



**DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)**

PILING WORKS: JACK IN PILES

Prepared by:

ARIFF IRWAN BIN ASMAWI

2017206692

DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

DECEMBER 2019

It is recommended that the report of this practical training provided

by

ARIFF IRWAN BIN ASMAWI

2017206692

entitled

Piling Works: Jack In Piles

be accepted in partial fulfillment of the requirement for obtaining the Diploma In Building.

Report Supervisor : Sr. Anas Zafiroi Bin Abdullah Halim

Practical Training Coordinator : En. Muhammad Naim Bin Mahyuddin.

Programme Coordinator : Dr. Dzulkarnaen Bin Ismail.

DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

DECEMBER 2019

STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references are stated herein, prepared during a practical training session that I underwent at Alam Jitu Bina Sdn Bhd for a duration of 20 weeks starting from 5 August 2019 and ended on 20 December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

.....
Name : ARIFF IRWAN BIN ASMAWI

UiTM ID No : 2017206692

Date : 13/12/2019

ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah, the Most Merciful, the Most Graceful.

I would like to extend my heartfelt gratitude for the guidance, advice and help rendered throughout the period of training by the following group of amazing individuals. First and foremost, I would like to thank Encik Mohd Shaipudin as the project manager for the opportunity given and conduct my training in his esteem company. Then, special thanks to Encik Mohd Mazlan as the assistant project manager because enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structures, building and civil works. They are also responsible towards streamlining and assessing my training and have extended their cooperation and help to further enhance my ability in understanding the procedures in construction and site administration, tests procedures, site safety and best practices in the industry. It is an honor for me to be given the opportunity to ‘work’ with all of you.

I would also like to give my special thanks to all the UiTM lecturers that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint especially to my Supervising lecturer, Sr. Anas Zafiroh bin Abdullah Halim who has helped me a lot to complete this report and industrial training. I would also like to thank my academic advisor, Puan Noor Rizallinda binti Ishak who has advise me to complete this report. Special thanks to Encik Muhammad Naim bin Mahyuddin as practical training coordinator and lastly thank to Dr. Dzulkarnaen bin Ismail as programme coordinator. I appreciate all of you for their value time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that have been shared over the last few semesters.

Last but not least, my special thanks to my beloved parents for their sacrifices because they advise me a lot and helped me in financial too, a special thanks to both of them.

Thank you so much.

ABSTRACT

Foundation provides support for structures, transferring their load to layers of soil or rock that have sufficient bearing capacity and suitable settlement to support them. The aims of this research are to investigate the method of jack in pile for constructing quarters building in Project Type 3 Health Clinic with Quarters, Raub Pahang. All the data was collected based on site visit, interview, document review. The objective of this report is to find out how the installation of the injection piles and to identify the problems that occurred during the process of jack in piles works and the solution. During practical training, research showed all the procedures used for this work follow the standard procedures.

CONTENTS		PAGE NO
Acknowledgements		iv
Abstract		v
Contents		vi
List of Tables		vii
List of Figures		viii
CHAPTER 1.0	INTRODUCTION	
1.1	Background and Scope of Study	1
1.2	Objectives	3
1.3	Methods of Study	3
CHAPTER 2.0	COMPANY BACKGROUND	
2.1	Introduction of Company	4
2.2	Company Profile	5
2.3	Organization Chart	6
2.4	List of Project	
	2.4.1 Completed Projects	7
	2.4.2 Project in Progress	9
CHAPTER 3.0	CASE STUDY (BASED ON TOPIC OF THE REPORT)	
3.1	Introduction to Case Study	10
3.2	Method of Jack in Pile	11
3.3	Problem	18
3.4	Solution	20
CHAPTER 4.0	CONCLUSION	
4.1	Conclusion	22
REFERENCES		23
APPENDIX I, II, III		24-26

LIST OF TABLES

Table 2.4.1	List of completed project	7
Table 2.4.2	List of project in progress	9

LIST OF FIGURES

Figure 2.1	Head quarter of Alam Jitu Bina Sdn.Bhd	4
Figure 2.2	Logo of Alam Jitu Bina Sdn.Bhd	5
Figure 2.3	Organization chart of Alam Jitu Bina Sdn.Bhd	6
Figure 2.4.2	View of construction of clinic	9
Figure 2.4.3	Excavation work to construct quarter	9
Figure 3.2	Construction drawing of piling point	12
Figure 3.3	Surveyor marks the piling point	12
Figure 3.4	Operator check the vertical of drilling point	13
Figure 3.5	Stability of the piling machine	14
Figure 3.6	Crane lifting the pile into the grip	15
Figure 3.7	Machine grip the pile body	15
Figure 3.8	The control panels of piling machine	16
Figure 3.9	Attachment of 6m pile with 12m pile	17
Figure 4.0	Welding works to joint both of pile	17

CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Foundation is the structure located below the ground that need to construct before the construction of the main structure begin. Foundations can divided into two types which are shallow or deep foundations. One of the examples of the deep foundations is the pile foundations. The structural members of the pile foundation are made of steel, concrete or timber. Despite the cost that is higher than the shallow foundations, the use of piles often necessary to ensure the structural safety of the structure. Some of the conditions that require the use of pile foundations are when one or more upper soil layers are highly compressible and too weak to support the load transmitted by the superstructure. Besides, the present of the expansive and collapsible soils at the site of a proposed structure. (Braja M. Das, 2004)

Pile foundations are the part of a structure used to carry and transfer the load of the structure to the bearing ground located at some depth below ground surface. The main components of the foundation are the pile cap and the piles. Piles are long and slender members which transfer the load to deeper soil or rock of high bearing capacity avoiding shallow soil of low bearing capacity. The main types of materials used for piles are wood, steel and concrete. Piles are made from these materials are driven, drilled or jacked into the ground and connected to pile caps. (Duraismy Y., 2009)

Piling works also a most suitable method to construct foundation especially for works over water such as jetties or bridge. Besides, there are many types of piling are used in construction industry such as jack in pile, bored piling, driven piles and driven and cast in situ piles. For bored piles, also called drilled shaft, is a type of reinforced-concrete foundation that supports structures with heavy vertical loads. A bored pile is a cast-in-place concrete pile, meaning the pile is cast on the construction site. The advantage of this pile are less disruption to adjacent soil occurs, vibration also low and it will reduce or not disturb the adjacent piles or structures and also large excavations and subsequent backfill can be minimized.

Driven piles is a preformed unit and usually in timber, concrete or steel driven into the soil by using blows of a hammer. (Tomlinson M.J, 1986). The advantage for this piles are pile can be precast follow the required specifications, piles of various size and length can be produce in advance and used at the site and work is neat and clean. The jack in piling system is classified as a displacement pile system whereby soil is displaced during the driving process. The pile will hydraulically jacked into the ground, the displacement causes the surrounding soils to compress against the jack-in piles and will increased load-bearing capacity. It is also environment friendly because this systems does not produce noise or vibration as compared to other piling systems, it is suitable to use for projects in urban areas where residents are sensitive to noise and vibrations. Therefore, for this project jack in piling has been used to construct clinic and quarter building.

The study was carried out at Raub, Pahang during the practical training. The study of the piling works in this site is more focusing to jack in pile method. The construction work on the site is to construct health clinic type 3 and quarter for the health facilities in Raub. The investigations that are carried out are to gain information about procedures of jack in piles construction where further explanations about piling works are explained by the assistant engineer and sub-contractor who in charged for this work. All the information about the piling machine and works procedure were also being explained.

1.2 Objectives

- (a) To investigate the methods of the jack in piles.
- (b) To determine the problems occurred during the process of jack in piles.
- (c) To determine the solution taken to solve the problems.

1.3 Research methods

To achieve the aim, there are few methods were used to obtain the data and information regarding to thi task. The types of methods that have being used for this research were as the following:

1. Observation – Observation are focused to study the methods of the jack in pile process and the observation are carry out during the practical training. Besides, contractor assigned the task to take over the pile works and record the data of the penetration of piles, so the data can be collect by taking picture and video.
2. Interviews – Interviews are carry out during the practical training and the contractor was interviewed about the construction process. Sub-contractor that in charge for the piling work also been interviewed about the works process. This interviewed was considered as a semi-structured interview as the questions were already being prepared beforehand for the contractor to answer and face to face interview also happen during the practical training.
3. Document reviews – The contractor provide methods statement of the piling works and assistant project manager also provided some photos and video during the construction process as additional information.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company



Figure 2.1 Head quarter of Alam Jitu Bina Sdn.Bhd

Alam Jitu Bina Sdn Bhd is fully owned by bumiputera contractor company. This company was founded by YH. Dato' Ahmad Latifi bin Haji Abd Malek on 9 September 1985. He already involved in the construction industries since 1978 and registered with Jabatan Kerja Raya under class F and has been upgrade to class D on 1982 and class BX on 1985. Finally, the result of continuous effort, Alam Jitu Bina has been upgrade to class B on 1996 and successfully upgrade to class A on 1998. Besides, this company also hiring a number of experienced engineers in construction industry and this thing help the company becomes a competitive company.

This company has already developed and managed a few projects and many of the projects are located at states of Pahang. Most of the completed projects are upgrading projects and construction of housing and schools.

2.2 Company Profile



Figure 2.2 Logo of Alam Jitu Bina Sdn.Bhd

NAME OF COMPANY : ALAM JITU BINA SDN.BHD

ADDRESS : B6, Desa Samudera, Jalan Kuantan-Sg.Lembing, Bandar Indera Mahkota, 25200,
Kuantan Pahang Darul Makmur.

