UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SEPTEMBER 2015

It is recommended that the report of this practical training provided

By

Muhamad Hilmi Azri bin Ismail

2013259932

entitled

The Steel Reinforcement Concrete Piling Works for 2 ½ Storey Bungalow at Simpang Kuala, Alor Setar Kedah

accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Perunding Shahda for duration of 5 months starting from 25 May and ended 9 October 2015. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a partial fulfillment of the requirements for obtaining Diploma in Building.

Name : Muhamad Hilmi Azri bin Ismail

UiTM ID No : 2013259932

Date : 7 October 2015

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 throughtout the period of training by the following group of amazing individuals. First and foremost, I would like to thank Ir. Mohamad Azan bin Othman for the opportunity given, to conduct my training in his esteem company. His team of professional comprising of Encik Mohd Jalani Abd Rahim, Encik Mohd Nasir Abdul Rahman, Encik Hafizudin bin Sabri, and Encik Mohd Akmal Mohd Jamil that have enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structure, building and civil works. They are also responsible towards streamlining and assessing my training. Also to the site personnel in an agencies involved who have extended their cooperation and help to further enhance my ability in understanding the procedures on installation of pile foundation. It is an honour for me to be given the opportunity to 'work' with all of you.

I would like to thank ALL the UiTM lecturers that have taught and nurtured me in becoming a better student and person. I would like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To Dr. Hayroman bin Ahmad, Supervising Lecturer, Encik Hamdan bin Othman, Visiting Lecturer, Puan Noor Rizallinda bt Ishak and Dr. Mohd Rofdzi bin Abdullah, Programme Chair, I value the 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 over the years.

Thank you so much.

ABSTRACT

It is not secret that the world has become more complex place today than years ago, therefore this report will discuss about the piling procedure as a primary stage in getting a structure works. This report was conducted for the building which is a 2 ½ bungalow storey at Simpang Kuala, Alor Setar, Kedah. The objective of this report is to study the systematic steps and the important elements that must be focused during the piling works. It includes the elements such as type of the suitable pile be used for the building, the procedure of installation and also the test that must be carry out to ensure the maximum loads that can be supported by the piles. To illustrate it more technically, the process will be discuss from one stage to the another stage starting from the first step taken until the completion of the works.

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CHAPTER 1.0

PREFACE

1.1 Introduction

When the soil bearing capacity is not sufficient to withstand the loads from the structures, then basically we need pile foundation as it base. Pile foundation can be used when it involves a several types of soil condition, type of loads that need to be transferred, site condition and also operational condition at a site. According to R.Chudley (1976), a pile can be loosely defined as a column inserted in the ground to transmit the structural loads to a lower level of subsoil.

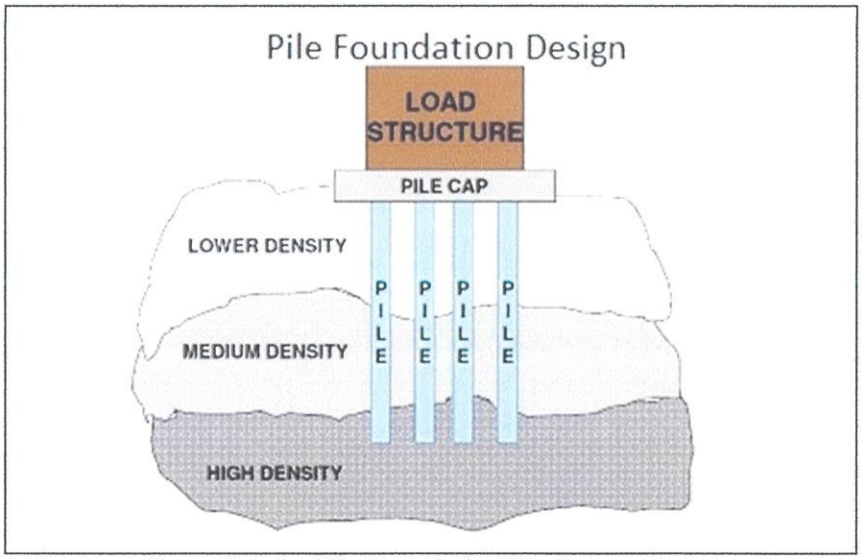


Figure 1.1.1 : Pile Foundation Design

Source : http://www.aboutcivil.org (2014)

Besides, there are several factors about why we cannot use surface foundation as a base for the certain structure. One of the factors is the nature soils and intensity of loads. The nature soil at site should be considered in choosing a suitable foundation to ensure its bearing capacity have strong enough to support the structure. Usually, when the soil have low bearing capacity, we will use pile foundation. The used of pile foundation can be seen in the construction of building in water such as bridges and dams.

Table 1.1.1 : Permissible soil bearing pressure (kN/m2)

Medium dense sand and gravel mix	250
Loose sand and gravel mix	150
Compact sand	300
Medium sand	150
Stiff clay	200
Firm clay	100
Soft clay	< 75

Source : Derek Seward (2009)

Furthermore, pile foundation consist of two basic component which is pile cap and single or group of piles. Single or group piles will be selected based on the type of structure and soil capacity. Either it single pile or group of pile, it need to be choose carefully because it will affect the ability of the structure to withstand the above loads. There are various length of pile and its can be more than 15m per pile. The formwork will form a pile bracket after driven works. According to E. M. Baker (1985), formwork is a temporary structure built to contain fresh concrete so as to form it to be required shape and dimensions and to support it until it hardens sufficiently to become self-supporting.

Nowadays, this world have been updated with the changes and revolution in construction technology, so there are a lots of renovation in construction technology. For example, in piling works, there are various type of piling driver that we can see today.

1.2 Objective

The purpose of this report is to:

i) To identify an adequate information for the penetration of pile foundation

ii) To investigate the method used in R.C. piling works

iii) To obtain the problems and solving during piling works.

1.2.1 Sub-topic

This report will discuss about the procedure in piling works. It will represent an information about the pile foundation for every stage. To illustrate it more technically, some parts like the test that should be conducted to ensure the strength and ability of the pile will be discussed too. As an extra, the problems in piling works also will be listed followed by their own solutions for every problems. The piling procedure will discussed technically with the illustration provided in case study.

1.3 SCOPE OF STUDY

In this report, the study will be focused to the installation of pile foundation. It includes the installation of the pile and the bracket on the ground. The installation process and method of installation are equally important factors as of the design process of pile foundations. According to Derek Seward (2009), a foundation must satisfy two design criteria, firstly, it must not cause the underlying soil to fail in shear and secondly, it must not be subject to excessive settlement.

During design stage, installation methods and installation equipment should be carefully selected in order to avoid damages to the piles. Several important factors should be taken based on the method chosen to avoid damages.

Basically, there are three types of pile foundations according to their construction methods which is driven piles, cast in situ piles and driven and cast in situ piles. This report will discuss on the type of the pile that be used for this structure (bungalow). According to Mark Huth (1980), certain characteristics are necessary if basement is to be a living space. Therefore, during design stage, a foundation should be proper in design because it will be an area for future expansion.

The pile must be test to assess a pile's bearing capacity in carry out the load from the above level of the structure. There are specific test that should be applied after the piling works done. This test basically will provide the contractor an information either the piles have an appropriate capacity to support the loads.

The problems occurred during the piling works and the solution taken to overcome the problems also will be discuss to show you on what the right steps need to be taken in every situation.

1.4 METHOD OF STUDY

In this study, I have used a several method in the process of collecting information about the topic issued. It was begin with the research on the internet, looking for further information in the piling works books or journal, prepare an interview session with an experts and make an observation by myself for this work when it on the operation at site.

Firstly, on the internet, I have gathered a basic information on how actually the piling works and why the piling been used for several construction site. I have obtain an information about the basic knowledge through my reading on the article provided by an expertise on the internet.

Secondly, I have gathered and collecting the information through the books that consist of detail informations about the piling work. By this method, I was make my way back to the Unversiti Teknologi Mara Perak (Kampus Sri Iskandar) to obtain and collect some useful informations from the books that related to the topic that have been discussed.

