

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

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Degree of Master of Engineering

Department of Civil 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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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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## **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