EMAIL : alamjitukk3@gmail.com

NO.TEL : / **NO.FAX :**

VISION : We aspire to be a strong and viable Bumiputera property development and development company in the Malaysian economic sector.

MISSION : Become a dedicated, respected property developer and committed to fulfill the needs of every client and community involved.

2.3 Organization Chart

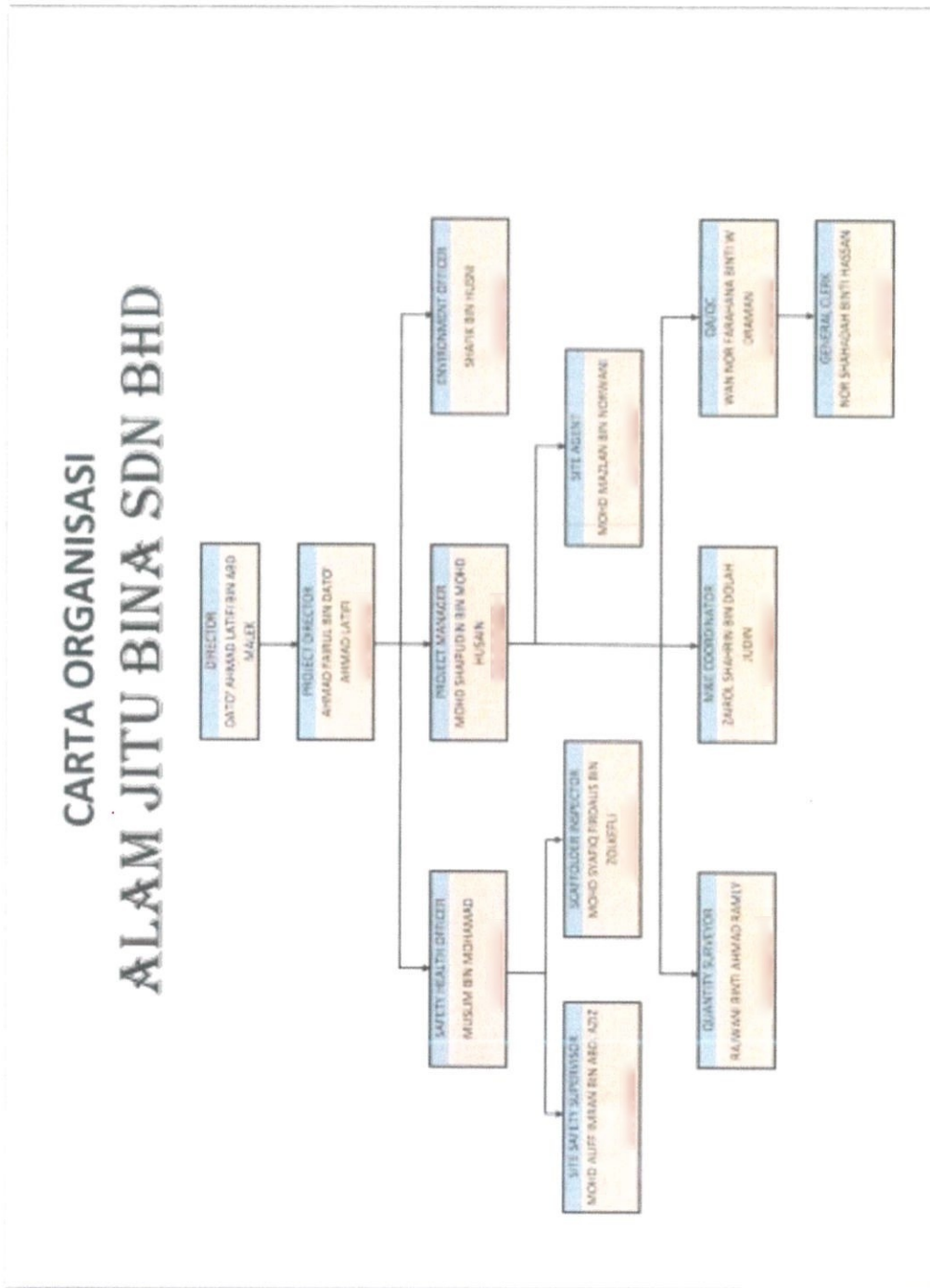


Figure 2.3 Organization Chart of Alam Jitu Bina Sdn.Bhd

2.4 List of Project

2.4.1 Completed project

BIL	NAME OF PROJECTS	NO. CONTRACT	CONTRACT PRICES (RM)	DATELINE
1	Mereka bentuk, membina dan menyiapkan 120 Unit Rumah Kluster (1 Tingkat) dan Kerja- Kerja yang Berkaitan Dengannya Bagi Program Perumahan Rakyat (PPR-Dimiliki) Kampung Tekek, Pulau Tioman, Pahang Darul Makmur.	KPKT/CPPP/JPN/10/2012	46,760,546.17	06/07/2015
2	Mereka bentuk, membina dan Menyiapkan 162 Unit Rumah Berkembar Bagi Program Perumahan Rakyat (PPR-Dimiliki) di Tg.Selangor, Pekan, Pahang Darul Makmur	JPN/2/10/1/2004	11,749,255.01	25/10/2010
3	Mereka bentuk, Membina & Menyiapkan 318 Unit Rumah Berkembar Bagi Program Perumahan Rakyat (PPR-Dimiliki) di KualaPahang, Pekan, Pahang Darul Makmur	JPN/PPR(M)/C/1/2002	13,156,400.00	04/10/2004
4	Cadangan Membina & Menyiapkan Kerja- Kerja Infrastruktur Bagi 100 Unit Rumah Nelayan Di Kuala Pahang, Pekan, Pahang Darul Makmur	PKNP/K/100/99	550,450.00	03/01/2000
5	Membina & Menyiapkan Blok Sekolah di Sek. Keb. Chebong Kuala Tembeling dan di Sek. Keb. LKTP Sg. Retang, Jerantut, Pahang Darul Makmur	F/PHG/J/DK/190/2002	5,501,811.60	13/10/2003
6	Cadangan Menaikkan Taraf Jalan dari Felda Sg. Retang ke Felcra Tembeling Tengah, Jerantut, Pahang Darul Makmur	JM63/2000	5,235,000.00	31/03/2003

7	Membina & Menyiapkan 150 Unit Rumah Kos Rendah & Kerja-kerja Yang Berkaitan Dengannya di PAKR Pulau Serai, Mukim Pahang Tua, Pekan, Pahang Darul Makmur	JPN/PAKR/C/3/9 8	4,290,000.00	14/08/2001
8	Membina dan menyiapkan dua blok Tambahan di Sek.Keb.Kedaik, Rompin, Pahang Darul Makmur.	F/PHG/PT/DK/204/ 2000	2,450,000.00	11/06/2001
9	Membina & Menyiapkan 2 Blok 4 Tingkat Asrama Lelaki & Perempuan, Dewan Makan Serta Kerja Berkaitan Untuk Sek. Men.Merapoh, Kuala Lipis, Pahang Darul Makmur	F/PHG/L/DK/234/97	3,429,020.00	05/10/1999