I have also prepare an interview session with the site engineer, Encik Md. Jalani Bin Abd. Rahim which involved in this project. He is one of the project engineer at my practical's company. He has shared a useful information and extra knowledge about piling works. En Md. Jalani have an experience about 20 years in engineering works.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Perunding Shahda name was inspired by Ir.Hj Mohd Azan taken from his wife's name. His wife's name is Nur Shahda binti Sulaiman. To appreciate the sacrifice of his wife, he tooks the name of Shahda as the company's name.

2.1.1 Company's History

Incorporated in Alor Star (1999) by Ir. Mohamad Azan Bin Othman. The Principal areas of activity of the firm are Civil and Structural disciplines.

The proprietor is directly involved in all the projects. He controls and coordinates the design teams and in particular liases closely with government departments in achieving the most satisfactory solution to any problems.

The firms undertakes the engagement of specialist services when the scope of the project requires the inclusion of the specialist services that are beyond the normal professional experience of the proprietor and senior staff.

Equity 100% - Bumiputra

2.2 Company Profile

VISION

TO PROVIDE TOTAL AND QUALITY ENGINEERING CONSULTANCY

MISSION

TO PROVIDE SERVICES IN THE AREA OF CIVIL AND STRUCTURE ENGINEERING

NAME	: PERUNDING SHAHDA
ALAMAT	: NO 141, TINGKAT 2
	KOMPLEKS ALOR SETAR
	LEBUHRAYA DARULAMAN
	05100 ALOR SETAR
	KEDAH DARUL AMAN
TELEPHONE NUMBER	:
FAX NO	: 04 – 731 8540
COMPANY NUMBER	: AS 206363 – T
REGISTRATION NUMBER	: 465-02000023

2.3 Organization Chart

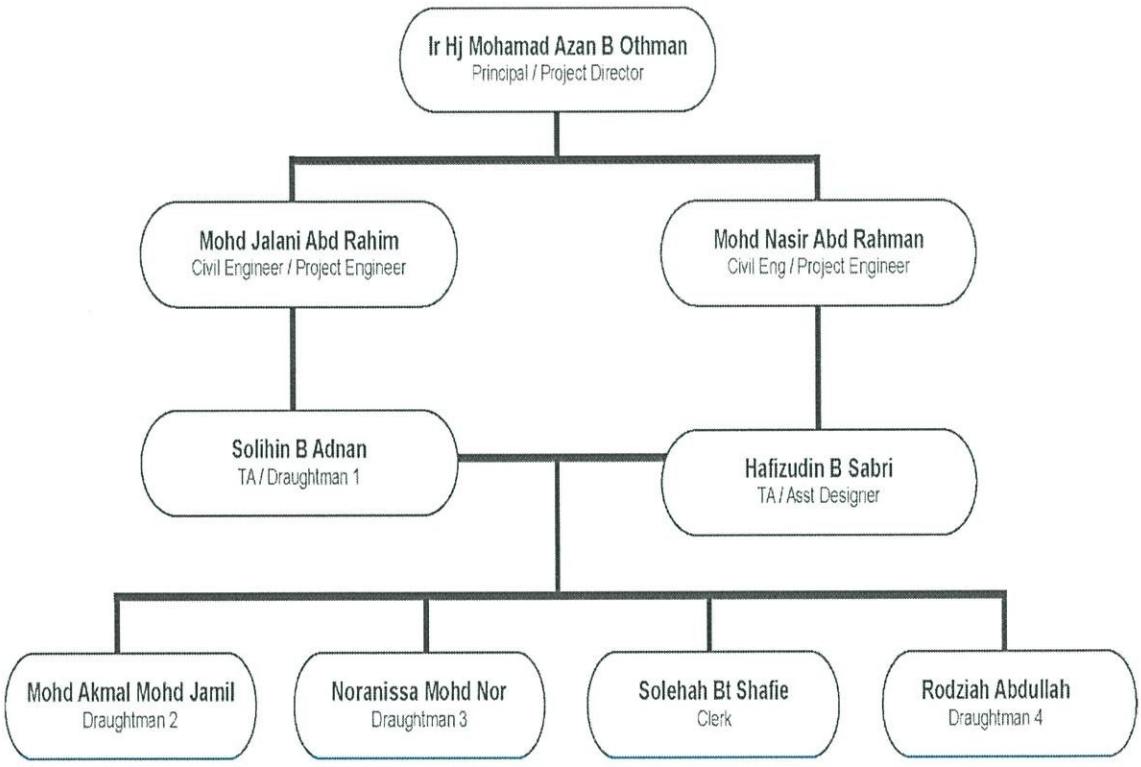


Figure 2.3.1: Company organization chart

2.4 List of Project

2.4.1 Completed Project

2004

1. PROPOSED DEVELOPMENT AT LOT 1081 / 1082 KG. SG. MERAB, MUKIM DENGKIL, SEPANG, SELANGOR UNTUK TETUAN BHOPOR MALAYSIA SDN BHD.
   PROJECT COST = RM 1.0 M

2. PROPOSED DEVELOPMENT AT LOT PT, LOT 30611, HULU LANGAT, KAJANG, SELANGOR UNTUK EN AHMAD NIZAM.
   PROJECT COST = RM 1.0 M

3. CADANGAN MEMBINA SEBUAH STESEN MINYAK DI PEKAN JITRA, KEDAH DARUL AMAN UNTUK ENCIK AHMAD MARIKAN BIN IFTIKAR AHMADKHAN.
   PROJECT COST = RM 1.5 M

4. CADANGAN MEMBINA SEBUAH STESEN MINYAK DI LOT 2542, JALAN KUALA KETIL, MUKIM TAWAR, DAERAH BALING KEDAH UNTUK SHELL TRADING (M) SDN BHD.
   PROJECT COST = RM 1.5 M

5. CADANGAN BANGUNAN TAMBAHAN PEJABAT MAJLIS DAERAH PADANG TERAP UNTUK MAJLIS DAERAH PADANG TERAP, KEDAH DARUL AMAN.
   PROJECT COST = RM 0.5 M

6. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH CHALET DUA TINGKAT DI ATAS LOT TELOK NIPAH, PULAU PANGKOR PERAK DARUL RIDZUAN.

PROJECT COST = RM 0.5 M

7. CADANGAN MEMBINA SATU UNIT KILANG SATU TINGKAT DI ATAS PLOT 477, KAWASAN PERUSAHAAN CENDANA, MUKIM SUNGAI PASIR, DAERAH KUALA MUDA, KEDAH DARUL AMAN UNTUK TETUAN CHEE EWE CHYE.

PROJECT COST = RM 1.5 M

8. CADANGAN MEMBINA SEBUAH DEWAN SERBAGUNA KULIM UNTUK MAJLIS PERBANDARAN KULIM, KEDAH DARUL AMAN.

PROJECT COST = RM 5.0 M

9. MEMBINA SEBUAH GALERI SENI 'TAPAK' DI SEKSYEN 8, SHAH ALAM ,SELANGOR DARUL EHSAN UNTUK ARTIS YUSOF GHANI.

PROJECT COST = RM 1.2 M

2005

1. CADANGAN PENGUBAHSUAIAN SEBUAH PASAR AWAM SEDIA ADA DI TAMAN DELIMA, DAERAH KUALA MUDA UNTUK MAJLIS PERBANDARAN SUNGAI PETANI, KEDAH DARUL AMAN.

PROJECT COST = RM 0.5 M

2. CADANGAN MEMBINA SEBUAH PASAR AWAM DI PEKAN SUNGAI LALANG, MUKIM SUNGAI PETANI, KEDAH DARUL AMAN UNTUK MAJLIS PERBANDARAN SUNGAI PETANI, KEDAH DARUL AMAN

PROJECT COST = RM 0.75 M

3. CADANGAN MEMBINA KEMUDAHAN AWAM TAPAK PELUPUSAN SAMPAH DI MUKIM TAWAR, DAERAH BALING, KEDAH DARUL AMAN UNTUK MAJLIS DAERAH BALING.

