DEPARTMENT OF BUILDING SURVEYING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

TITLE

METHOD FOR PILING WORK IN TASEK KENYIR

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(2010209088)

DIPLOMA IN BUILDING SURVEYING

PRACTICAL TRAINING REPORT

JUN 2013 –OCTOBER 2013

ACKNOWLEDGEMENT

In the course of practical training for four months, many of those who supported me for the success of the report. First of all, I would like to TFC Time Future Construction for giving me the opportunity to do practical training in companies.

In addition, I would like to thank the site supervisor TFC, En Zul Kifli Bin Ismail because give more information and guidance to me about construction. He also gave full faith and an opportunity of doing any work.

Not forgetting my parents a lot of help in financial terms in the success of this practice. They also often provide support and encouragement to me to complete the practical training report.

I would also like to thank my supervisor, Zuraihana Binti Ahmad Zawawi because she has helped and assisted in completing the practical training report. Additionally, not forgetting my fellow friend because gave support and cooperation in making my final project.

Finally, I am satisfied with all the work I do and it's a lot of positive impact on me. I hope the University of Technology Mara (UiTM) will continue to cost and practical training such as this to the coming generation.

ABSTRACT

Practical training is a course that should be completed by all students who took the final semester of Diploma in Building Surveying. Students can choose where company or palace to conduct the practical training.

I have selected the state government departments of the TFC Time Future Construction. As a place for the practical training. The site supervisor as a leader in this site had been appointed to be my supervisor during the training.

During the practical training, I learned about the use of concrete in construction of apartments. For example, knowing that each type or grade of concrete, know the making and delivery of concrete to the construction site.

Practical training will be end after four months the students complete the training. Finally, students will then prepare a report according to the topics that relevant to the work during the practical training that had been done.

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CHAPTER 1:

INTRODUCTION AND BACKGROUND OF THE ORGANIZATION

1.1 Company profile

Figure 1.1: Time Future Construction Office

Time Future Construction (M) Sdn Bhd (TFC) was established on 11th. June 2001. At its inception, TFC is only involved with the work of the developer before actively involved in the work of civil engineering and mechanical engineering. Based on the experience and determination to move forward, TFC has been registered with the Contractor Service Centre and the Construction Industry Development Board Malaysia (CIDB) to be the main contractor. TFC has been granted eligibility by the PKK in Class 'B' class natives on the 27th. February 2002 and registered with the CIDB in the Grade G6.

However, on 01st April 2009, the Company TFC registered under Class 'A' with PKK and CIDB G7 below to continue to strive and thrive in the construction industry.

1.2 Corporate Information

Chairman & Chief Exe. Officer	: Dato' Haji Abdul Rahman Bin Mat Yasin
Directors	: Dato' Haji Abdul Rahman Bin Mat Yasin
	: Kamarudin Bin Ali
	: Fahruzali Bin Rashid @Mohamad
Company Secretaries	: Iman Partners Consult
Registered Office	: 111-C, Tingkat 1, Jalan Batas Baru
	20300 Kuala Terengganu
	Tel No: 09-6244616, Fax No: 09-6245616
Office Address	: Lot Pt 32597, 1st Floor, Rumah Kedai
	Tepoh, Jalan Kelantan,
	21060 Kuala Terengganu,
	Terengganu Darul Iman
	Tel No: 09-6624089, Fax No: 09-6623089
Registration No	: 549827 M
Date of Incorporation	: 11 Jun 2001
Nature of Business	: i. PKK Class A (Status Bumiputeras)
	ii. Class CIDB G7
Authorised Capital	: RM 1,000,000.00
Paid-Up Capital	: RM 1,000,000.00

Company Audit	: ADIB AZHAR & CO Chartered Accountants 111C-1, 1st Floor, Jalan Batas Baru, 20300 Kuala Terengganu, Terengganu Darul Iman
Bank Account	: Hong Leong Islamic Bank Berhad No. 31, Jalan Sultan Ismail, 20200 Kuala Terengganu, Terengganu Darul Iman
No Account	: 35901010503

1.3 Quality Policy

(549827 M)

TIME FUTURE CONSTRUCTION (M) SDN.BHD.

SAFETY & HEALTH POLICY

As a responsible company, we have a fundamental responsibility and commitment to ensure that all of our employees work in a safe and healthy environment.

We believe this policy will contribute positively to the quality of life for our employees, our operating standards, public safety and care for the environment. We will work towards and increase gradually our processes to meet and exceed OHSAS 9001: 2008 and any other legal and other requirements related to safety and health.

We will work towards the following objectives: -

- Achieving Zero Injury and Occupational Disease
- Constructing the Effective Emergency Response System and efficiently
- Improving Machinery and Machine Management System
- Improve Site Safety and Health Management.

The success of this implementation can only be achieved by a total commitment to this policy by all parties.

SAFETY PAYS TO ALL

(549827 M)

TIME FUTURE CONSTRUCTION (M) SDN.BHD.

ENVIRONMENTAL POLICY

TIME FUTURE CONSTRUCTION (M) SDN.BHD. Believes in the protection of human health, natural environment, prosperous economy and spiritual harmony. To comply with Legislative Requirements and Environmental Quality Act, **TIME FUTURE CONSTRUCTION (M) SDN.BHD.** Will apply technically proven and economically feasible measures for the Protection of the Environment: -

- Establish policies, programs and practices for conducting business in an environmentally sound manner.
- Monitor Environmental Program and ensure compliance with Legislative and Company's requirements.
- Review and improve Environmental Performance based on the latest and economical technology.
- Require Sub-Contractors and Suppliers to meet Environmental Requirement and Performance.
- Ensure all employees understand and are able to full fill their Environmental Responsibilities though training and awareness programs.
- Makes available our Environmental Policy to the Public.

We value the efforts of all members of the **TIME FUTURE CONSTRUCTION (M) SDN.BHD.** To make above a reality.