10	Mereka bentuk, Membina & Menyiapkan 100 Unit Rumah Nelayan Kuala Pahang, Pekan, Pahang Darul Makmur	PKNP/K/806/97	1,500,000.00	02/11/1998
11	Membina & Menyiapkan 1 Blok Bangunan 4 Tingkat, 1 Blok di Kantin Sek. Men. Agama Bukit Ibam, Muadzam Shah, Pahang Darul Makmur	S/PHG/P/DK/701/96	1,474,415.00	16/12/1996
12	Kerja-kerja Menambun Tapak, Membaiki Saliran, Mengubahsuai, Meroboh Bangunan Sediada, M&M Tangki Air Junjung, Dewan Serbaguna dan Kerja-kerja Berkaitan Untuk Cadangan Kolej Islam Pahang, Kuantan, Pahang Darul Makmur	S/PHG/IP/DK/109/ 95	4,300,000.00	27/12/1995
13	Mereka bentuk, Membina dan Menyiapkan 120 Unit Rumah Kluster (1 Tingkat) dan Kerja-kerja yang Berkaitan dengannya bagi Program Perumahan Rakyat (PPR-Dimiliki) Kg. Tekek, Pulau Tioman, Pahang Darul Makmur	KPKT/CPPP/JPN/1 0/4/2012	46,760,546.17	6/7/2015
14	Cadangan Pembinaan Semula dan Menaiktaraf Sekolah Daif Menggunakan Kaedah Industrialized Building System (IBS) di Semenanjung Malaysia (Fasa 1) Tahun 2018 Bagi Negeri Pahang	F/PHG/R/DK/107/201 8	6,558,220.00	29/5/2018

Table 2.4.1 Completed project

2.4.2 Project in progress

BIL	NAME OF PROJECT	NO.CONTRACT	CONTRACT PRICES (RM)	DATELINE
1	Membina Klinik Kesihatan Jenis 3 dengan Kuarters di Raub Pahang Darul Makmur.	F/PHG/R/DK/121/2017	26,447,541.28	20/4/2020

Table 2.4.2 Project in progress



Figure 2.4.2 View of construction of clinic



Figure 2.4.2.1 Excavation works to construct quarter

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

Project that has been investigated is located at Raub, Pahang Darul Makmur. This project involves the construction of Klinik Kesihatan Jenis 3, quarter buildings, TNB Substation, mechanical blocks and water tank. This project involves one main engineer which is JKR Raub and one main contractor which is Alam Jitu Bina Sdn.Bhd. This project is prepared for their client which is Ministry of Health Malaysia. The duration of this project is two years which is start April 2018 and expected to be complete on April 2020 and the cost of this project are about RM26 millions. The objectives of this project is to add more health facilities for peoples because increasing numbers of peoples in Raub and to support Hospital Raub facilities.