PROJECT COST = RM 0.5 M

4. CADANGAN MEMBINA KEMUDAHAN AWAM TAPAK PELUPUSAN SAMPAH DIMUKIM SEMELING, DAERAH BEDONG, KEDAH DARULAMAN UNTUK MAJLIS PERBANDARAN SUNGAI PETANI, KEDAH DARUL AMAN.
PROJECT COST = RM 0.5 M

5. CADANGAN MEMBINA DUA UNIT KILANG SATU TINGKAT DIATAS LOT 477, KAWASAN PERUSAHAAN CENDANA, MUKIM PASIR, DAERAH KUALA MUDA , KEDAH DARUL AMAN.

PROJECT COST = RM 3.0 M

6. CADANGAN MEMBINA SATU UNIT KEDAI DAN PEJABAT DIATAS LOT 2158 JALAN PASAR, BANDAR SUNGAI PETANI, MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN UNTUK TETUAN SYED AHAMD BASHIR.

PROJECT COST = RM 1.5 M

7. CADANGAN MEMBINA SEBUAH BENGKEL TERBUKA DI ATAS LOT 25932, KAWASAN PERINDUSTRIAN MIEL, SUNGAI LALANG, MUKIM SUNGAI PETANI, DAERAH KUALA MUDA , KEDAH DARUL AMAN UNTUK TETUAN HO KENG WAI.

PROJECT COST = RM 0.5 M

8. CADANGAN MENDIRIKAN 9 UNIT RUMAH KEDAI 2 TINGKAT DI MUKIM BELIMBING KIRI, DAERAH PADANG TERAP, KEDAH DARUL AMAN UNTUK TETUAN THEK KOK

PROJECT COST = RM 1.0 M

9. CADANGAN MEROBOH DAN MEMBINA SEMULA RUMAH KEDAI DI PEKAN KUALA NERANG, DAERAH PADANG TERAP, KEDAH DARUL AMAN. UNTUK MAJLIS DAERAH PADANG TERAP.

   PROJECT COST = RM 0.5 M

10. CADANGAN MEMBINA 43 UNIT RUMAH BERKEMBAR SATU TINGKAT DAN 20 UNIT RUMAH SESEBUAH 2 TINGKAT DI ATAS LOT 4261, ALOR MENGKUDU, DAERAH KOTA SETAR UNTUK TETUAN AVERICE ACRE SDN BHD.

    PROJECT COST = RM 3.0 M

11. CADANGAN MEMBINA SEBUAH BANGUNAN UNTUK MENYIMPAN KEPINGAN KAYU DIATAS LOT 4055, MUKIM SUNGAI, KEDAH DARUL AMAN UNTUK TETUAN RF INDUSTRI SDN BHD.

    PROJECT COST = RM 1.0 M

2006

1. CADANGAN MEMBINA 4 UNIT RUMAH BANGLO SETINGKAT DIATAS LOT 1536-1539 , BANDAR DARUL AMAN DAERAH KUBANG PASU, KEDAH DARUL AMAN UNTUK TETUAN LEE HONG DEV. SDN. BHD.

   PROJECT COST = RM 1.0 M

2. CADANGAN UBAHSUAI BANGUNAN SEDIA ADA UNTUK TETUAN KOPERASI KAUM IBU KUBANG PASU, LUBUK BATU , DAERAH KUBANG PASU, KEDAH DARUL AMAN.

   PROJECT COST = RM 0.5 M

3. CADANGAN MEMBINA SEBUAH PASAR AWAM DI BANDAR LAGUNA MERBUK, MUKIM SUNGAI LALANG, DAERAH KUALA MUDA, KEDAH DARUL AMAN UNTUK MAJLIS PERBANDARAN SUNGAI PETANI

   PROJECT COST = RM 0.75 M

4. CADANGAN MEMBINA SEBUAH RESTORAN TERAPONG DI SUNGAI MERBOK, DAERAH SEMELING, KEDAH DARUL AMAN UNTUK MAJLIS PERBANDARAN SUNGAI PETANI, KEDAH DARUL AMAN

   PROJECT COST = RM 2.0 M

5. CADANGAN MEREKABENTUK SEBUAH MASJID JENIS 'P' DIKAMPUNG BUDI, DAERAH PENDANG UNTUK JABATAN KERJA RAYA NEGERI KEDAH DARUL AMAN.

   PROJECT COST = RM 5.0 M

6. CADANGAN MEREKABENTUK SEBUAH MASJID DI KAMPUNG BANAI, DAERAH KUBANG PASU UNTUK KHARIAH MASJID KG BANAI, KEDAH DARUL AMAN.

   PROJECT COST = RM 1.5 M

7. PEMBINAAN KOMPLEKS MINI KHEDN LANGKAWI, KEDAH DARULAMAN..

   PROJECT COST = RM 57 JUTA

2007

1. CADANGAN PEMBESARAN MASJID AL-HANA LANGKAWI, KEDAH DARUL AMAN.

   PROJECT COST = RM 2.5 M

2. CADANGAN MEROBOH DAN MEMBINA PASAR AWAM DI KILANG LAMA, KULIM , KEDAH DARUL AMAN .

   PROJECT COST = RM 2.0 M

3. CADANGAN MEMBINA JETI NELAYAN DI KUALA SUNGAI MELAKA, MUKIM PADANG MAT SIRAT, DAERAH LANGKAWI, KEDAH DARUL AMAN.

   PROJECT COST = RM 2.5 M

4. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH MASJID SERTA KERJA-KERJA BERKAITAN DI PPSK FELCRA BERHAD, BUKIT TAMPOI, KEDAH DARUL AMAN.

   PROJECT COST = RM 3.0 M

5. CADANGAN MENDIRIKAN 9-UNIT KEDAI/PEJABAT 2-TINGKAT DIATAS HSM 314 PT 643, KE HSM 322 PT 651, MUKIM BELIMBING KIRI, DAERAH PADANG TERAP, KEDAH DARULAMAN.

   PROJECT COST = RM 1.5 M

6. CADANGAN MEMBINA TANDAS AWAM DAN MENARA JAM DI LANGKAWI

   PROJECT COST = RM 3.0 M

7. CADANGAN PEMBANGUNAN TAMAN AWAM TASIK SERDANG UNTUK MAJLIS DAERAH BANDAR BAHARU KEDAH DARULAMAN.

   PROJECT COST = RM 3.0 M

2008

1. CADANGAN MEMBINA SEBUAH BANGUNAN HOSTEL 2 TINGKAT DI ATAS SEBAHAGIAN LOT 9182, JALAN HI-TECH 2/4, ZON PERINDUSTRIAN FASA 1, KULIM HI-TECH PARK, MUKIM PADANG CINA, DAERAH KULIM KEDAH
   PROJECT COST = RM 5.0M

2009

1. CADANGAN MEMBINA JETI NELAYAN DI KUALA SUNGAI MELAKA, MUKIM PADANG MAT SIRAT, DAERAH LANGKAWI, KEDAH DARUL AMAN.
   PROJECT COST = RM 2.5 M
2. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH MASJID SERTA KERJA-KERJA BERKAITAN DI PPSK FELCRA BERHAD, BUKIT TAMPOI, KEDAH DARUL AMAN.
   PROJECT COST = RM 3.0 M
3. REVIEW AND DETAILED DESIGN OF REHABILITATION, UPGRADING AND MODERNISATION OF IRRIGATION SCHEMES IN BAN MERBOK, KUALA MUDA, KEDAH DARULAMAN.
   PROJECT COST = RM 50M
4. CADANGAN PEMBINAAN BANGUNAN PEJABAT PERTUBUHAN PELADANG KAWASAN (PPK) MENGGUNAKAN PERUNTUKAN SUMBER DALAMAN LEMBAGA PERTUBUHAN PELADANMG (LPP)
   PROJECT COST = RM 1.5 M

2011

1. KAJIAN DAN REKABENTUK TERPERINCI KERJA MENAIKTARAF PARIT N-12(JALAN PERAK), DAERAH TIMUR LAUT, PULAU PINANG

   PROJECT COST = RM 0.5 M

2012

1. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH BANGUNAN BAZAAR 2 TINGKAT, DI ATAS SEBAHAGIAN LOT TANAH MILIK MAJLIS DAERAH KUBANG PASU, BUKIT KAYU HITAM, MUKIM SUNGAI LAKA, KUBANG PASU KEDAH DARUL AMAN.

