NOISE EMITTED BY DROP HAMMER PILING MACHINE AND WORKERS' NOISE EXPOSURE

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DEDICATION

This project is dedicated to my father Sheikh Ahmad Sheikh Long, who taught me that the best kind of knowledge which is learned for its own sake and entirely based on his experience and from the ultimate book which is the Al-Quran.

It is also dedicated to my beloved mother Noraini Jaafar, who taught me that even the largest task can be accomplished if it is done one step at a time. And to complete this humongous task of this project report in timely manner.

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"A GENIUS is a person who encounters "IDIOTIC" phases in life
and diverts around "IT" the next time,

An "IDIOT" is a person who repeats His "STUPIDITY"
repeatedly throughout His life.

ABSTRACT

Hammer driven piling machine is the typical piling equipment in Malaysia, according to previous research on piling activities more than a decade ago more than an average of 90 dBA was recorded during the occurrences of piling activities at a common construction site that disturbs the neighbourhood. However, the direct effect of piling activities are the operator and signal man. Up to date there is no detail data about the noise exposure level experienced by these workers from these activities in order to facilitate the noise management in construction site. In this paper the propagation of sound level data on the recent hammer driven piling machines and noise exposure to operators and signal man were acquired and evaluated. Sound data were obtained by using sound level meter type 2 while noise exposure of workers by using noise dosimeter. Data were taken from six sites with piling machine age bellow 10 years, 7ton Hammer, 300mm Spun Pile and Laterite type of soil. It was obtained that piling hammering noise level was found exceeds the permissible maximum noise level of 90 dBA as highlighted by FMR 1989 up to distance more than 4m from piling machine. With this result it directly affected the signalmens and this is confirmed by the reading of noise exposure of them exceeding the 90 dBA and more than 100% dose. From the analysis, clearly that the piling machine workers especially the signal man underestimate the impact of high impact pulsing sound level generated even at the softest soil condition. It is proposed that signal man must wear proper hearing protection device with Noise reduction rating (NRR) of 20-30 dBA.

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LIST OF ABBREVIATIONS

OSHA	-	Occupational Safety and Health Administration
NIOSH	-	National Institute of Safety and Health
NIHL	-	Noise-Induced Hearing Loss
HPDs	-	Hearing Protection Devices
PPE	-	Personal Protective Equipment
dB	-	Decibel without frequency weighting
dBA	-	Decibel in A-Weighted
NRR	-	Noise Reduction Rating
HCP	-	Hearing Conservation Program
ER	-	Exchange Rate
ISO	-	International Organization for Standardization
MLR	-	Multiple Linear Regression
TWA	-	8-hoursTime-Weighted Average

LIST OF SYMBOLS

LAeq	-	A-Weighted Daily Noise Exposure Level
L_w	-	Sound Power Level
R	-	Distance (m)
T_e	-	Time of measurement
T_0	-	8 hours' time of measurement
L_{avg}	-	Exposure level over the entire time of measurement
L_{min}	-	Minimum exposure level
L_{max}	-	Maximum exposure level

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The construction sector plays an effective role in Malaysian economy. The construction sector supplies basic amenities for instance commercial and residential space, car parks, stadiums and playgrounds, roads, highways, railways, airports, ports, hospitals, communication and etc. Among others it is important to improve quality of life to the nation and at the same time, the construction sector contributes hugely in generating employment in a thriving economy of Malaysia.

It could not be denied that the construction activities are the main source of environmental pollution to neighbourhoods. Noise is typically identified as the undesired sound which could not be defined as a physical contaminant. Which to a person, a particular sound is considered just another form of sound or annoying to another particular person. The type or loudness of a particular sound that is being emitted or heard by a particular person is very subjective. And in some cases, some sounds are acceptable for a certain period of time and could change to annoying after that duration period.