This construction site is located 3 KM away from the city and which takes almost ten minutes to go there. This project is surrounded by population area and one secondary school. Heavy vehicles likes lorry, crane and loader need to use main road in the city so it will disturb the traffic at the city.

There are some works are carried out in this case study which is jacked in piling. This work had done at clinic zone, water tank, mechanical blocks and pump house before this, and this piling works continue at quarters building that have five storey. This quarter building function is to provide settlement for staff at the clinic. Jacked in piles is needed to build this building especially on the weak soil. It will provide foundation that support heavy loads that suitable to this size of building. Then, this project use jacked in pile system because this system does not produce as much noise or vibration as compared to other piling systems, it is suitable to use for projects that surround with peoples are sensitive to noise and vibrations.

Furthermore, all the information about jacked in piling from the setting out until the work finish has been obtained from the site agent and the sub-contractor who is in charge for this work. Besides, documents reviews also has been provided as a research and as additional information.

3.2 Methods of Jack In Pile's Construction

Jack in pile used as deep foundation elements to support heavy loads and transmit it into the ground. In the process to construct quarters building because it has five storey so this jack in pile is require. Jack in pile foundation also offer us a lot of advantages because this system will faster the construction work rates, quality control, less damage of piles and lower noise as the construction site are near with the population area. The working capacity of piles installed is similar to normal driven piles, in the range of 1000 KN to 2500 KN.

The jack-in piling system is classified as a displacement pile system because soils are displaced during the driving process. Piles will hydraulically jacked into the ground and the displacement causes the surrounding soils to compress against the jack-in piles resulting in an increased load-bearing capacity. For this project, 250 mm square concrete are handled by this machines. Besides, it is typical jack in pile that consists of setting out, drilling works, handling, installation and extension.

The observation of the working procedure are observed by using document reviews and face to face with site agent and sub-contractor who is in charge for piling work.

1. Setting out Pile location

Surveying works are run by the surveyor to marks the point before drilling works start to operate. Land surveyor will survey and check the setting out positions of pile points according to construction drawing.

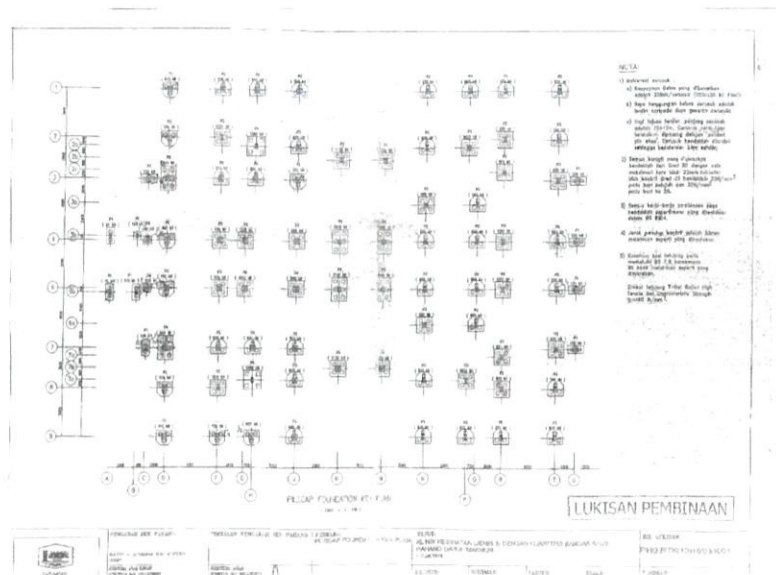


Figure 3.2 Construction drawing of piling point

After that, mark the pile positions with pegs which are planted at the center of the pile positions and at the same time, survey the existing level at the pile positions. Total of the point that has been marks before drilling works are 283 points.



Figure 3.3 shows surveyor mark the piling point before drilling work is begin. It is to make sure all the point are drill correctly and piling works more efficient.

2. Drilling work

After all the points are marked, drilling works are commenced. Auger drill used to excavate the soil so the pile easy to jack in. Before that, operator must check the vertically of drilled hole during boring operation. As a precaution if the bored hole is unstable or collapsible, temporary casing is inserted into the hole.



Figure 3.4 shows the operator checked the vertically and make sure it is in right place. Then, drilling works are commenced until the designed depth is achieved. If hard material is encountered during boring, use chisel or rock tool to penetrate into the hard strain. For this work, require depth from engineers which is JKR is 12m depth and after reaching the required depth clear the base of bored hole with a cleaning bucket.