   PROJECT COST = RM 6.0 M

2. PERMOHONAN KEBENARAN MERANCANG KEPADA CADANGAN SEBUAH HOTEL BAJET 4 TINGKAT (51 BILIK) DI ATAS LOT 2436, (GM 1451), MUKIM PADANG MATSIRAT, DAERAH LANGKAWI, KEDAH DARUL AMAN.

   PROJECT COST = RM 5.0 M

3. CADANGAN MEMBINA SATU UNIT STESEN MINYAK DI ATAS LOT 2254, MUKIM PERING, DAERAH KUBANG PASU, KEDAH DARUL AMAN.

   PROJECT COST = RM 2.5M

4. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH MASJID DUA (2) TINGKAT DI ATAS LOT PT 3522, AMPANG JAJAR, BANDAR DARUL AMAN, DAERAH KOTA SETAR, KEDAH DARUL AMAN.

   PROJECT COST = RM 4.8 M

2013

1) CADANGAN MEMBINA SEBUAH STESEN MINYAK 1 TINGKAT , DI MUKIM KURONG ANAI PERLIS.
   PROJECT COST = RM 2.0 M

2) CADANGAN MEMBINA 4 UNIT BANGUNAN ` 2 TINGKAT
   DI ATAS 4492, 4493, 4494, MUKIM BAGAN SAMAK, BANDAR BAHARU,
   KEDAH DARUL AMAN
   PROJECT COST = RM 2.0 M

2014

1. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH MASJID DUA TINGKAT DI ATAS LOT PT 3522, AMPANG JAJAR, BANDAR ALOR SETAR, DAERAH KOTA SETAR, KEDAH DARUL AMAN.
   PROJECT COST = RM 6.0 M

2. DETAILED DESIGN OF TERTIARY IRRIGATION FACILITIES FOR IRRIGATION BLOCK IN MADA, KEDAH/PERLIS.
   PROJECT COST = RM 34.0 M

'TAPAK' Art Gallery, Shah Alam

Client:- Yusof Ghani

Cost:- RM 1.2 M

SHELL Service Station, Jitra

Client:- SHELL(M) Trd S/B

Cost:- RM 1.3 M

BP Service Station, Jitra

Client:- BP(M) Trd Sdn Bhd

Cost:- RM 1.3 M

EAE Godown, Bkt Kayu Hitam

Client:- EAE Transport S/B

Cost:- RM 3.0 M

Masjid Kg Banai, Kubang Pasu

Client:- Khariah Kg Banai

Cost:- RM 1.5 M

Masjid Kg Budi, Pendang

Client:- JKR Negeri Kedah

Cost:- RM 4.0 M

Dewan Serbaguna, MP Kulim

Client:- Majlis Pbdn Kulim

Cost:- RM 5.0 M

Single Story Factory, Cendana

Client:- Messr Chee Ewe Chye

Cost:- RM 3.0 M

Renovation of Existing Shoplot, Jitra

Client:- Koperasi Kaum Ibu Kubang Pasu

Cost:- RM 0.5 M

Housing Development, Kota Star

Client:- Messr. Averice Acre

Cost:- RM 4.0 M

Housing Development, Kota Star

Client:- Messr. Averice Acre

Cost:- RM 4.0 M

Housing Development, Jitra

Client:- Messr. Lee Hong Development S/B

Cost:- RM 1.5 M

Year:- 2003

2.4.2 Project in Progress

2015

1. PROJEK MENAIKTARAF TAMAN ULAR/GAZEBO SG BATU PAHAT, PERLIS

   PROJECT COST = RM 5.0 M

2. CADANGAN MEMBINA DAN MENYIAPKAN 1 BLOK ASRAMA 2 TINGKAT DAN DEWAN MAKAN TERBUKA 1 TINGKAT DI ATAS SEBAHAGIAN LOT PT 1732, SEKOLAH MENENGAH AGAMA AL NAHDZAH, MUKIM SALA BESAR, DAERAH YAN, KEDAH
   PROJECT COST = RM 4.0 M
3. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH HOTEL BAJET 4 TINGKAT (51 BILIK) DI ATAS LOT 2436 (GM 1451) , MUKIM PADANG MATSIRAT, DAERAH LANGKAWI, KEDAH DARUL AMAN.
   PROJECT COST = RM 5.0 M
4. CADANGAN MEMBINA DAN MENYIAPKAN SEBUAH HOTEL 5 TINGKAT
   (70 BILIK) DI ATAS SEBAHAGIAN LOT 2947, PENGKALAN ASAM, MUKIM WANG BINTONG, PERLIS.

   PROJECT COST = RM 8.0 M

5. PEMBINAAN MASJID AL-HUDA YANG BARU BAGI KARIAH PADANG MATSIRAT, LANGKAWI, KEDAH DARUL AMAN.

   PROJECT COST = RM 5.0 M

CHAPTER 3.0

THE STEEL REINFORCEMENT CONCRETE PILING WORKS FOR 2 ½ STOREY BUNGALOW AT SIMPANG KUALA, ALOR SETAR KEDAH

3.1 Introduction of Project

This bungalow is constructed on the location around 105 x 80 feets area. It was constructed for Pn. Sharifah Noor Aziah binti Syed Zainol Abidin by a company MZF Resources as a contractor who totally responsible for this project. This project was begin on 20 April 2015 and are expected to be full completed on 19 April 2016. The workers were working 6 days within one weeks in other to ensure this project will be completed on time. Totally workers that involved in this project is 15 people supervised by Encik Zakir bin Sofian as a contractor.

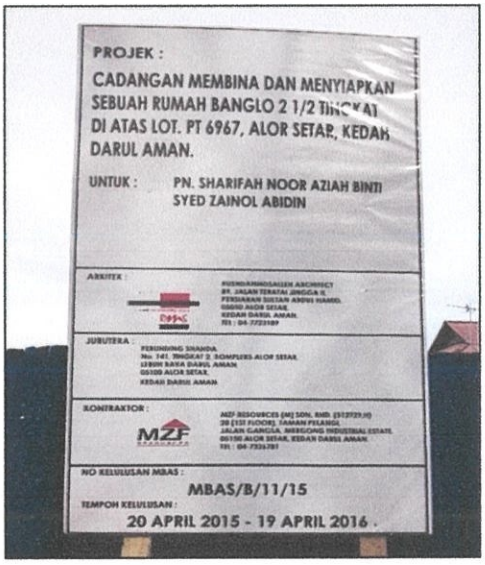


Photo 3.1.1 : Project Signboard

This bungalow consist of two and half storey to be construct. Based on the architectural and structural drawing, a front and rear section is two storey and the middle area is two and half storey. Due to soil condition, this project need to use a pile foundation as its base in other to ensure the ability to support the loads from above. By referring to the plan prepared by the architect and consultants that involved in this project, this bungalow have 12 rooms, wet kitchen and dry kitchen, 10 bathrooms and a pool. All of this makes the value of this project is about 1.5M.

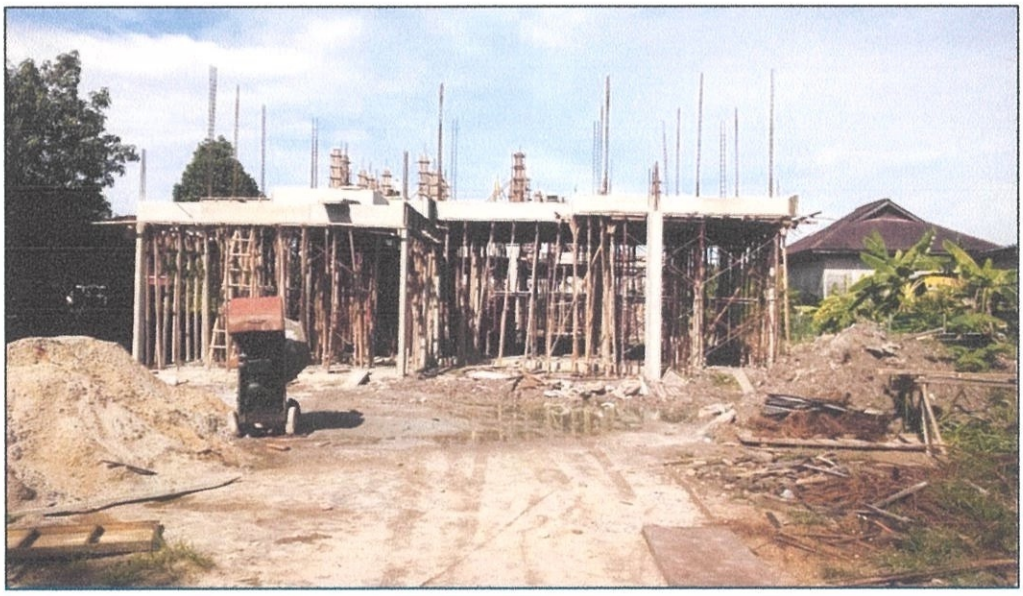


Photo 3.1.2 : Front view of the project at 25% progress

3.2 Case Study

3.2.1 Type of pile used

For this project, steel reinforcement concrete piles have been used by the contractor. Precast concrete piles have been selected because it is the most suitable pile based on the construction of this bungalow. Basically, precast concrete piles usually can be used in various type of constructions of foundations in a wide range and different structures in the civil engineering and building sectors. This precast pile also provide an effective piling cost solution.

