



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

PILING AND PILECAP WORKS FOR 1020 UNITS APARTMENT

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(PERAK)**

FEBRUARY 2022

It is recommended that the report of this practical training provided

By

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entitled

PILING AND PILECAP WORKS FOR 1020 UNITS APARTMENT

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

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FEBRUARY 2022

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 KERJAYA PROSPEK (M) SDN BHD for duration of 5 months starting from 23 August 2021 and ended on 7 January 2022. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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Date : 7 JANUARY 2022

ACKNOWLEDGEMENT

Firstly, I would like to take this chance to thank Allah, the Most Graceful for being able for me to complete this internship with success.

The internship opportunity I had with KERJAYA PROSPEK (M) SDN BHD was great chance for learning and professional development. Therefore, I consider myself as a very lucky person as I provided with an opportunity to be part of its. I am also grateful for having a chance to meet so many wonderful people and professionals who led me through this internship period.

I express my deepest thanks to Dr Tee Eng Han, Project Director and Mr. Abdul Muthalib, Senior Project Engineer, for taking part in useful decision and giving necessary advice and guidance and arranged all facilities to make life easier. I choose this moment to acknowledge his contribution gratefully

It is my radiant sentiment to place on record my best regards, deepest sense of gratitude to Ms. Fatima Izzati, QAQC Engineer, Mr. Nurfahmi and Mr. Ikmal Shafik, Site Engineer, Mr. Safmarudin, Land Surveyor, Mr. Johanes, Assistant Land Surveyor, Mr. Haziq Munir, Safety & Health Officer, Mr. Lim, Environmental Officer, Ms. Ong, Assistant Purchasing Manager (HQ), Ms. Ng Bee, Assistant Contract Manager (HQ), Ms. Sia Wee, Contract Executive (HQ), and Ms. Giselle, Contract Executive for their careful and precious guidance which were extremely valuable practically.

I perceive as this opportunity as a big milestone in my career development, I will strive to use gained skill and knowledge in the best possible way and I will continue to work on their improvement, in order to attain desired career objectives. Hope to continue cooperation with all of you in the future.

ABSTRACT

Pile foundations are typically used to transfer loads from superstructures through weak strata to harder soils or rocks. An important design consideration is to check the characteristics of the load. This report was conducted for the building envelope at reclamation land in Tanjung Tokong, Penang. The objective of this report is to know about a method of piling work and pile cap work. In this study also will focus on starting phrase of building construction. The methodology that have been used in this study report is observation, document reviews, and involved in activity on site. This report will also look at importance of foundation so that it can support various different types of structural loads in building construction.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

Piles and pile cap are main components for foundation of high rise building. Pile foundations are important part of a structure used to carry and transfer the load of the structure to the bearing ground located at depth below ground. There are 2 types of pile which is R.C. pile and spun pile and the design of pile cap will be decided by design engineer.

Piling is a deep foundation construction technique used to transmit building loads to strong deep strata underground. A strong layer can be a hard bedrock or a dense soil bed. Piles are usually round or rectangular cross-sectional columns of reinforced concrete, wood, steel-concrete composite material. They are driven into the earth until the ends reach a hard layer of soil. (*Shuanglong Machinery Co, 1999*).

Pile cap is used to transfer the load from the upper structure to the pile. The pile cap is a thick concrete mat that rest on the top of pile. It is part of foundation and used to distribute the load over the pile. Pile are used when the ground bearing is insufficient to carry the load of the structure. (*Mo Civil Engineering, 2016*)

1.2 Objectives

- To identify the method of piling work
- To identify the method of pile cap work.
- To determine the problems occurred and solution taken by engineer on site to solve the problems.

1.3 Scope of Study

This case study carried out at reclamation land Seri Tanjung Pinang, Tanjung Tokong, Penang and the site is located within the reclamation land. My focus of this study is to know how piling and pile cap works process is done to make a solid foundation for 1020 units' apartment.

The method of piling work used at this site is driven piling. The driven piles are meant to be hammered into the ground with the use of hammer drop and it is suited for ground with high water levels such as this site which are in reclamation land. The type of pile used for piling work on this site are spun pile and be prepared off-site by piling company. For machineries, there are two types of piling machines on site which are hammer rig 13Tan and 11Tan. Piling machine hammer rig 13Tan used to driven pile size 500mm and below, and for piling machine hammer rig 11Tan used to driven pile size 450mm and below.

For pile cap work, the construction method is constructed by excavating the area of pile cap based on drawing design by engineer to enable formwork to be inserted before concrete work is carried out. The material used for pile cap work is concrete, steel and formwork.