3. Handling and Lifting

First of all, each pile shall be clearly marked with red ink at 500mm intervals to enable the reading of jacked in pressure or force can be record every 500mm depth of pile penetration. After that, operator need to make sure the vertical support structure of the jacked in machine is plumbed to ensure the pile is vertical and this is achieved by adjusting the four stabilizers.



Figure 3.5 show the bubble at the center, this mean the vertical support structures are in stable condition, also the piling machine.



Figure 3.6 show the pile will lifted by crane and pile should be put into the grip of the jack in machine and operator will gripped the pile body.



Figure 3.7 show the pile will put into the grip and the machine will grip the pile body.

4. Installation of pile

Before jacking is commences, operator must make sure the pile is vertical and to achieve that spirit level will use to check the position of the pile either vertical or not. Final vertical check and positioning by moving in the X and Y direction.



Figure 3.8 The control tools that use to stabilize the machine and jack in the pile.

Once the pile is vertical and in position, jacking work is commences. Jacking work carry out by applying the jacking onto the grip device to press down the pile into the hole. During pile installation, the hydraulic pressure of main jacks measured by pressure gauge and the corresponding pile penetration are recorded by the site staff at regular intervals. The minimum depth of the penetration of the pile is 12m and 18m is the maximum doth of penetration according to the engineer design.

5. Extension of pile

After the pile penetrate at the required depth, if the reading of force still not reach at the required reading pile can be extended by using 6m extension pile and joint them using welding set. Then, after both of the pile are connected, jacking work will commences again and after require resistance reached and the jacking work will stop. If the machine cannot jack in the pile until 18m depth, so the pile will cut off. For example the pile penetrate until 15m depth, 3m balance will cut off by operator.



Figure 3.9 show the 6m pile attached with the 12m pile for the extension work.

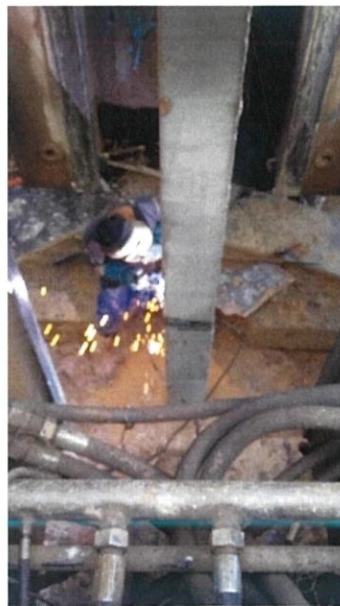


Figure 4.0 show the both of the pile are joint by using welding set.

3.3 Problems

Every construction works have problems that encountered either in progress or after it finished. Problems during construction are the common things that the contractor, clients, general workers and other parties involved in the construction must face whether it is forced or not and this is not expected when it will happen. There are some problems can occur which are machineries, safety and health issue, duration and weather condition. Some of the problems occur might have been out of control and handle if it there are no precaution taken to solve the problems as the construction cannot be carried out smoothly without facing any minor or major enigma. These problems caused deficiency in the capacity of the piling work unless they have been tackled properly.

1. Machineries

Machineries are one of the important aspects that should be taken care of during the construction work. It is one of the main things that play the essential roles besides manpower in set up any construction. The sub-contractor who in charged for piling work said that they have no major problems that caused injuries to the workers at the site according to the machineries problems. Unfortunately, they have problems with the rope at the crane to lift the pile because sometimes the rope become loose and risk the pile to fall are high. Furthermore, the erosion from the weather changed also can affect the strength of the crane rope. Besides, gen set which is supply the power cannot be exposed to the water too much because it can cause electrics shock to the piling machine and will harm the operator.

2. Safety and health issues

From safety and health aspect, the safety officer of this site is very strict in monitoring the workers that works for piling on whether they took seriously the rules like wearing Personal Protective Equipment during working. This is because they can exposed to high risk injury during the lifting of the pile if they ignored the priority of using the safety equipment. Workers at the piling machine also can be exposed to the injury during extension of piling because they use welding set, they will injured if not be careful.

3. Duration

There is a delay for this project which was caused by weather condition. As there is delay, the piling works was taking longer than it was planned. When it was raining heavily, the piling work needs to be stop for a moment until the weather condition is suitable to continue working. As it was raining, the gen set that supply power for piling machine cannot be exposed to water too much because it can cause electric shock during the oiling works. Furthermore, rain can be longer than one day so the work are delay too much. For this project, piling were delays for two month according to the due date because of the weather.

4. Weather condition

For this project, piling works to construct quarter were begin in the end of the year so monsoon season occurs during that time. The daily weather condition in this district is usually hot but sometimes during the afternoon to the evening the heavy rain has been occurred. The unpredictable rains make it harder for piling works to carry on because it can cause harm for the machine and also to the workers.