Photo 3.2.1 : Reinforcement Concrete Pile

Table 3.2.1 (a) : Suitability of foundations for buildings based on soil type

NO	SOIL TYPE	FOUNDATION TYPE
1	Sands and gravel or sands and gravels with small proportions of clays, dense silty sands.	Shallow, strip or spread footings
2	Soft clays, soft silty clays	Strip footings up to 1m wide or rafts
3	Peat, fill	Bore piles or driven piles
4	Deep deposit of loose sand	Rafts, cast in situ piles. Driven piles could be used and would densify sand

Source : http://anr.ext.wvu.edu (2013)

In other to define it, precast concrete piles also known as a reinforced concrete pile which is moulded in various shape such as circular, square, rectangular or octagonal form. It will be cast and cured in a casting yard before transported to the site for driving works. Precast concrete is an effective because they are quick to install without producing spoil or arising material in the process, and also providing a further saving on waste disposal costs. According to Braja M. Das (2004), concrete piles may be divided into two basic categories: (a) precast piles and (b) cast insitu piles.

Table 3.2.1 (b) : Driven Pile Types Comparison

Driven Pile Types Comparison
(for sizes up to approximately 20 inches)

Installation Characteristics		H-Piles	Pre-Stressed Concrete	Tapered Steel Piles	Pipe Piles: Closed-End	Pipe Piles: Open-End[5]
Stratigraphy						
End-Bearing Pile[1]		X	X	---	X	X
Friction Pile[1]	Cohesive Soils[2]	O	X	---	X	O[7]
	Cohesionless Soils[3]	---	X	X[6]	X	O[7]
High Soil/Pile Set-Up[4] Soils		O	X	O	X	O[7]
Physical						
High Capacity		X	O	X	X	O
Low-Displacement Pile		X	---	---	---	O[8]
Full-Displacement Pile		---	X	X	X	O[9]

X - Good Application O - Marginal Application --- - Not Applicable

Source : www.atlastube.com (2014)

Using an ordinary reinforcement bar and designed to resist bending stress during picking up and transport to the site, this type of pile can support the bending moments from lateral loads and provide sufficient resistance to vertical loads and any tension that may be developed during driving. For this bungalow, the contractor used a 6m concrete precast piles with 150mm diameter. Basically for precast piles, the maximum length of pile that can be used may be between 10m to 12m with the loads for usual conditions around 900 kN.

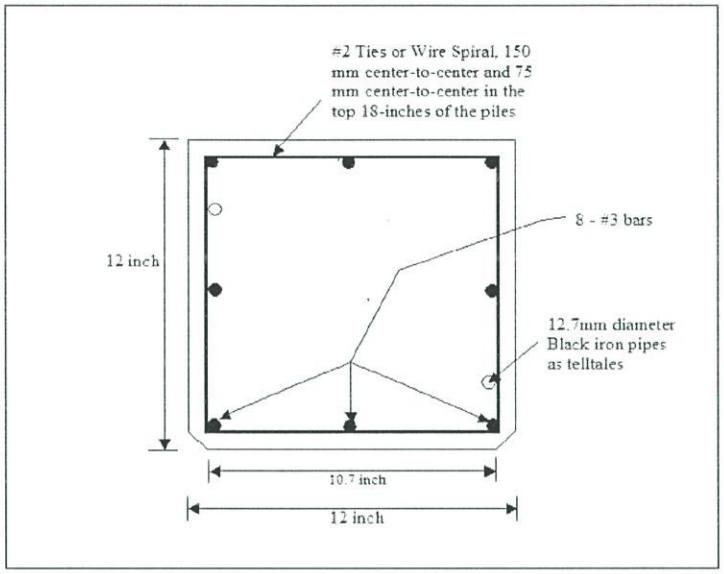


Figure 3.2.1 : Reinforcement Details for Precast Concrete Pile

Source : http://www.ejge.com (2005)

Basically, the function of reinforcement in this precast concrete pile are to resist the stresses produced on account of its handling, driving and the loading of structure which the pile is finally expected to receive. Longitudinal reinforcement usually consists of one bar 20mm to 50mm in diameter at each angle of the pile. The vertical roads are tied horizontally by bars 6mm to 10mm in diameter.

3.2.2 The Method of Installation

For this project, the piles have been driven into the soil using the method of dropping weight. In this method, there are several factors that should be taken into consideration for piling work such as the size and the weight of the pile, the driving resistance which has to be overcome to achieve the design penetration, the available space and head room on the site, the availability of the cranes and the noise restrictions which may be in force in the locality.

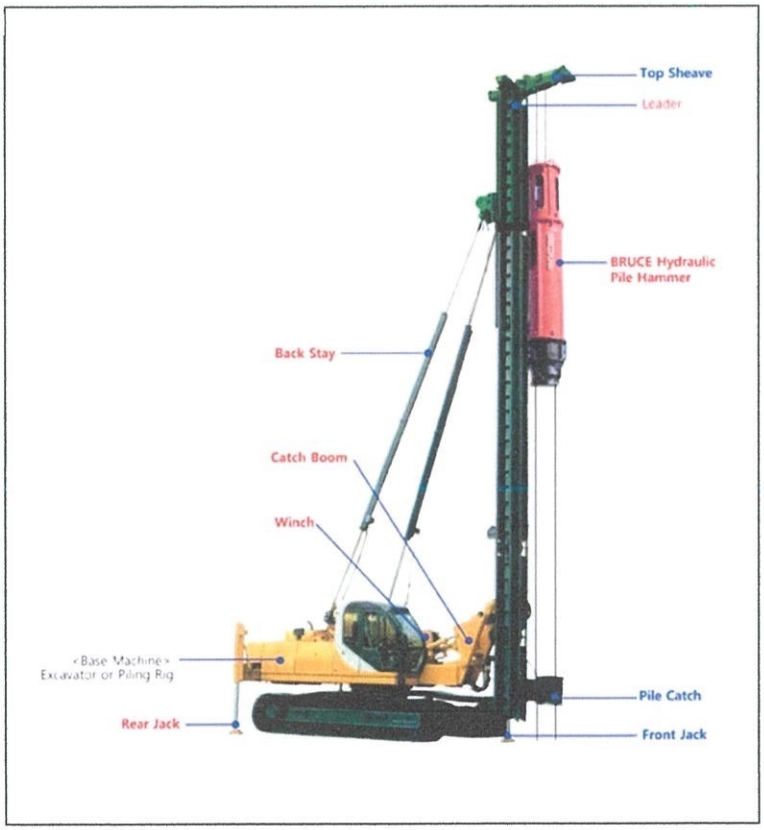


Figure 3.2.2 : Hydraulic Pile Hammer

Source : http://www.powerquip.com (2015)

In this method, a hammer with approximately the weight of the pile is raised at a suitable height in a guide and released to strike the pile head. This method was a simple form of hammer used, because it may be uneconomical for the contractor to bring a steamboiler or compressor on to a site to drive a limited number of piles.