1.4 Methods of Study

The methods used to collect data for this study are:

1. Observation

The observation method is one of the method that has been used due to the exposure on real construction field. Witnessing and monitoring during this internship period have enhance my understanding on how real work being done specifically in the deep foundation. Within six months, I used to take pictures and videos in order to record my observation which enable me to refer back from times to times.

2. Document reviews

Document review is a method of collecting a data by reviewing existing documents. Reviewing existing documents helps understand the operation and purpose of the program. The documents that I have refer for this project is construction drawings, progress report of piling activity, and pictures of pile cap work share by my site engineer.

3. Involved in activities on site

In order to gain more knowledge about building construction, I have involved myself in every activity that happen on site. It helps me to improve my skills in terms of communication and how to handle the situation on site. My site engineer teaches me how to make a decision to solve a problem that may occurs on construction site.

CHAPTER 2.0

COMPANY BACKGROUND



KERJAYA PROSPEK GROUP BERHAD

Figure 2.1.1: Kerjaya Prospek (M) Sdn Bhd's company logo.

2.1 Introduction of Company

KERJAYA PROSPEK (M) SDN BHD, formerly known as Fututech Berhad, made its debut on the Main Market of Bursa Malaysia Securities Berhad in 1996. The Group is principally involved in construction of high-end commercial and high-rise residential buildings, property development and manufacturing of lighting and kitchen solutions.

The Group improved its track record significantly throughout the years and currently owns a portfolio of various completed and ongoing construction projects. In year 2018, Kerjaya has made its mark as No. 4 biggest construction counter in Bursa saham Malaysia.

Kerjaya Prospek Group's principal activity is mainly involved in building and constructing of high-rise residential and commercial buildings in Malaysia. Their main clients include Eastern & Oriental Berhad, SP Setia Berhad, Eco World Development Group Berhad, BCB Berhad, Yong Tai Berhad, Nusmetro Sdn Bhd, Aspen Group, Bon Estates Sdn Bhd and BBCC Development Sdn Bhd.

Moving forward, the Group plans to further develop and expand its construction segment with capabilities in piling, reclamation and infrastructure projects. The Management believes that this will further enhance the Group’s competitive edge within the industry as the Group continues to grow and strive towards the mission as a top industry player.



Figure 2.1.2: Kerjaya Prospek (M) Sdn Bhd’s Mission and Vision.

2.2 Company Profile

Company Name :	KERJAYA PROSPEK (M) SDN BHD
Business Address :	No 1 Jalan Wangsa Permai, 3rd Floor, Bangunan One Wangsa, Taman Wangsa Permai, 52200 Kuala Lumpur
Tel No :	03-6277 5192
Fax No :	03-6277 5443 / 5772
Email :	kerjayapropek@yahoo.com
Company Registration Number	35407 - U
CIDB Grade	Grade 7
Website :	www.kerjayagroup.com

Table 2.2.1: Company Profile.

2.3 Company Organisation Chart

EXECUTION AND COMPLETION OF SITE WORKS AND EARTHWORKS, FOUNDATION PILING SYSTEM AND PILE CAPS CONSTRUCTION, BASEMENT CONSTRUCTION AND ALL ASSOCIATED WORKS FOR THE PROPOSED TWO BLOCKS OF 35 STOREY SERVICE APARTMENTS (TOWER A - 440 UNITS, TOWER B - 580 UNITS) WITH 1 LEVEL BASEMENT ON PLOT B (PART OF LOT

PT16), KAWASAN TEBUSGUNA TANAH SERI TANJUNG PINANG (FASA 2A) DAERAH TIMUR LAUT, PULAU PINANG UNTUK TETUAN PESADA MENTARI SDN. BHD.

ORGANISATION CHART FOR EARTHWORK, FOUNDATION PILING SYSTEM AND PILE CAPS CONSTRUCTION, BASEMENT CONSTRUCTION AND ALL ASSOCIATED WORKS FOR THE PROPOSED TWO BLOCKS OF 35 STOREY SERVICE APARTMENTS BASEMENT ON PLOT 16B