1.4 Company Logo

Figure 1.2: TFC Logo

1.5 Organization Chart

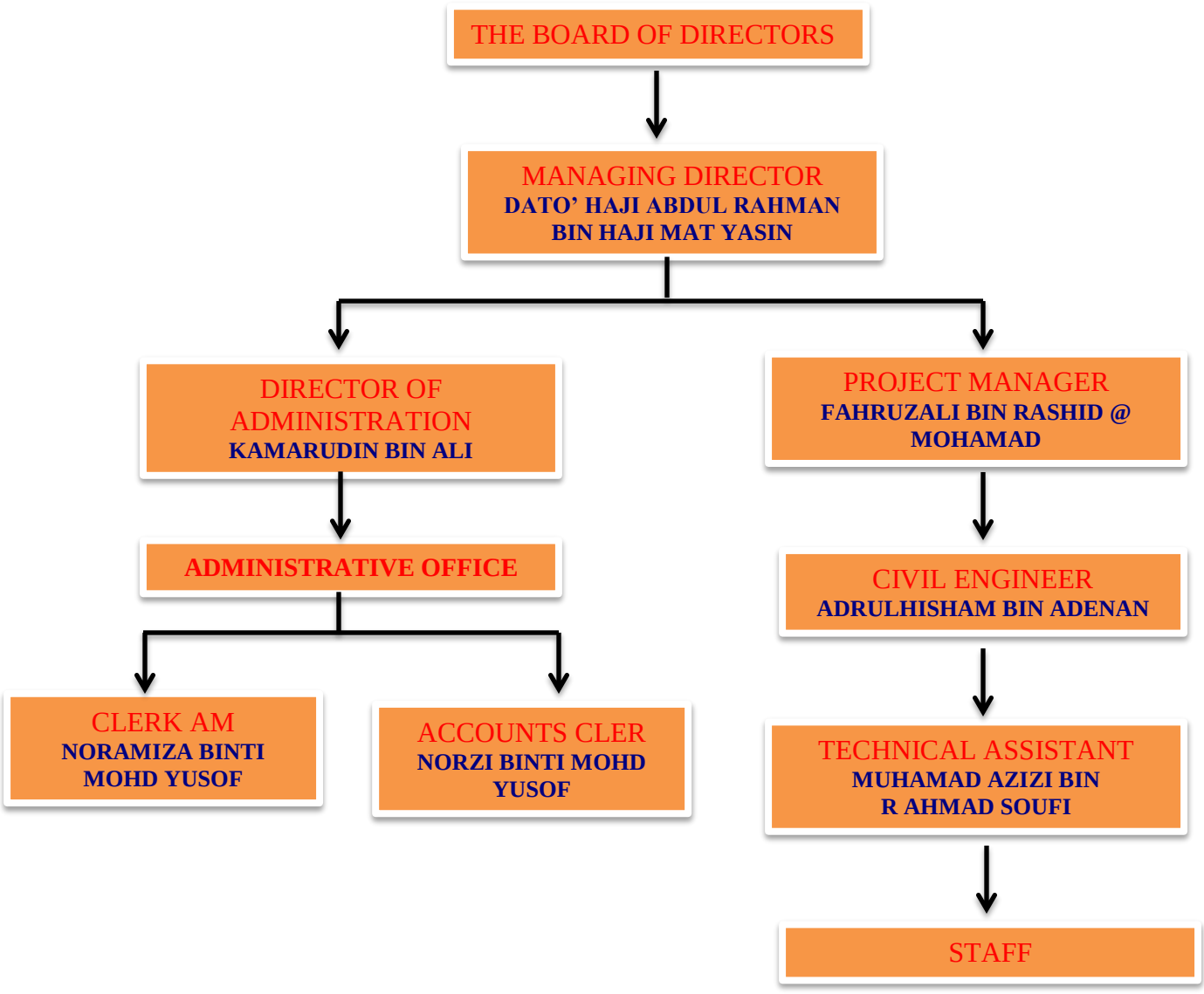

Figure 1.3: 0rganazation Charts

I. MANAGING DIRECTOR

The Biodata Managing Director

Name	: Dato 'Haji Abdul Rahman bin Haji Mat Yasin
No. K / P	: 5020455 (L)
	560720-11-5013 (B)
Date of Birth	: 20/07/1956
Race	: Malay
Address	: No.A-208, Jalan Pecah Rotan Batu Bukit, 21020 Kuala Terengganu.

Academic Background & Experience

He graduated SPM and has been involved in business since 1984. He is experienced in the field of construction contractors, plumbing works and road works.

He also served as a director of several companies from 1991 to 1996. He was also appointed to the Board of Directors in Usmeta Sdn Bhd, a subsidiary of Mara Holdings.

II. DIRECTOR OF ADMINISTRATION AND FINANCE

The Biodata Director of Administration & Finance

Name	: Mr. Kamarudin Bin Ali
No. K / P	: A 1099128 (L)
	690101-11-5589 (B)
Date of Birth	: 01/01/1969
Race	: Malay
Address	: No 115, Perumahan Awam, Batu Hampar, Manir 21200 Kuala Terengganu.

Academic Background & Experience

He holds a Diploma in Electrical Engineering from Universiti Teknologi Malaysia in 1991.

He served as Project Manager at Time Enterprise Company engaged in the construction of buildings, roads and pipe installation.

III. PROJECT MANAGER

The Biodata Project Manager

Name	: Mr. Fahruzali Bin Rashid @ Mohamad
No. I / C	: 770608-11-5035
Date of Birth	: 08/06/1977
Race	: Malay
Address	: 1234, Jalan Mawar 10, Taman Permin JayaChendering, 21080 Kuala Terengganu, Terengganu
Qualification	: Bachelor of Civil Engineering Universiti Teknologi Malaysia (Year 2005)

Academic Background and Experience

He holds a Bachelor of Civil Engineering from UiTM in 2005. He served as an engineer in the States KZA COMPATIBLE SDN.

IV. CIVIL ENGINEER

The Biodata of Civil Engineers

Name : Mr. Adrulhisham Bin Adenan

No. I / C : 850607-11-5199

Date of Birth : 06/07/1985

Race : Malay

Address : Kg. Telaga Papan Setiu

21010 Bdr Permaisuri,

Terengganu.

Academic Background and Experience

He holds a Bachelor of Civil Engineering from UTHM, Batu Pahat, Johor in 2004 and 2008. He has worked as a Site Engineer in 2008 upon graduation.

V. TECHNICAL ASSISTANT

The Biodata Technical Assistant

Name	: Mr. Mohammad Azizi Bin Ahmad Soufi R
No. I / C	: 890712 - 11-5787
Date of Birth	: 07/12/1989
Race	: Malay
Address	: No 161 A, Kampung Langgar 21700 Kuala Berang Terengganu.

Academic Background and Experience

He holds a Diploma in Civil Engineering from Polytechnic Sultan Mizan Zainal Abidin, Dungun, and Terengganu in 2010.