Basically, there are two main type of drop hammers. Firstly, is single acting steam or compressed air hammers and the second is double acting pile hammers. In this project, the contractor have used a single acting steam hammers to drive the piles. This type of dropping hammer provide a massive weight in the form of a cylinder. In detail, steam or compressed air admitted to the cylinder raises it up the fixed piston rod. Hence, at the top of the stroke, or at a lesser height which can be controlled by the operator, the steam is cut off and the cylinder falls freely to the pile head. The stroke will be repeated until the pile drive into the soil.

Photo 3.2.2 (a) : Pile driven process at site

Photo 3.2.2(b) : Pile welding process

3.2.3 Load Test

In piling procedure, after the pile have been driven into the soil, there are some test that should be conducted to ensure the strength and stability of the pile to resist the above loads from the structure. This test is known as Dynamic Load test or also can be called Pile Dynamic Analysis. This test is conducted by applying a dynamic load on a pile head while acceleration and strain will be record. Basically, this test was conducted in relation with soil bearing capacity. Bearing capacity can be justify as a capacity of the soil that able to resist the loads that applied on the ground. It relate well with a connection between the soil and foundation in other to prevent shear failure during load transfer.

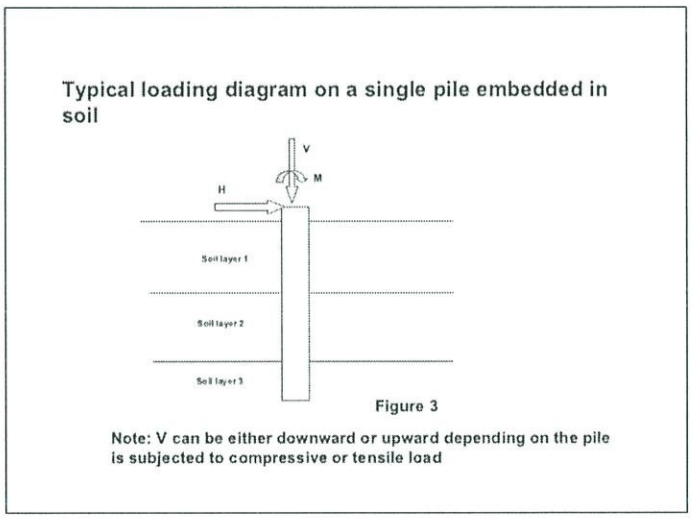


Figure 3.2.3 (a) : Typical Loading Diagram

Source: www.buildersengineer.info (2014)

Moreover, this test will be conducted after pile installation. The type of pile installation will be a factor that need to be considered, so that this test will be perform based on their installation method. In addition, this test will provide an information about resistance distribution and evaluates the shape and the ability of the foundation element.

Based on my research, this PDA Test also needs to collate well with a result from static load test that also will be perform on the same foundation element. This static load test is performed when it is subjected to predetermined load. After this test have been performed, we are able to determine the working load and also at multiples of working load. In addition, the ultimate pile's bearing capacity also can be calculated.

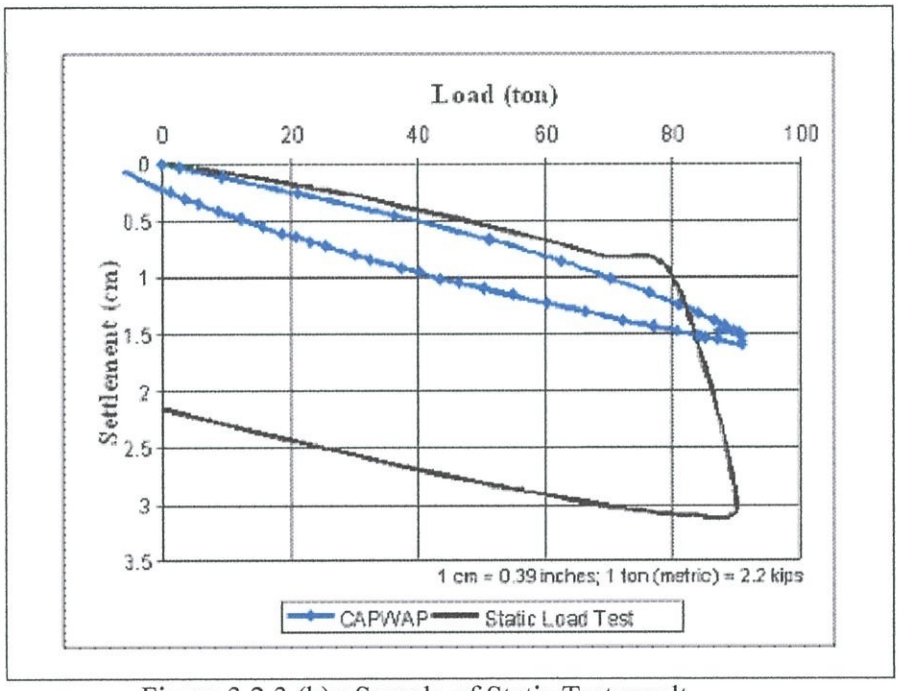


Figure 3.2.3 (b) : Sample of Static Test result

Source : www.fhwa.dot.gov (2006)

After searching an information from many sources like the books and internet, and also asking an engineer about this static loads test, I can simplify that there are three types of static loads test that will be perform which is:

1. MAINTAINED LOAD TEST

   During perform this test, the load will increased in stages and will be held for a specific time. When it is about 100% DVL, the load will be released and next, a second cycle up to 100% DVL + 50% SWL applied. From this stage, the highest settlement and residual settlement can be calculated accordingly. All of a pile displacement will be monitored according to ICE requirements. The capability to carry out testing using a variety of anchor pile systems is based on a reaction beams that have been selected.

2. TENSION TEST

   The next test that consist in static load test is tension test. For this test, when it is subjected to a tensile load, pile performance will be monitored. Basically, a loading schedules in this test are similar to the maintained load test. The procedure includes placing a hollow hydraulic cylinder over the test pile and let it reacts against a suitable reaction beam that have been selected. As maintained load test, pile displacement also will be monitored by ICE requirement.

3. CONSTANT RATE OF PENETRATION TEST (CRP)

   In addition, CRP Test will be carried out in case the ultimate bearing capacity of the pile test is required for some purposes. It is important to ensure the rate of penetration is match well with increments in the load applied.

4. TEST REPORT

All of the test that have been performed need to come up with a full report that should be provided by the person in charge for all of this test. If there are any initial preliminary findings, then it will be issued immediately to the clients. Basically, the reports consist of tabulated data, with a graphic representations of some cross match as LOAD vs SETTLEMENT of piles, LOAD and SETTLEMENT vs TIME and finally, DISPLACEMENT (individual transducer) vs TIME. In addition, if there are any request for additional representation, then it can be provided.

The movement of pile head (Settlement against load) and the plastic deformation can be plotted in a curve formation on the graph table after conducting the load test. Basically, the curve of elastic deformation can be obtained by subtracting the curve of plastic deformation for each load.

In addition, the theoretical elastic deformation also can be calculated using a formula of e=RL/AE, where e is elastic deformation, R is the reaction of load on pile L is length of pile, A is pile's area, and E is Young's Modulus of pile material. This is only for piles of end bearing type unrestrained by friction.

Furthermore, by substituting e into the above formula, we can obtain the elastic deformation read from the curve of elastic deformation, while L, which shows the location of the center of resistance corresponding to that load also will be obtained too.

3.2.4 Common pile driving problems and possible solutions to be implemented

PROBLEMS	SOLUTIONS
Piles blow above minimum pile penetration requirements	Firstly, ensure the pile has sufficient drivability and that the matched driving system is used with the pile. If the pile and driving system are already matched, hence, check driving system. It is important to ensure that the installation process is compliances with the manufacturer's guidelines. If there are still no obvious problems are found after all of this, perform dynamic measurements to determine if the problem either cause by driving system or soil behavior related. Some of the problems that may cause by driving system is low hammer efficiency, or soft cushion. Moreover, soil problems could include greater soil strength than anticipated, large soil quakes, or high soil damping.
Piles driving was deeper than estimated	This is may cause by soil resistance at the time of driving that could be lower than anticipated or in case driving system performance is better than anticipated. To get a solution, perform restrike tests after an appropriate waiting period. This is basically to evaluate soil strength changes.