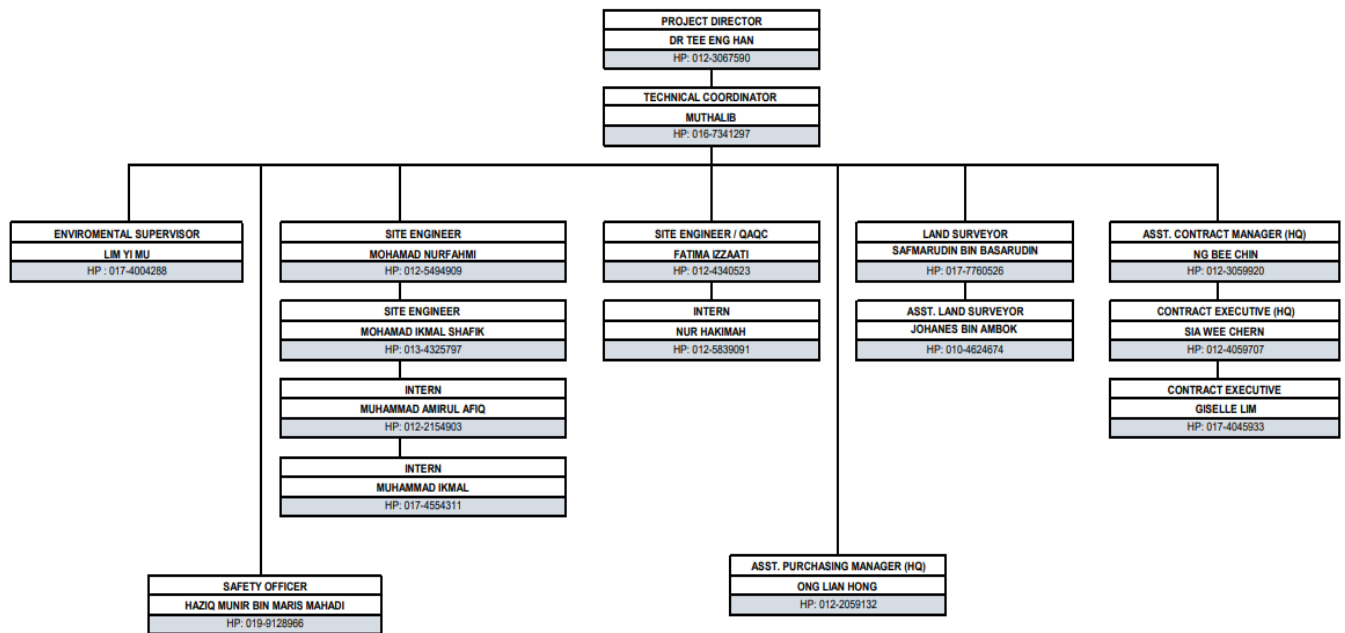


Figure 2.3.1: Company Organisation Chart.

2.4 List of Projects

2.4.1 Completed Projects

No.	Project Title	Project Value	Start Date	Completion Date	Client
1.	The Shore Mixed Commercial Development @ Melaka River	-	-	May 2015	Kerjaya Hotel Sdn Bhd
2.	Straits Quay Marina Complex @ Seri Tanjung Pinang	-	-	December 2012	E&O Property (Penang) Sdn Bhd
3.	Vista Residences @ Genting Highlands	-	-	September 2018	Bazarbayu Sdn Bhd (Subsidiary of Kerjaya Prospek Group Berhad)
4.	St. Mary Residences @ Jalan Tengah, KL	-	-	May 2012	Mergexel property Dev Sdn Bhd (JV of E&O Berhad & Lion Group)
5.	E&O Hotel @ Bandaraya Georgetown, Penang	-	-	May 2010	E&O Property (Penang) Sdn Bhd (Subsidiary of E&O Berhad)

Table 2.4.1: List of Completed Projects

2.4.2 Projects in Progress

No.	Project Title	Project Value	Start Date	Target Completion Date	Client
1.	Vertu Resort @ Batu Kawan, Penang	-	-	November 2020	Aspen Vision City Sdn Bhd
2.	Arte @ Cheras	-	-	March 2022	Nusmetro Property Sdn Bhd
3.	Axon @ Bukit Bintang	-	-	July 2022	AK Star Sdn Bhd (Subsidiary of Aset Kayamas)
4.	Bloomsvale Mixed Commercial Development @ Old Klang Road	-	-	November 2022	Kerjaya Prospek Property Sdn Bhd
5.	Edusphere @ Cyberjaya	-	-	March 2021	Aspen Entity Sdn Bhd (Subsidiary of HCK Capital Group Bhd)

Table 2.4.2: List of Projects in Progress.

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study



Figure 3.1.1: Finishing Look of 1020 units' apartment.