1.6 List of Abandoned Project

Bil	Job Descriptions	No. Contract	Agency / Company Name and Address Job Offering	Name and address of the Monitoring Project Implementation Engineer	Price Contract (RM)
1.	Repair Of Access Road to Water Tank Hill, Kuala Berang, Terengganu	JBA/PERS/ T/3/89	Jabatan Bekalan Air Terengganu (JBA)	JBA K. Berang Terengganu	94,951.62
2	Broad Street Office, Kuala Terengganu, Terengganu	MPKTR – 13/2 – Bhg. 5	Majlis Perbandaran Kuala Terengganu (MPKT), Trg	MPKT Kuala Terengganu	35,000.00
3	The Supply And Delivery Of Steel Pipes And Special For Felda Kerteh 2 & 3, Daerah Dungun, Terengganu	JBA/N/T/9/ 90	Jabatan Bekalan Air Terengganu (JBA)	JBA Dungun Terengganu	2,370,000.00
4	Steel Pipe Supply and Deliver Goods And Special Water Pipe Fittings From Junction 2 & 3 to Kerteh Water Tank, Ketengah Jaya, Terengganu	JBA/N/T/1 7/91	JBA Terengganu (JBA)	JBA Terengganu (JBA)	1,100.000.00
5	Upgrade and Renovation Project Sekolah Kebangsaan Seri Geliga Kemaman, Terengganu	KP/PR (NT – SMK) SERI GELIGA) / UT/2002	Kementerian Pelajaran Malaysia	Kementerian Pelajaran Malaysia	1,627,000.00
6	Construct two (2) Hostel Building Block 4 Floor And A (1) Eating House Sek. Men. Telemong, Hulu Terengganu.	P/T/61/200 2	JKR Kuala Trg Terengganu	JKR Kuala Trg Terengganu	6,945,000.00

7	Artificial reefs Installation Project In Coastal And Island State under the provisions of the Federal Government Special Funds for State Terengganu	LKIM/TT/ 1/245	Kementerian Pertanian Malaysia	Lembaga Kemajuan Ikan Malaysia (LKIM)	5,000,000.00
8	Recommendations Annex Two (2) Block Hostel And A (1) Block Dining Hall SMK Lembah Bidung, Setiu, Terengganu Darul Iman	JKRNT (T) /7/ 2005	JKR Negeri Terengganu	JKR Negeri Terengganu	6,990,948.00
9	323 Construction and Completion of Terrace Housing Units and Work - Work Connection Therewith For Low Cost Housing Project (RKR) Di Kampung Batu 22, Mukim Tanggul, Daerah Hulu Terengganu.	SUK.TR(P) RKR/BT.2 2(HT)/8/20 09	Pejabat Setiausaha Kerajaan Terengganu (Perumahan) Tingkat 7, Wisma Negeri, Kuala Terengganu	Pmint	26,730,000.00
10	Construction and Completion of School Building Supplement Health and Other Work Related Sekolah Kebangsaan Tok Raja Besut,Terengganu (RMK 9)	JKR/T/P/2 6/ 2009	JKR Negeri Terengganu	Jurutera Dearah,JKR, Besut	8,285,966.00

1.7 Location Plan

i. Location plan for office

Figure 1.4: Location Plan for Office

ii. Location plan for site

Figure 1.5: Location plan for site

CHAPTER 2:

LITERATURE

REVIEW

2.1 Definition of Pile

Foundations consisting of vertical structural members that are forced into the ground by impact (from a machine called a pile driver). Some early structures utilized wood piles, but steel and concrete became more practical at the beginning of the 20th century. Piles can be driven to bedrock, or more commonly, to refusal (that is, until underlying soil resists the pile being driven significantly further into the soil).

A special type of foundation that enables a structure to be supported by a layer of soil found at any depth below the ground surface. A pile foundation comprises two basic structural elements, the pile and the pile cap. A pile cap is a structural base, similar to a spread footing that supports a structural column, wall, or slab, except that it bears on a single pile or group of piles. A pile can be described as a structural stilt hammered into the ground. Each pile carries a portion of the pile cap load and transfers it to the soil in the vicinity of the pile tip, located at the bottom of the pile (see illustration).

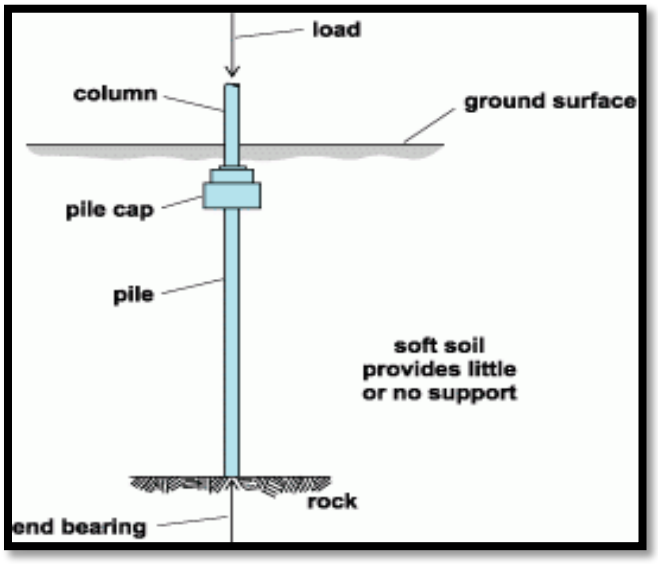

Figure 2.1.1 Examples Pile

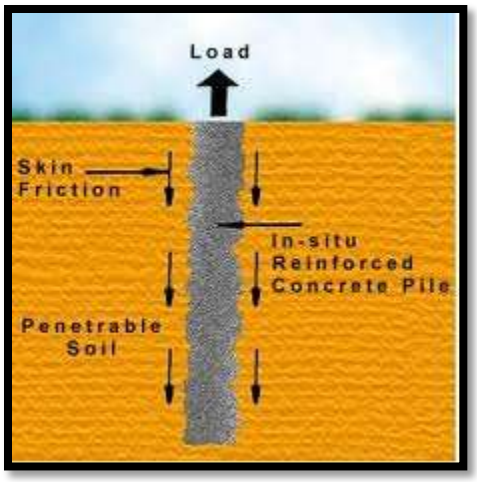

Figure 2.1.2 Load Pile

The pile and pile cap configuration has provided the basic design solution to the difficult problem of obtaining deep foundation support below areas where poor soil conditions prevail. Poor soil conditions may be difficult to excavate through, and are incapable of supporting structural loads. They are typically characterized by the presence of a soft, compressible layer of clay, high ground-water levels, loosely filled soils, uncontrolled landfills, boulders, abandoned underground structures, and natural bodies of water. By supporting a structure on piles in lieu of spread footings, any adverse soil condition may be virtually bypassed, and adequate foundation support can be obtained at any depth, without the need to perform deep excavation, dewater, and install temporary sheeting and bracing.