	If the ultimate capacity based on restrike blow count is still low, check drive system performance and restrike capacity with dynamic measurements.
Blow count was lower than expected.	First, review soil borings. If there are no soft layers indicate by soil borings, pile may be damaged below grade. If the problem is the pile was spliced, re-evaluate splice detail and field procedures to prevent possible splice failure.
Movement of previously installed piles when driving new piles	Pile movements basically due to soil displacement by adjacent pile driving. To settle up this problem, re-driving of installed piles, make a change in sequence of pile installation, or predrilling of pile locations in other to reduce ground movements.
Piles out of alignment	This problem may cause due to hammer-pile alignment control or cause by soil conditions. If there are due to poor hammer-pile alignment control, a pile gate, template or fixed lead system can improve the ability to maintain the alignment respectively. If it cause by soil conditions, such as near surface obstructions or steeply sloping bedrock, minimize the used of overburden material can prevent tolerance from being met.

3.3 Method Statement

PROCEDURE	EXPLAINATION	EQUIPMENT	DURATION
1) MOB OR BRINGING PILING MACHINE TO THE SITE	Clarify the location that the piling machine has to be moved to. After that, the piling machine will be moving in the location in the site. The piling machine will be set on place.  Stage 1 : Bringing piling machine to the site	Pile Hydraulic Driver	< One day
2) DRIVING INITIAL PILE	a) After bringing the piling machine, first pile or starter pile or initial pile will be ready to drive in to the ground by following the pile point that shown in the construction drawing. The initial pile will be driven into the ground until maximum or cannot be driving anymore. b) Hence, the pile will be welded.	Pile Hydraulic Hammer	4 days

Stage 2 (a) : Driven initial pile

Stage 2 (b) : Welding process

3) DRIVING EXTENSION PILE	If initial pile has been fully driving into the ground, the second pile or extension pile will be jointing to the initial pile and drive again. The extension pile will be will be driving into the ground until maximum as the initial pile.  Stage 3 : Driving jointing pile	Pile Hydraulic Driver	4 days
4) CUTTING OFF PILE HEAD	Let's say the 6 metres extension pile has been driving into the round of 3 metres extension depth only and cannot be driving anymore. The excessive of 3 metres extension pile will be cutting off.	Hammer	2 days

5) PREPARATION OF PILE HEAD OR PILE CAP	After cutting off the excessive pile, excavate the soil surrounding of the pile about 300mm depth for preparation of pile cap.  Stage 5 : Cut off the excessive pile	Hammer	2 days
6) LOAD TEST	The purpose of load test is to test the strength of the pile. A certain load will be putting on the pile for a certain period. If the concrete pile is crack, which mean the concrete pile is failed to support the load. If the concrete pile left for certain days without any crack, which mean the concrete pile is strength enough to carry the load of the building.	PDR (Pile Testing Monitory System)	24 Hours

CHAPTER 4.0

CONCLUSION

As a conclusion, all of us know that pile foundations basically used for the support of structures to transfer structural loads to the ground safely and at the same time to avoid excess settlement or lateral movement. Pile foundation are very effective in transferring structural loads through weak or compressible soil layers into the more competent soils and rocks below.

Furthermore, now we know that installation of pile is depends on the type of pile used. The driven method and equipment to be use must be chosen properly incase to avoid damages to the pile. There are a risk if we choose the driven method and equipment that not suitable with the type of pile. Some of damages that might occur is pile's crack.

In addition, there are various categories of pile foundation. This types of foundation must be suitable to be used depending on the soil condition at the site. It is strongly important in other to ensure that the type of foundation are able to resist the structure loads and prevent shear failure.

In other to ensure the pile have an enough strength and stability to resist the load, some test will be perform to recheck the capacity of the pile. If the result shows that the pile are able to support the load, the construction works will be on operation. If not, the other pile will be drive into the ground.

In a nutshell, every problems have their own solution. As in a piling works, there are several problems that will be occur. However, there are solutions for every problems. In reality, pile foundation become one of the best foundation to be used especially for the building in the water like bridge and dams.

REFERENCES

Books:

R. Chudley (1976). Construction Technology (Volume III). Longman Group Ltd, Harlow.

Derek Seward (2009). Understanding Structures (Fourth Edition). Palgrave Macmillan, UK.

Mark Huth (1980). Introduction to Construction. Delmar Publisher Inc, US.

Braja M. Das (2004). Principles of Foundation Engineering. USA.

E M Baker (1985). Making and Placing Concrete. Longman Group Limited, Harlow.

Websites:

Pile Installation Method. (2014). Available from: http://www.theconstructor.org

Classifications of Pile. (2014). Available from: http://www.aboutcivil.org

Purpose of Conducting Load Test. (2014). Available from: http://engineeringcivil.com

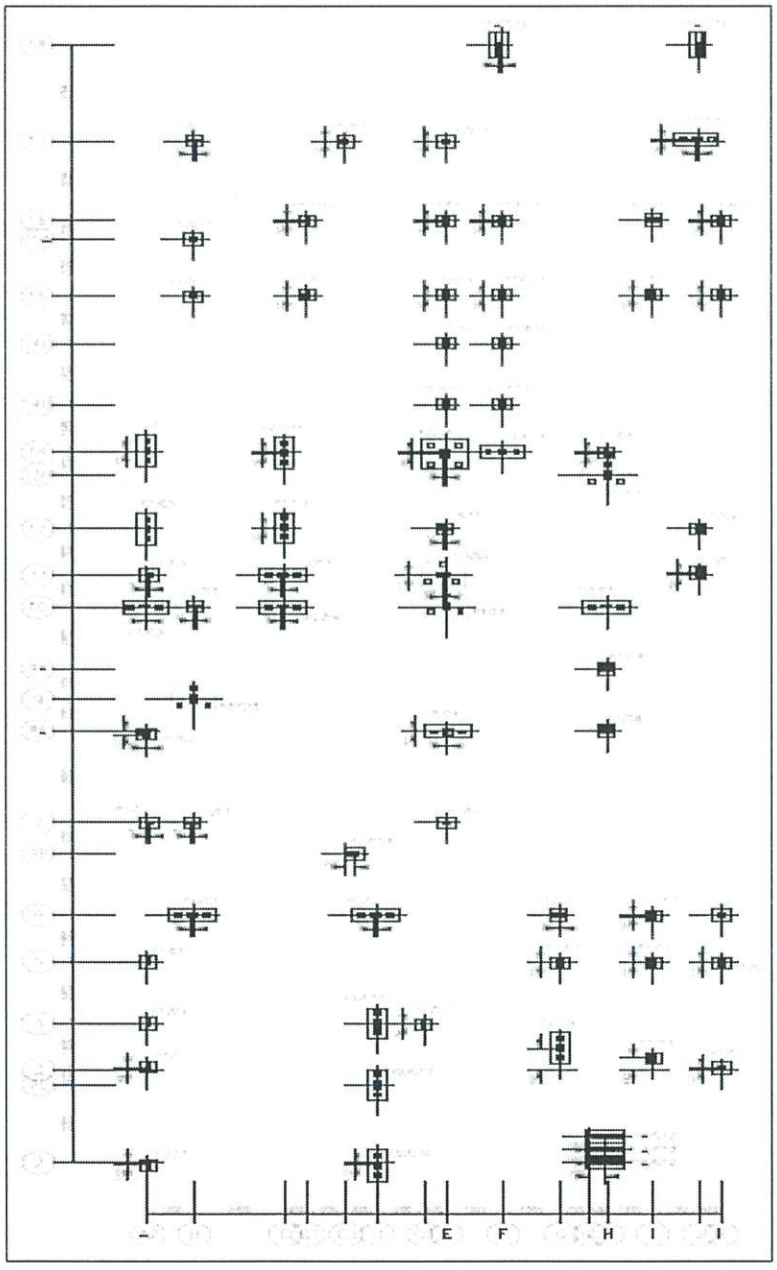
Deep Foundations. (2014). Available from: http://www.environment.uwe.ac.uk

Pile Foundation. (2014). Available from: http://www.enka.co.uk

Pile Problems and Solutions (2014). Available from: http://construction.about.com

