CHAPTER 3. METHODOLOGY	20
3.1 Developing a correlation for the static stiffens from the dynamic stiffness and investigate the uses of TDR method	20

3.2	Developing a methodology to determine the allowable bearing capacity of bored piles using low strain pile integrity testing	22
3.2.1	Settlement Criteria for Piles	22
CHAPTER 4.	RESULTS AND DATA ANALYSIS	25
4.1	Developing a correlation for the static stiffness from the dynamic stiffness and investigate the uses of TDR method	25
4.1.1	Dynamic Stiffness (K_d)	25
4.1.2	Relationship between dynamic stiffness and value of EA/L	30
4.1.3	Base fixity of end bearing rock socketed piles	32
4.1.4	Effective length	35
4.2	Developing a methodology to estimate the allowable bearing capacity of bored piles	37
4.2.1	Shaft shortening due to the pile top load in the linear zone of load-settlement graph (pile set 1)	37
4.2.2	Shaft shortening due to the pile top load in the non-linear zone of load-settlement graph (pile set 2)	38
4.2.3	Pile toe displacement under a Load	39
4.2.4	Allowable carrying capacity estimation.....	42
CHAPTER 5.	DISCUSSION.....	49
CHAPTER 6.	CONCLUSION.....	50
CHAPTER 7.	REFERENCES	51

LIST OF FIGURES

Figure 2.1	Velocity vs. Time signal.....	8
Figure 2.2	(a) Velocity and Force in Time Domain; (b) Spectrum of Velocity; (c) Mobility (PIT-W user manual, 2009)	9
Figure 2.3	Relationship between direction of the wave velocity and the particle velocity.....	12

Figure 2.4 Alternative points for zero point.....	13
Figure 2.5 American and European practices (Pile integrity testing, 2009).....	14
Figure 2.6 The particle velocity of a pile with minimum soil resistance and minimum pile resistance measured at the pile top.....	15
Figure 2.7 The particle velocity of a pile with soil resistance and minimum pile resistance measured at the pile top.....	15
Figure 2.8 Simulation of measured velocity and force of a typical pile (PIT – W software manual).....	19
Figure 3.1 Load - settlement curve at the top	21
Figure 3.2 Load - settlement curve at the bottom	21
Figure 3.3 Load-Settlement Curve.....	24
Figure 4.1 Static stiffness of pile head vs. dynamic stiffness of pile head	26
Figure 4.2 Time domain reflectogram and mobility spectrum of pile P17.....	27
Figure 4.3 Time domain reflectogram and mobility spectrum of pile P6.....	28
Figure 4.4 Comparison of suggested static stiffnesses and values of EA/L	31
Figure 4.5 Comparison of first resonant frequency (f_1) and value of $c/4L$	34
Figure 4.6 Time domain reflectogram of pile P2.....	34
Figure 4.7 Time domain reflectogram of pile P3.....	34
Figure 4.8 Mobility spectrum of pile P7	35
Figure 4.9 Time domain reflectogram and mobility spectrum of pile P9.....	36
Figure 4.10 Time domain reflectogram and mobility spectrum of pile P23.....	36
Figure 4.11 Time domain reflectogram and mobility spectrum of pile P10.....	37
Figure 4.12 Observed elastic shortening vs. PL/AE of linear region	38
Figure 4.13 Observed elastic shortening vs. PL/AE of non- linear region	39

Figure 4.14 Pile toe load vs pile top load in linear zone of load settlement graph	40
Figure 4.15 Pile toe load vs pile top load in non-linear zone of load settlement graph	41
Figure 4.16 Forecasted pile top load vs true mobilized pile load	44

LIST OF TABLES

Table 2.1 Intensity of the defects based on β (PDA User manual).....	6
Table 2.2 Typical piles with respective reflectogram reflectograms (Rausche et. al 1988)	16
Table 4.1 List of pile stiffnesses determined from TDR and HSDT methods.....	28
Table 4.2 Settlements under the working load measured from signal matching of HSDT results and estimated from LSPT	29
Table 4.3 List of K_d , K , EA/L , f_1 and K_{toe}	31
Table 4.4 HSDT Results	45
Table 4.5 Allowable carrying capacity estimation.....	46
Table 4.6 Pile top load calculation from proposed methodology with the actual mobilized settlement	48

LIST OF ABBREVIATIONS

Abbreviation	Description
CIDA	Construction Industry Development Authority
HSDT	High Strain Pile Integrity Testing
ICTAD	Institute of Construction Training and Development
LSPT	Low Strain Pile Integrity Testing
NDT	Non-Destructive Testing
PDA	Pile Driving Analyser
PIT	Pile Integrity Testing
PEM	Pulse Echo Method
TDR	Transient Dynamic Response Method