The conditions are worsened and becomes more problematic when the construction project doesn't have any proper noise management and at the same time uses conservative technology in their daily work. Thus, the project director and project manager should consider the impact of their work on humans and to reduce the effects of noise to the sensitive human receivers, and at the same time follow the guidelines and regulations that the authority has established

Noise mitigation devices should be set in place if it exceeds the permissible levels and any noise sources from construction activities should be identified and suppressed to avoid the after effects to construction workers and civilians around the construction site.

1.2 Problem Statement

In 2017, there were about 78.9% (4787 cases) were related to noise and a total 6020 reported cases of occupational diseases and poisoning based on the report by Malaysian Department of Safety and Health (DOSH, 2019). Majority of them were related to noise induced hearing loss (NIHL) or hearing disorders.

According to this statistic collected, the importance of wearing proper noise equipment during working around heavy machinery is still low because majority of the occupational diseases are very high compared to other types of injuries at the working space despite efforts being done by the government by introducing Occupational Safety and Health (Noise Exposure) Regulations 2019.

Previously, a study done by Sabariah Samsun (2008) more than an average of 90 dBA was recorded during the occurrences of piling activities at a common construction site. These numbers are very much near the occupational safety and health administration limit which is at 90 dBA and also at the same time, the regulation by FMR (1989) states that no employee shall be exposed to noise level more than 115 dBA at any time during working hours.

However, up to now there is no detailed data about the noise exposure level experienced by these workers from these activities in order to facilitate the noise management in construction site in the future.

1.3 Aim and Objectives

This study aims to investigate the adverse impact of noise emitted by drop hammer piling machine on construction workers at construction sites. Thus, the objectives of this study are:

a) To identify the level of noise emitted by piling works

b) To assess the noise exposure experienced by workers surrounding piling works.

c) To evaluate workers and management team perception of noise from piling activities.

d) To propose the proper noise mitigation for piling works activities

1.4 Scopes of Study

The scope of this study is as per below:

a) The data were collected from eight construction sites around the vicinity of Perak Darul Ridzuan and all of the construction noises measured at site shall be actual on-site data.

b) The main priority shall be recording the piling noises during the piling phase and some characters of which 7ton Hammer, 300mm Spun Pile, Laterite type of soil since this type of soil are located surrounding the state of Perak.

c) Accessing the noise exposure of the construction workers that are mainly involved managing and operating the piling machine and in the same time, the noise of the piling machines affecting the other workers that are around the construction site.

d) The noise exposure of workers on-site was carried using out dosimeter that comply to Malaysian Factories and Machinery (Noise Exposure) Regulations 1989.

1.5 Significance of Study

These are some of the significance of the study;

a) To identify the type of machinery and the average level of noise that the machine emits so that a base level could be determined.

b) The information that has been collected would be used to prove the hazard of working in such conditions.

c) To mainly educate the construction workers that operate and assist the works related with machine operation and in the same show the data obtained to the machine operation management on the hazards and effects of handling those machines if no precaution has been taken.

d) To remind the enforcement of the law by notifying the piling service companies and main contractors that the laws has been passed and precautions should be taken and in place at all times during the operation of the piling machines.

1.6 Expected Findings

After conducting the study, the level of noise generated by the piling machines that directly affects the machine operator and the surrounding workers would be taken and compared to the permissible noise level that has been enforced by the governing body. And in the same time to understand and record the level of understanding of the piling machine workers the hazard of working in such condition after long hours. After that, a recommendation shall be notified to the management

body including the workers on what type of protective equipment shall be in place to minimize the effects on the human sensory.

1.7 Summary

Eight construction sites surrounding the state of Perak, which is selected according to hammer head size of 7 ton, 300mm spun pile and laterite type of soil has been selected. When excessively being exposed with noise that is generated from piling machine could lead to NIHL which is hazardous for the workers and management team.

Identification of noise level, assessment of noise exposure, workers and management perception and mitigation plan for HPD. To record & identify the type of machinery and noise base level would be recorded. Worker's education and inform the management team the current laws regarding noise exposure at the working space.

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