Piling Inspection Sheets (2014). Available from: http://qaqc-construction.com

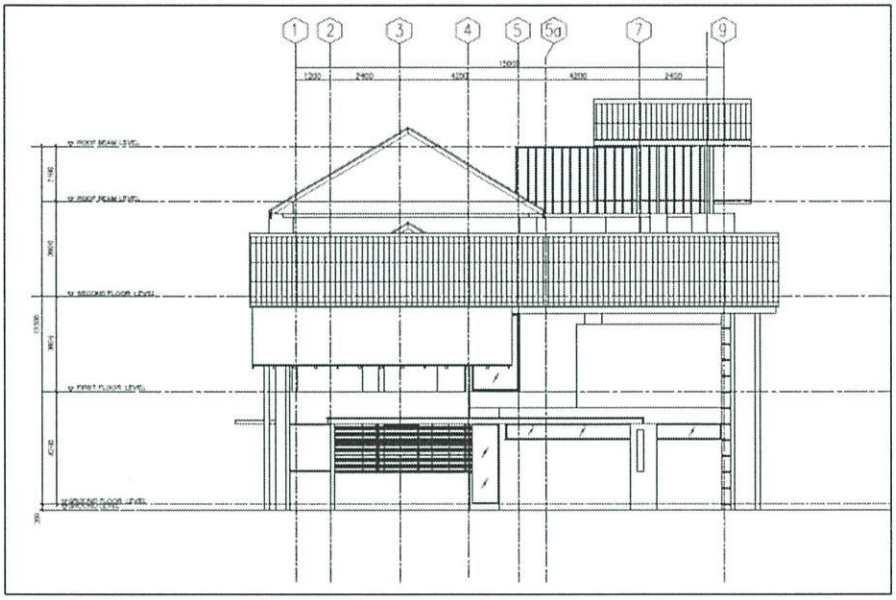
Appendix A: Piling Layout



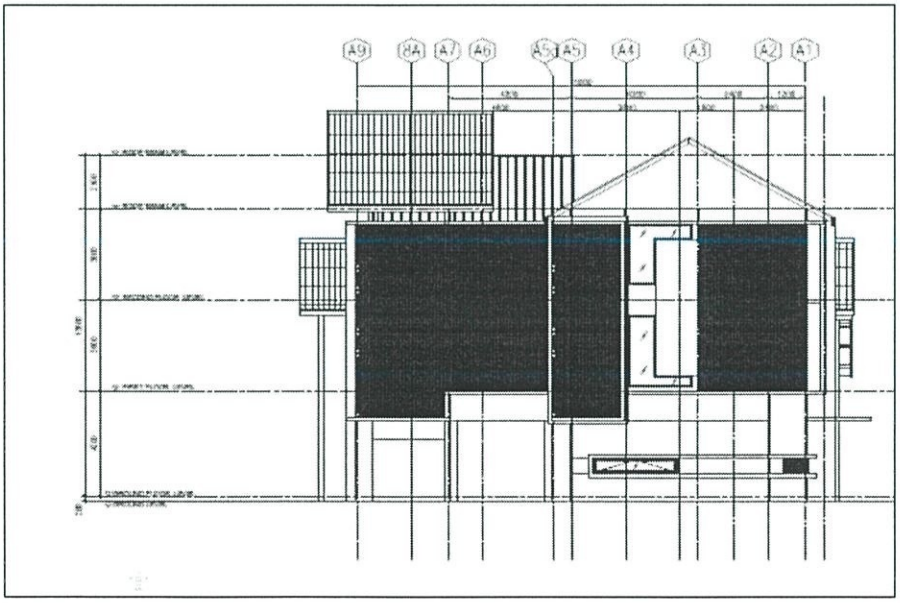
Source : Project Detail Drawing (2015)

Appendix B: Front and Rear Elevation

Front Elevation



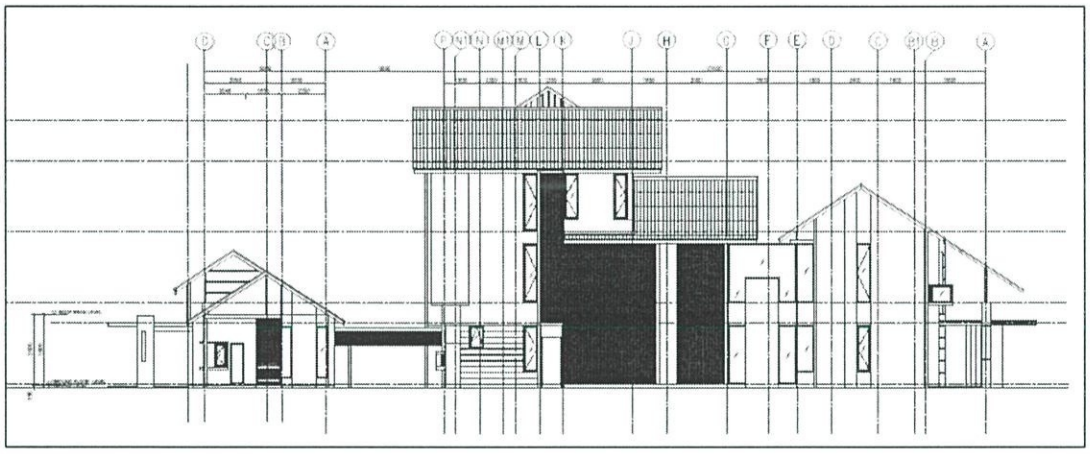
Rear Elevation



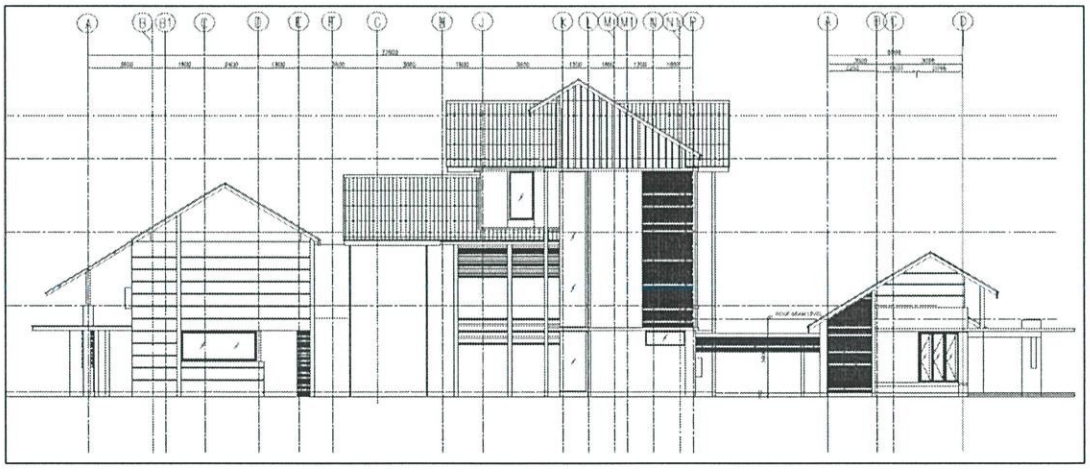
Source : Project Detail Drawing (2015)

Appendix C : Right and Left Elevation

Right Elevation



Left Elevation



Source : Project Detail Drawing (2015)

Appendix D: Sample of Piling Data Sheets

APPENDIX D

(*Clause* 7.13.2)

DATA SHEETS

Site.....

Title.....

Date of enquiry.....

Date piling commenced.....

Actual or anticipated date for completion of piling work.....

Number of pile.....

TEST PILE DATA

Pile: Pile test commenced.....
Pile test completed.....

Pile type: .....
(Mention proprietary system, if any).....

Pile specification: Shape — round/square.....
Size — shaft.....toe.....
Reinforcement.....No.....dia for.....(depth)
.....)

Sequence of piling (for Groups): From centre towards the periphery or from periphery towards the centre

Concrete: Mix ratio 1 :..... : .....by volume/weight
or strength after.....days.....kgf/cm²
Quantity of cement per m³ :.....
Extra cement added if any :.....

Details of drilling mud used: .....
Time taken for concreting: .....
Quantity of concrete — Actual: .....
— Theoretical: .....

Source : www.qaqc-construction.com (2014)