2.2 Function of Piles

As with other types of foundations, the purpose of pile foundations is:

a) To transmit a foundation load to a solid ground

b) To resist vertical, lateral and uplift load

A structure can be founded on piles if the soil immediately beneath its base does not have adequate bearing capacity. If the results of site investigation show that the shallow soil is unstable and weak or if the magnitude of the estimated settlement is not acceptable a pile foundation may become considered. Further, a cost estimate may indicate that a pile foundation may be cheaper than any other compared ground improvement costs.

In the cases of heavy constructions, it is likely that the bearing capacity of the shallow soil will not be satisfactory, and the construction should be built on

Pile foundations. Piles can also be used in normal ground conditions to resist horizontal loads. Piles are a convenient method of foundation for works over water, such as jetties or bridge piers.

2.3 Classification of Piles

Classification of pile with respect to load transmission and functional behavior

i) End bearing piles (point bearing piles)

ii) Friction piles (cohesion piles)

iii) Combination of friction and cohesion piles

i) End bearing piles

These piles transfer their load on to a firm stratum located at a considerable depth below the base of the structure and they derive most of their carrying capacity from the penetration resistance of the soil at the toe of the pile (see figure 1.1). The pile behaves as an ordinary column and should be designed as such. Even in weak soil a pile will not fail by buckling and this effect need only be considered if part of the pile is unsupported, i.e. if it is in either air or water. Load is transmitted to the soil through friction or cohesion. But sometimes, the soil surrounding the pile may adhere to the surface of the pile and causes "Negative Skin Friction" on the pile. This, sometimes have considerable effect on the capacity of the pile. Negative skin friction is caused by the drainage of the ground water and consolidation of the soil. The founding depth of the pile is influenced by the results of the site investigate on and soil test.

ii) Friction or cohesion piles

Carrying capacity is derived mainly from the adhesion or friction of the soil in contact with the shaft of the pile (see fig 1.2).

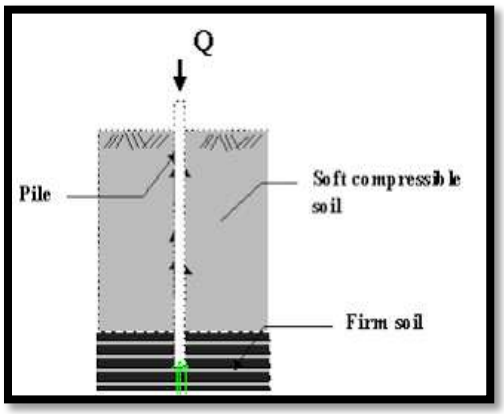

Figure 2.3.1 End bearing piles

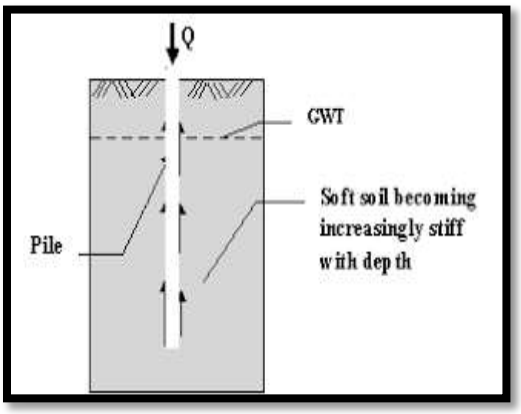

Figure 2.3.2 Friction or cohesion pile

a) Cohesion piles

These piles transmit most of their load to the soil through skin friction. This process of driving such piles close to each other in groups greatly reduces the porosity and compressibility of the soil within and around the groups. Therefore piles of this category are sometimes called compaction piles. During the process of driving the pile into the ground, the soil becomes molded and, as a result loses some of its strength. Therefore the pile is not able to transfer the exact amount of load which it is intended to immediately after it has been driven. Usually, the soil regains some of its strength three to five months after it has been driven.

b) Friction piles

These piles also transfer their load to the ground through skin friction. The process of driving such piles does not compact the soil appreciably. These types of pile foundations are commonly known as floating pile foundations.

iii) Combination of friction piles and cohesion piles

An extension of the end bearing pile when the bearing stratum is not hard, such as firm clay. The pile is driven far enough into the lower material to develop adequate frictional resistance. A farther variation of the end bearing pile is piles with enlarged bearing areas. This is achieved by forcing a bulb of concrete into the soft stratum immediately above the firm layer to give an enlarged base. A similar effect is produced with bored piles by forming a large cone or bell at the bottom with a special reaming tool. Bored piles which are provided with a bell have a high tensile strength and can be used as tension piles (see fig.1-3)

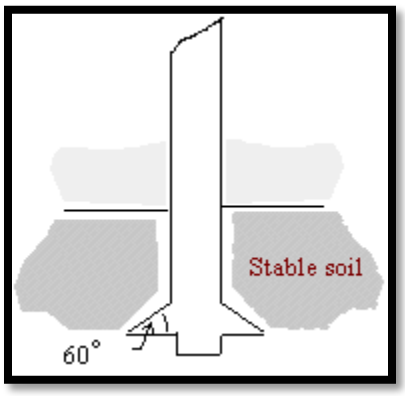

Figure 2.3.3 under-reamed base enlargements to a bore-and-cast-in-situ pile

2.4 Types and Installation of Piles

I. Pre-Cast Concrete Piles

Used for all types of structures and foundations, from housing, through other forms of domestic building, to commercial and industrial buildings and installations. The piles can also be used for all types of civil engineering applications from bridges to embankment support, power and transmission towers and rail-related structures.

The RB Pre-cast Concrete Piling System is quick to install and very cost-effective in most ground conditions. This pile is environmentally attractive as no spoil or arising is generated from pile installation.

In its standard form the pile is a compression pile with small tensile and bending resistance capability. The design is however, easily adapted to accommodate larger tension and bending forces. The standard segment lengths of 1.5m, 3m and 4m can be complemented as required by 6m segments and by tapered lead sections or enlarged lead sections, as required.

Figure 2.4.1: Pre-Cast Concrete Piles

Installation

RB pre-cast concrete piles are usually top-driven using hydraulic drop hammers, some of which are super silenced and are part of the company's fleet of remotely operated “Quiet” hammers. Hammer capacities range from 1T up to 10T for our general purpose low noise, low vibration hammers and can be mounted on a variety of tracked or wheeled rigs, depending upon project location, type, access and headroom constraints. All rigs are designed and purpose-built in-house to meet specific site access and transportation criteria.