3.4 Solution

Problems that occurs at the site must have own solution and it depends to the problems that have been experienced so that suits to the problems. Solutions that are taken must be properly plan that can be managed, measured and controlled systematically. Consequently, the standard of solution is very important. A great management or discussion on how to solve any of the problems should be done together among the parties that have been in contact to get the best precautions. Besides conferences, planning is also the most important things to do to avoid any unpredictable matter. Therefore, each part of the company can control and improve different aspects of solutions and integrate them into the rest of the company processes.

1. Machineries

Inspection every week or daily before start the work to the machineries can be done by site supervisor or sub-contractor who is in charged for piling work during the weekend time. The inspection should be regularly taken to identify whether the work equipment can be operated and maintained safely so it cannot caused any injury to the other workers. Therefore, it is very important to make sure that any problems that happen to the machineries can be identifying and fixed immediately before it can be operate for the next operations. The results of the inspection been recorded and be kept until the next inspection of the equipment. This record is to ensure that the inspection have been done systematically without missing the data of the equipment checklist inspection. Meanwhile, the company has run an effective ways to decrease the incidents by provide the rules for sub-contractor that they must change crane's rope once a month to make sure the rope strength is nor unaffected.

2. Safety and health issues

To make sure that the workers are following the rules, the safety officer required to have an inspection every Wednesday to check every worker's performance. They were also be given some talk about priorities their safety during working at the site to avoid any injuries. At the same time, those that did not obey the rules about wearing the safety equipment can get a penalty with the worthy amount for them to be able to follow the rules onwards. The safety officer is also very strict in making sure the workers to obey the regulations all the

time, not just for a few days so that the safety at the site can always be maintain without any big injuries happening like provide a notice board in the site. Safety officer also inform to the sub-contractor to make sure all of their worker wearing the Personal Protective Equipment especially who doing the welding job.

3. Duration

In order to avoid delaying and dragging the duration of project, the sub-contractor start the piling works early in the morning to avoid the delay until evening because they know in the evening usually heavily rain will occurs. Furthermore, if they start the works early many pile can be penetrate so the works times to complete the works can be reduce. In addition, they extend their works on Saturday and Sunday to reduce the delay times so the piling works can be complete early. Production planning is the process in which all contractors, subcontractors, and others involved in construction collaborate to create a realistic schedule. This gives proper timeline of the project so that the delay can always be covered and no other further delay.

4. Weather condition

When it is raining heavily, site supervisor will inform the sub-contractor they shutting down the machineries and all the works must stopped at all cost. All the workers must dismiss from their workplace to the designated shelter area. This is to avoid the electric shock during the piling works. After the rain is done, the work for the construction are being resume with precaution taken for the workplace condition whether safe or not after the rain.