The title of project that I had involved for my internship as trainee was:

“CADANGAN MENDIRIKAN PEMBANGUNAN PANGSAPURI PERKHIDMATAN 35 TINGKAT YANG TERDIRI DARI:

A) FASA 1:

- i) 1 TINGKAT TEMPAT LETAK KERETA DI ARAS BAWAH TANAH (BASMEN).
- ii) 2 TINGKAT RUANG KEDAI (ANGILARI) DI ARAS BAWAH DAN ARAS 1.
- iii) 4 TINGKAT TEMPAT LETAK KERETA DI ARAS BAWAH, 1, 2 & 3.
- iv) 1 TINGKAT RUANG KEMUDAHAN DI ARAS 4.
- v) MENARA B – SATU BLOK PANGSAPURI PERKHIDMATAN 31 TINGKAT (580) (ARAS 4 – 34) DAN KEMUDAHAN RUANG DI ARAS 34.

B) FASA 2:

- v) MENARA A – SATU BLOK PANGSAPURI PERKHIDMATAN 24 TINGKAT (440) (ARAS 4 – 27) DAN RUANG KEMUDAHAN DI ARAS 27 DI ATAS PLOT B (SEBAHAGIAN LOT PT16) KAWASAN TEBUS TANAH SERI TANJUNG PINANG (FASA 2A) DAERAH TIMUR LAUT, PULAU PINANG. UNTUK TETUAN PERSADA MENTARI SDB BHD.

The construction site is located within 760 - acre reclamation land at Sri Tanjung Pinang, near Gurney Drive, Pulau Pinang. This construction site is in the middle of reclamation so it need to go through a new bridge that connect Tanjung Tokong with reclamation land. This project consists of 2 buildings tower, which are block A and block B. For the information, block A have 24 floors and for block B have 35 floors.

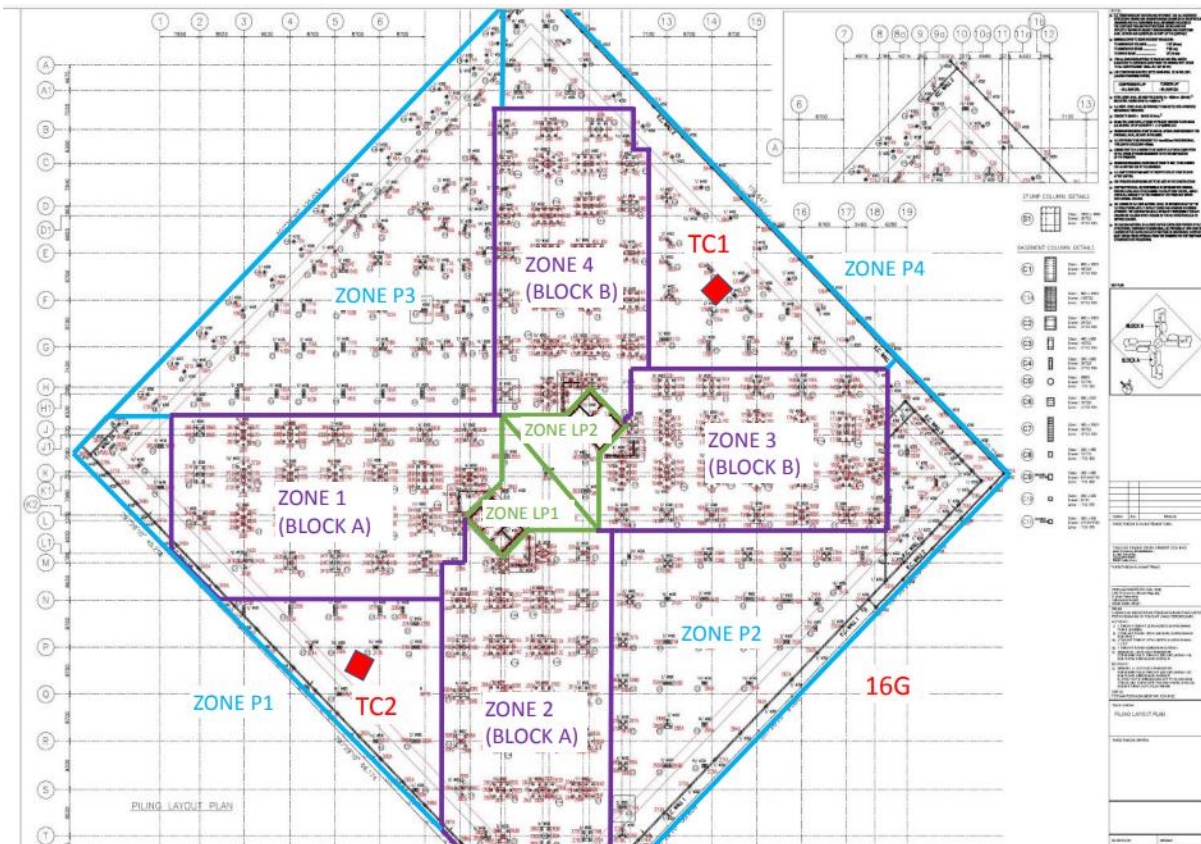


Figure 3.1.2: Drawing of piling layout

For now, the construction of the building is in the first phase of construction which is piling and pile cap works. There are 5 machines piling on site that involved in piling work and they are divided into two types of machine piling which are hammer rig 13 Tan and hammer rig 11 Tan. All machines piling operated by sub-contractors. There are also workers from sub-contractors who are in charge in pile cap works.