The smaller sizes of RB pre-cast concrete pile may also be jacked into the ground using a totally vibration less system utilizing RB in-house designed and built jack-down piling rigs. Quality assurance procedures apply to pile manufacture and delivery, unloading, storage and installation. RB pre-cast concrete piles are suitable for all open, unrestricted site activities; however the variety of segment lengths and existence of specialist equipment makes them ideal for restricted access and low headroom applications.

II. Continuous Flight Auger (CFA)

General all-purpose application for new and refurbishment projects. The piles are speedily installed and can cater for a variety of ground conditions. They are cost-effective and can accommodate large working loads, depending upon the ground conditions into which they are installed.

The standard size range may be complemented with intermediate sizes if required and pile lengths of up to 19m can be constructed.

Standard reinforcement details are used where appropriate which will comprise single centrally positioned reinforcing bars or reinforcement cages as required to suit horizontal or bending moment loadings. Special cages can be manufactured to suit specific loading situations.

Figure 2.4.2: Continuous Flight Auger

Installation

RB CFA piles are formed using hollow stem auger boring techniques, which will produce arising's from the bores in most UK ground conditions. Having produced a bore to calculated depth through known strata, concrete is pumped into the bore under pressure and continues to be pumped as the auger flight is lifted.

Concrete simultaneously fills the void left by the auger extraction. The reinforcement is installed in the bore after the pile has been concreted.

The company operates a fleet of bored piling rigs which have the capability of installing computer-controlled continuous flight auger (CFA) piles and sectional flight auger (SFA) piles. These are suited to all types of conditions from open, unrestricted access sites to very confined, low-headroom situations.

III. Tubular Steel Piles Unrestricted Access

Whilst clearly being suitable for taking large axial loads, these piles are particularly suitable for accommodating significant horizontal loads and vertical tension loads, induced by large bending moments/horizontal reactions and uplift/heave reactions respectively.

These piles are also very suitable for driving in difficult or uncertain ground conditions up to 50m deep. Hard driving conditions and fill, obstructions or boulders can also be dealt with using this system.

These piles are ideal where embedment is required on steeply sloping bedrock and supplemental rock-socketing by drilling through the end can be achieved in extreme slope conditions or where load capacity at rock head needs to be increased.

Figure 2.4.3: Tubular Steel Piles Unrestricted Access

Installation

These piles are top driven to 'set' or length using purpose-built rigs with hydraulic hammers. The internal void can subsequently be filled with concrete or grout if required and reinforcement incorporated for bonding into pile cap or ground beams. Normally the piles are driven open ended so that a soil plug is rapidly formed. In exceptional circumstances the open end can be closed using a welded end plate.

Site Requirements

The site should be firm, dry, flat and level, and capable of sustaining the load of the piling rigs which typically will weigh up to 35T. Access roads must be suitable for normal delivery vehicles.

IV. Continuous Helical Displacement (CHD) Bored Displacement Piles

This type of pile can be used for all foundation applications where bearing piles are required for either buildings or structures. The pile may also be used where there is a retaining requirement. The ability to form bored piles without producing any spoil makes this kind of pile particularly advantageous on contaminated sites. There is minimal vibration and noise.

In most ground conditions, this pile is an ideal alternative to CFA (continuous flight auger). Enhanced load carrying capacity may be achieved compared with CFA piles of similar dimensions, due to compaction of the soil during boring. In some ground conditions improvements of up to 30% have been demonstrated with a consequential shortening of the pile and reduction in cost.

Figure 2.4.4: Bored Displacement Piles

Installation

The piles are formed using a highly efficient multi-flight, bullet ended shaft, driven by a high torque rotary head, enabling penetration of the strata without bringing material to the surface. Data is recorded using computerized instrumentation.

Nominal surface heaving may occur but compared with the arising's from CFA boring, the volume is negligible.

2.5 Pile Testing

I. Dynamic Load

Application

Dynamic load testing is suitable for all types of pile, but is most frequently employed on RB pre-cast concrete or tubular steel driven piles. This method is also ideally suited to small contracts, e.g. mini-piles or underpinning, which cannot justify the relatively large investment of static load testing. The technique determines the load bearing characteristics of the pile including skin friction and end bearing. There are numerous other parameters which can be determined including pile hammer energy transfer, pile integrity, pile stresses, driving and load displacement behavior.

Equipment

In order to carry out this technique, pile driving analyzer hardware from Pile Dynamics Incorporated and the modeling programmer CAPWAP provided by GRL Inc. are used. Both organizations are responsible for the theories behind this technique and are acknowledged as market standard, reliable and accurate procedures.

Figure 2.5.1: Dynamic Load

Description

In order to dynamically test a pile, the pile must be rest ruck using a pile hammer. Two strain transducers and accelerometers are firmly attached to the face of the pile near to the head. As the pile is rest ruck the equipment measures the force and the acceleration of the pile. This information is relayed to the pile driving analyzer, which gives information on the CASE method pile capacity to an experienced test operator. As the test only takes a matter of minutes per pile, a large number can be tested in one site visit. Once a series of blows have been struck on the test pile, the data is digitally stored and relayed back to our offices for further analysis. A stress wave analysis is conducted on the data in the RB test department. This includes computer generation of a theoretical pile and soil model, which is compared with the recorded data.

The aim of the method is to produce a model that resembles as closely as possible that which would be required to replicate the recorded data. To this end, the model is continually updated and altered until the measured data is matched. Once this has been achieved, the model gives shaft friction distribution, bearing capacity and load settlement behavior, together with additional information as required.

II. Static Load

Application

Static load testing is the method by which the loads placement characteristics of a pile can be determined. All piles are suited to testing in this way .The RB in-house designed and purpose-built static load testing frames can accommodate loads of up to 4000 kN. Additionally, specialist equipment for low headroom or restricted access locations is available.

Equipment

Reaction loading frames and ken ledge assemblies allow tests of up to 4000kN to be carried out. Measurement of pile response to load is measured by digital load cells and electronic linear variable displacement transducers. Larger capacity tests can be accommodated on request.

Figure 2.5.2: Static Load

Description

In order to apply a known load to the test pile some form of reaction is necessary. The most commonly used methods are ken ledge or tension pile reaction, dependent upon ground conditions. Other methodologies can be adopted according to site requirements e.g. in areas of restricted access or headroom.

Once adequate reaction has been provided, the testing is carried out using a hydraulic jack and calibrated digital load cell to a previously agreed procedure. Time, load, temperature and displacement data are usually recorded. The data is stored electronically for transmission via mobile phone, to RB's test department for processing. The information is then presented in conventional graphical and tabular format.