CHAPTER 4.0

CONCLUSION

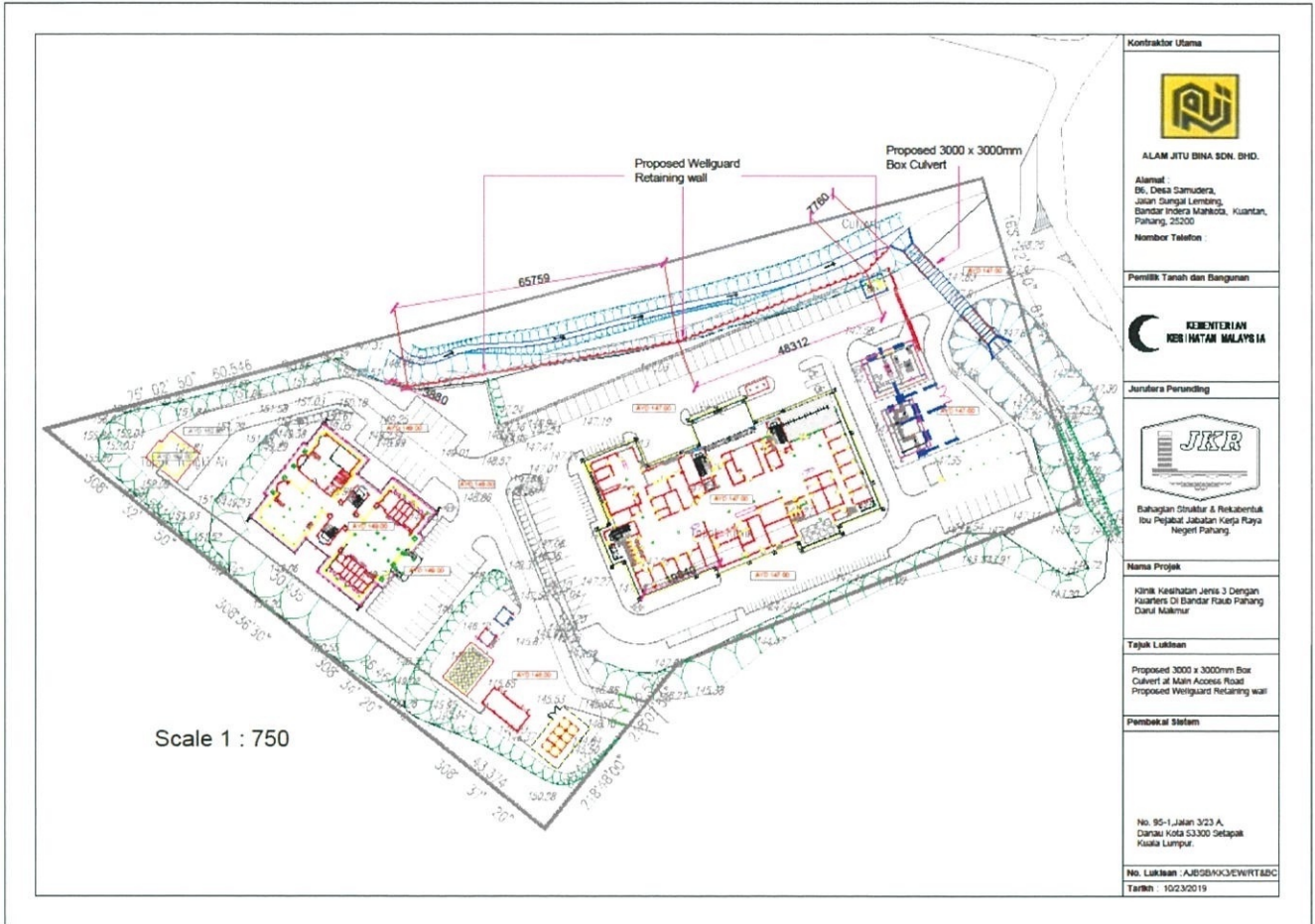
4.1 Conclusion

The project of the piling works showed the progress including methods, problems, solutions and type of machineries used. This project started with a land survey and ended with inspection and hand-over of completed site to client. The process of this jack in piles has been investigate throughout the site visit and interview with site engineer and successfully discovered all the flow of project from the started and finished. The procedures of jack in pile are follow all the procedures in method statement and continuously carrying on well. Furthermore, in this construction the most occurred problem and most difficult to solve are related to the machineries. This is also affect the duration of the project to be completed according the due date as it has delayed and need to be extended of working time. In addition, weather condition also one of the big problems that can affect the duration of the project and it is unpredictable.

LIST OF REFERENCE

1. Braja M. Das. 2004. Principles of Foundation Engineering. United State of America. Thomson Brooks/Cole
2. Duraisamy Y. 2009. Introduction to Pile Foundation. Universiti Malaysia Pahang. Pebina. Com. Sdn. Bhd
3. Thomlinson M. and Woodward J. 2015. "Pile Design and Construction Practice". United State: CRC Press – A Spon Press Book.
4. <http://www.g-pile.com.my/seag.html>
5. http://www.gnpgeo.com.my/download/publication/2009_06.pdf
6. <https://www.thebalancesmb.com/bored-pile-advantages-also-referred-as-drilled-shafts-844753>

APPENDIX 1



Kontraktor Utama



ALAM JITU BINA SDN. BHD.
 Alamat:
 Bt. Desa Camudera,
 Jalan Dangul Lembing,
 Bandar Indera Mahkota, Kuantan,
 Pahang, 25000
 Nombor Telefon

Pemilik Tanah dan Bangunan



Jumlah Perancang



Bahagian Struktur & Rekabentuk
 Iru Pejabat Jabatan Kerja Raya
 Negeri Pahang

Nama Projek

Korak Kesihatan Jenis 3 Dengan
 Kuarters Di Bandar Kuala Pahang
 Darul Makmur

Tajuk Lukisan

Proposed 3000 x 3000mm Box
 Culvert at Main Access Road
 Proposed Wellguard Retaining wall

Pembekal Sistem

No. 95-1, Jalan 3/23 A,
 Danau Kota 53300 Seberang
 Kuala Lumpur

No. Lukisan : A/B5BKKJEWRT&C

Tarikh : 10/2/2019

Scale 1 : 750

APPENDIX II



APPENDIX III



A) SPINE

MUHAMMAD SYAHMI AZRI BIN MOHD SALIM
THE CONSTRUCTION OF DRAINAGE SYSTEM
DECEMBER 2019

B) FRONT COVER



**DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)**

**THE CONSTRUCTION OF
DRAINAGE SYSTEM IN NON-
RESIDENTIAL BUILDING**

**Prepared by:
MUHAMMAD SYAHMI AZRI BIN
MOHD SALIM**

2017206476