III. Sonic Integrity

Application

Integrity testing is primarily used on continuous flight auger (CFA) or RB continuous helical displacement (CHD) and other wet bored piling techniques. The method is fast and reliable, allowing a large number of piles to be tested in a single site visit. The technique is used to determine the reliability, morphology and quality of construction of the piling method.

Equipment

The sonic testing equipment is supplied by both Pile Dynamics (USA) and TNO-Profound (Holland). They are battery powered and can be operated by one engineer to give an indication of integrity on site.

Figure 2.5.3: Sonic Integrity

Description

The pile to be tested must be sufficiently cured, free of latency and trimmed to sound concrete, preferably to final cut-off level. Using a small hand-held hammer, a series of low strain acoustic shock waves are passed down the pile. As it does so, the wave rebounds where changes in impedance occur.

This rebound or echo is then recorded by a small accelerometer, held against the pile head. The response is stored digitally and a graphical representation displayed and plotted, usually against time, for immediate inspection.

CHAPTER 3:

CASE STUDY

3.1 Introduction

Tasik Kenyir is located in the upper reaches of the River Kenyir, Terengganu is the largest lake ever built by humans to generate electric power in Southeast Asia. This lake of 2,600 square miles and contains 340 small islands. Since the existence of the dam here, especially surrounding highway was first known by the public both from within and outside the country. This lake is a popular tourist spot in the state since its existence. It was completed in 1988. Tasik Kenyir has drowned several villages and forests. Many wild animals have been rescued during the construction of this dam. Construction of the dam has created economic return to the majority of the population are farmers. Indirectly, the people here can raise their social status. Tourist arrivals here are famous for sweet corn raised highway city name in the eyes of outsiders, previously known as the 'city of the dead'. Various efforts at enhanced in order to introduce Tasik Kenyir in a higher level.

South East Asia's largest man-made lake is undeniably a haven for adventurers and nature lovers. The future sees the enhancement of Kenyir Lake into a Free Trade Zone to make it not only a prime getaway for eco-tourism but a shopping paradise as well. Officially declared a Free Trade Zone by the Menteri Besar of Terengganu, when fully operational, its aim is to open its doors to visitors and investors to a unique and contemporary eco-tourism experience. The heart of the Free Trade Zone is the Kenyir Trade Centre, which will be home to a duty free shopping haven, a business centre, the Bayas Square, and a 3-star hotel. To make the centre accessible to more visitors, an iconic bridge will be erected to link the jetty to the Kenyir Trade Centre. Terengganu's heritage and cultural design will be adopted into its architecture. The development plan sees Lake Kenyir further supplemented by a 40-seater "Shotover" jet boat, the construction of a cable car line, the development of a theme park, and a second jetty for visitors coming from the west.

Importantly, the infrastructure and transportation system leading to the lake and specifically to the islands will be upgraded to accommodate the increase in the influx of tourists.

Pulau Bayas as a duty free zone is precisely because the island was the focus of visitors at Tasik Kenyir. Pulau Bayas surrounded by various tourist attractions like Lake Kenyir water theme park on the Pulau Besar as well as a variety of Ecotourism Park and visitors will stop at Pulau Bayas to relax. Island with an area of 1,000 hectares, is one of 340 islands in Tasik Kenyir, the largest man-made lake in Southeast Asia.

Figure 3.1.1 Perspective View of Shopping Complex

3.2 Introduction for Piling

Kenyir Trade centre is a new development proposal by the state of Terengganu to develop the interior part of the state. It's located at Bayas Island one of the island in the Kenyir lake which is the largest manmade lake in South East Asia. The development consisted of a duty free shopping complex, Bayas Square, Surau and other facilities and most of the buildings are single to double storey structures.

The substructure of the buildings designed on the pad footing and pun pile length of 9m while the superstructure designed on precast system, developed by Teraju Precast. Current progress at site the piling work which is still on going. Due to design requirements, the piling contractor has to comply with the consultant's design, where all piles have to reach the designed length which is 9m. For any pile less than 9m or has reached the hard strata, the contractor has to drill into the rock.

This has posed some difficulties to the contractor which drilling into the rock has caused very significant delays. Looking at the number of pile points yet to be done based on the current delays, the contractor may take another one year to complete the piling works. This does not include problems that tidal fluctuations may cause.

METHOD FOR PILING WORK

Perunding ZNA (Asia) Sdn. Bhd. (PZNA) was invited to propose an alternative foundation for the Proposed Duty Free Shopping Complex in Tasik Kenyir, Terengganu.

1) All piles to be of sirim approved brand and comply with MS 1314 and JKR specification.
2) The piles shall be 300mm. Pretension spun high strength concrete piles with structural capacity 800kN, min effective pre stress 5.0 N/mm2 and cracking bending moment 23kNm.
3) Pile shall not be out of plumb by more than 1:75
4) Pile shall not be out of position by more than 75mm at any direction.
5) Pile shall be cut off evenly at the levels shown in the drawing with a minimum embedment of 100mm into the pile cap.
6) All pile shall be driven to set with minimum set 25mm after 10 blocks.
7) Minimum pile length = 9m. Allow max 6m prepare for pile in hard shirt.
8) Estimated pile length (provisional) = 18m (12+6m)
9) Contractor shall install 20nos trial pile prior to installation of other working pile. The location will be determined by consultant.

10) Pile shall be tested to twice working load (800kN) by using.

i. Static maintained load test (Kent ledge, ground anchor, tension pile)
   a. Preliminary – 2
   b. Subsequent – 2

ii. Pile driving analyzer (PDA)
   a. Preliminary – 5Nos
   b. Subsequent – 15Nos

Figure 3.2.1: View of the piling work on the lake edge.

3.3 Material Supplier of Piling

i. Company will order items pile with Concrete Engineering Products Berhad (CEPCO). Here is information about suppliers:

The Company was established in 1983 under the name of Concrete Engineering Products Sdn. Bhd. with the objective of producing high quality concrete engineering products to meet the needs of the rapidly developing Malaysia and other ASEAN countries.In May 1991, the Company assumed the name of Concrete Engineering Products Berhad when it was converted into a public listed company. In January 1992, the Company was listed on the Kuala Lumpur Stock Exchange.

The Company currently operates five factories, strategically located in Penisular Malaysia, fully certified with both requirements of SIRIM QAS International MS ISO 9001: 2000 (Quality Management Systems for the Manufacture of Pretensioned Spun Concrete Piles and Poles), and the IKRAM QA Services MS 1314: Part 4: 2004 (Product Certification for Class A, B and C of Precast Pretensioned Spun Concrete Piles from 250mm to 1000mm diameters). Since its founding, the Company has been constantly striving for product excellence and today enjoys the reputation of being one of the market leaders in this region on prestressed spun concrete piles and poles.

Figure 3.3.1 Company Logo

ii. Delivery orders

Deliveries will be made on a monthly basis at the beginning of the month or the end of the month. Materials will be sent by truck to the construction site based in Lawit jetty. After the receipt will be provided as evidence that the goods have been delivered.

Figure 3.3.2 Delivery Pile to Site

Figure 3.3.3 Bill Delivery Order

3.4 Types of piles on site

A. Oslo Pile Shoes

The first pile which were driven in 1931, were already supplied with a special point and careful considerations were given to its form in order to safeguard against the sliding of the pile on an inclined rock surface. The pile shoes were equipped with a specially designed shoe that would prevent a pile sliding against sloping rock. The final solution was to make the point of a round steel bar the lower end of which was hollow ground. In this way the sharp edges of the bar should be able to secure a hold in the rock immediately after the initial rock contact. This type of pile shoe has since been called an ‘Oslo point’

Figure 3.4.1 Oslo Pile Shoes

B. Spun Pile Shoes

Foundations of any building or structure shall be designed and constructed to withstand safely all the dead, imposed and wind loads without impairing the stability or inducing excessive movement to the building or of any other building, street, land, slope or services. The allowable capacity of the soil/rock under working loads where any foundation is founded shall be the lesser of:

i. The ultimate capacity for bearing, bond or friction with an adequate factor of safety against failure.

ii. The value in relation to bearing, bond or friction such that the maximum deformation or movement induced to the foundation under working loads can be tolerated by the building, any other building, structure, land, street and services.

Figure 3.4.2 Spun Pile Shoes

3.5 Proposed Method for Piling Work

1. Upon possession of site arrange for surveyor to check boundary times and subsequently set out the corner pegs of the proposed building lot, from there proceed to set out individual pile points indicated either by steel rod or timber pegs.

Figure 3.5.1 Site Area

Figure 3.5.2 Point Marking

2. Mobiliser the IPH Hydraulic Piling Hammer & Piling Machines, also mobiliser the welding machines.

Figure 3.5.3 Hydraulic Piling Hammer

3. Arrange for the supply and delivery of the 300mm x 300mm Spun piles in combination of 9m starter & extension piles, 6m extension and also 3m extension piles as appropriate.

Figure 3.5.4 Supply and delivery pile

4. Unload the piles using cranes and place the piles on timber supports near the lifting position and stacked the piles nearly to the piling points.

Figure 3.5.5 Cranes and Place the Piles

5. Use leveling rule using to check the verticality of the pile and also set up plumb line tripped to crass check vertically.

Figure 3.5.6 Land Leveling

6. Drive the piles by lifting the hammer to the appropriate into drop height and hammer on the pile helmet on the pile.

Figure 3.5.7 Piles Lifting the Hammer

7. Record the number of blows for each for penetration.

No.	Date Drive	Pile Ref. No.	Pile Combination							Pile Shoe	Handle, Sling & Pitch		Driven (m)	
			12mS	9mS	9mE	9mE	6mE	6mE	6mE		Vertical	Raked	Vertical	Raked
1	10.07.2012	23D/F(1)		1						1	1		8.10	
2	10.07.2012	23D/F(2)		1						1	1		8.70	
3	10.07.2012	23D/E(1)		1						1	1		8.40	
4	10.07.2012	23D/E(2)		1						1	1		7.50	
5	10.07.2012	23D/AX		1	1					1	2		9.60	
6	11.07.2012	23D/B1(1)		1	1					1	2		10.50	
7	11.07.2012	23D/B1(2)		1	1					1	2		10.20	
8	11.07.2012	23B/E(1)		1	1					1	2		9.30	
9	11.07.2012	23B/E(2)		1						1	1		9.00	
10	11.07.2012	23B/F(1)		1						1	1		8.10	
11	11.07.2012	23B/F(2)		1						1	1		8.10	
12	24.07.2012	30A/E		1						1	1		6.00	
13	24.07.2012	30A/F2		1						1	1		1.80	
14	25.07.2012	32A/C		1						1	1		3.00	
15	25.07.2012	31/B		1						1	1		5.40	
16	25.07.2012	29/A		1						1	1		3.90	
17	04.09.2012	44		1						1	1		6.30	
18	04.09.2012	96		1						1	1		2.70	
19	04.09.2012	132		1						1	1		3.90	
20	05.09.2012	306		1						1	1		4.50	
21	05.09.2012	319		1						1	1		6.30	

Figure 3.5.8 Example Piling Record

8. Upon driving the starter pile, lift the extension pile over and slot in same to starter pile at the male and female joint, commence complete but welding all-round the joint. Repeat driving process and further welding for extension piles.

Figure 3.5.9 Lift the Extension Pile

9. Upon apparent that the piles are about to set graph paper for taking set is prepared and the last 10 blows are recorded and from the renounce of the pencil on the graph paper, determine the acceptable set criteria according to the set calculation requirement.

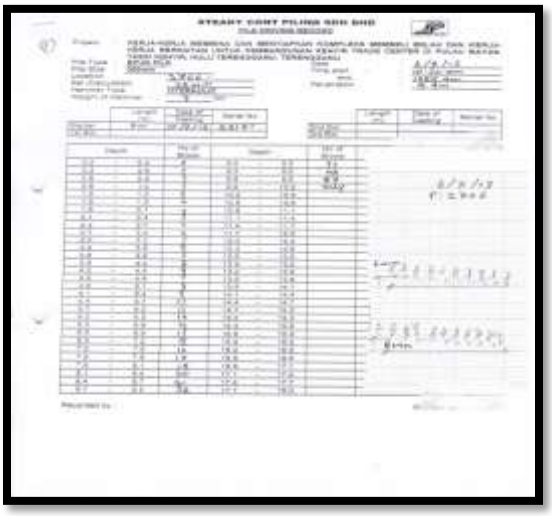

Figure 3.5.10 Record Set Graph Paper

10. Repeat driving process and further welding for extension piles. Arrange to carry out initial and subsequent load testing as per load test procedure.

Figure 3.5.11 Welding for Extension Piles

11. Arrange to carry out initial and subsequent load testing as per load test procedure.

Figure 3.5.12 Arrange for load test

12. Cut the piles at the cut off level, exposing the steel bars for tying into pile caps. Clean and clear site.

Figure 3.5.13 Cut of Piles

3.6 Method for Load Test

i. Working Load Test

Load test shall be carried out on working piles selected by the S.O. The test piles shall be load tasted to twice the designed working load of the piles.

ii. Preparation of Pile Head

The pile shall be cut the necessary elevation. A mild steel plate with thickness not less than 10mm will be mounted on the top of the pile head accommodate the loading and settlement measuring equipment and to prevent damage due to the concentrated of load from the load equipment.

iii. Jack

The hydraulic jack must cover a range in excess of the ultimate load of the pile (i.e. twice the pile working load). The load to be applied shall be determined by the Engineer. The jack must be in order and no leakage shall be anticipated.

iv. Dial Gauge & Pressure Gauge

Must be in good working conditions and calibrated recently at an approved laboratory not exceeding six (6) month from the date of load test.

v. Kent ledge

The test load shall be applied by means of a jack which is obtains its reaction from Kent ledge in excess of twice the pile cap working load by 20%. Kent ledge must be arranged in a manner to provide an effective load test without imposing any danger.

vi. Measurement of Settlement

Using a reference beam which shall be supported on two firm stakes placed sufficiently far from the pile cap under test and the reaction system is to be unaffected by ground movement resulting from the tests. Should be made by four dial gauges arranged diametrically on top of the steel plate. Readings shall be taken to an accuracy of 0.001 in (0.1mm) and the dial gauge must have a travel distance of not less than 2 in.

vii. Loading Sequence

The loading increment was shown in APPENDIX B

viii. Result

On completion of the necessary stages of loading a pair of graphs shall be plotted.

a. A graph of load versus settlement
b. Time versus load

ix. Maximum Permissible Settlement

a. Settlement at working load shall be less than 12.5mm
b. Settlement at twice working load shall be less than 38mm

Figure 3.6.1 Load Test for Site

3.7 Piling Equipment and Construction Machinery

NO.	EQUIPMENT	DESCRIPTION
1.	 Figure 3.7.1 Truck	Trucks used for delivery and piling into the area of the construction site at the base Gawi. Pile can be entered in a truck in a time between 50-60 rod. This hampers the delivery of piling into the site took quite a long time.
2.	 Figure 3.7.2 Tokang Ships and boats	After the goods arrived at the base Gawi goods arrive will be placed in tokang.. Used to transport goods to the site such as sand, stone, cement, piling sticks and so on. This case because tokang be used for the project area is located in the middle of Lake Kenyir. This hampers the delivery process takes quite some time.

3.	 Figure 3.7.3 Crane	To facilitate transfer of large and heavy items included is peeling. This is done to speed up time and more secure. Peeling inside the tokang will be transferred to the site with ease.
4.	 Figure 3.7.4 Excavator	Used to dig the ground so that young peeling cuts can work done. Electronic control system to monitor the working conditions of machinery, auto rotation to create high temperature protection, stationary speed auto, auto hot machine, testing errors.

5.	 Figure 3.7.5 Bulldozer	Soil removal equipment commonly known as engineering vehicles are designed and built to do the job of land transfer. Soil removal equipment widely used in the construction and maintenance of soil and gravel roads.
6.	 Figure 3.7.6 Land Surveyor	This server work done since to mark the point to do the work. Piling settings or putting out the survey established the position of foundation piling or putting gritty it is very important vanity because this way you can ensure that no errors will be set back in line that set by the authorities.

7.	 Figure 3.7.7 Hydraulic Piling Hammer	The hydraulic system has been modified from excavator. Without any power pack. No power pack is required for the above system. It is capable to work in rough terrain. It is able to handle up to 9m length of pile. If required longer leader could be arranged. It is able to drive raked section at the ratio of 1:3.

PROBLEM

AND

RECOMMENDATION

Problems and Recommendation

I. Problems

Based on the research has been done in building Kenyir Trade center in Bayas Island, Lake Kenyir, Hulu Terengganu, Terengganu to study the work of peeling makers. From the inspection, the problem is to work on the transmission shaft to the site of piling Bayas Island. This case because the site area in the middle of Lake Kenyir. By the long time to send the trunk peeling takes a long time. Due to piling up to the site to use tokang and boats. Long time to get to the site between 3-4 hours.

Besides the problems faced in Bayas Island is quite hard conditions printed over land because the soil in the site is filled with large stones. This will cause delays in the process of peeling planting work can be done. By the piling work for hammering done only about 3-6 meters pile embedded in the ground.

Process for doing piling work is quite slow because the first job is done peeling machine do the work site there is only one area. This cause's hammering piling process takes quite a long time to complete the piling work.

II. Recommendation

Based on the research has been done in building Kenyir Trade center in Bayas Island, Lake Kenyir, Hulu Terengganu, Terengganu to study the work of peeling makers. From the inspection was done, the proposal needs to be done to address the problem of delivery and peeling from the jetty to the site of Bayas Island. The company must add tokang and boats to ensure the delivery of work can be done more quickly than by using a tokang and boat only for delivery and piling work.

The problem over hard ground conditions and print. Recommendation to solve the problem is the work of pre-bore before need to be made before the entry piling on the points involved so that the rod hammering peeling can be performed more quickly and save time.

Recommendation to solve the problem of time delay smoothness piling work hammering. Proposal is to add macros pile machine brought into the site. This is to facilitate the process of hammering the pile can be done more quickly. To solve the problem of delays piling work hammering.

CONCLUSION

Conclusion

In addition, in conclusion I can say is that matters relating to the piling work of a particular material. Taken into account if the boat trip takes about 4 hours employees can do a lot of work in the next 4 hours. Therefore, the piling work should act more efficiently and efficiently.

In conclusion, i have checked all the documents given regarding the foundation works for the project. I propose to downgrade the pile capacity and to add more piles. The pile caps also will be revised to suit the additional piles. For piles sitting on suspected steep slopes, we propose to use Oslo pile shoes to assist in pile stability.

I will design for the additional piles and enlarged pile caps. I will be providing the drawings according to the behaviour of the piles and the number of additional piles required. For piles that set at 9m then they are deemed to be satisfactory.

References

1. En. Zul Kifli bin Ismail- Managing Director
2. En. Mohd Noor Anzam bin Deraman- Project Manager
3. En. Adrul Hisyam bin Adnan- Site Engineer
4. Panduan Kerja-Kerja Pemeriksaan Kecacatan Bangunan- Dr. Ahmad Ramly
5. Peter Glover, Building Surveys, Third Edition, 1996.

APPENDIX