My focus as a main-contractor is to coordinate and supervise all workers on site regarding piling and pile cap works. The contract commencement date of this project is on 31 May 2021 and completion date is on 30 May 2022, which by means the contract lasts for 12 months. The value of this project is RM 28,398,000.00 and the client of this project is Persada Mentari Sdn. Bhd.



Figure 3.1.3: Overview of Construction Site.



Figure 3.1.4: Elevation A of Construction Site



Figure 3.1.5: Elevation B of Construction Site.



Figure 3.1.6: Elevation C of Construction Site



Figure 3.1.7: Elevation D of Construction Site



Figure 3.1.8: Pile Cap Progress

3.2 The Method of Piling Work.

Piling is defined as one of important element in foundation that are driven through the ground level along a certain length of area to carry and transfer loads to underneath ground. Basically, that means that piles are generally used when the bearing capacity of the ground is deemed insufficient for the load of heavy construction structures. The pile foundation has to design carefully by engineer according to ground conditions and loads. (*Aarsleff Ground Engineering Ltd, February 2019*).

3.2.1 Setting Out

Pile setting out need to be carried out jointly with the setting out and including additional reference points if necessary. It is to enable immediate checking for any issues regarding pile positioning.

3.2.2 Piling Platform

Pier pile positions have to install over a suitable pile installation platform such as on firm ground or on an elevated staging. The platform established have to be stable to handle weights of piling machine and working forces that will develop during pile driving. The platform also need to have height that allow for pile penetration control and pile fixing when necessary.



Figure 3.2.1: Piling Machine

3.2.3 Pile Installation

Firstly, pile need to be lifted from an overlapping position using two designated lifting points especially for concrete piles. The starter of the pile planted in the correct position manually by hanging the pile from the pushed end and then be adjusted to the required angle. When driving start, the first few blows have to closely monitored in order to enable any initial deviation to be physically corrected.



Figure 3.2.2: Driven pile

3.2.4 Pile Driving Records

Pile driving have to be recorded through an agreed format by consultant and all the relevant information such as size of pile, numbers of blows, and hammer height.

The image shows a piling record form for 'Point 1438'. It includes a data table with columns for 'Time', 'Blow', 'Depth (m)', 'Blow Count', 'Blow Energy (kJ)', and 'Set (mm)'. The table contains 20 rows of data. To the right of the table is a graph with a vertical axis for 'Depth (m)' and a horizontal axis for 'Blow Count'. The graph shows a step-like curve representing the relationship between depth and blow count. Handwritten notes on the graph include '12.4 min' and '10 blow/W'. The form also has sections for 'Project', 'Date', 'Block No.', 'Pile Ref No.', 'Pile Size (mm)', and 'Pile Serial No.'. The name 'AMIR ALI' is written at the bottom.

Figure 3.2.3: Piling Record Form

3.2.5 Pile Jointing

Pile have to be joined at the specified position using the recommended method by engineer and consultant. The required setting and hardening times for primers and epoxies have to complied with when pile joints are made in order to ensure a safe and effective joint. When welding joints, connecting plates between the driven pile and the extended pile need to have no gaps.



Figure 3.2.4: Joint of piling

3.3 Pile cap Work

What meaning by pile cap is foundation structure that transferring their loads to layer of soil or rock with sufficient capacity and suitable settlement characteristic to support them. There are two type of foundation which is shallow foundation or deep foundation. Pile foundation are deep foundation, formed by long, slender, columnar element typically made from steel or reinforced concrete. Pile caps create a stable foundation and offer a larger area for the distribution of the building load onto the piles. This types similar with piled raft foundation which concrete slab rest on soil which may susceptible to movement, above a group of piles. Pile cap are constructed by excavating an area around pile group to enable install formwork. The pile tops may be trimmed to ensure they at the same level or height. A reinforcement cage built and positioned according the alignment into the formwork. The concrete poured and then left to cure after the formwork is remove.

3.3.1 Pile Cut-off Level and Pile Plug

Pile cut-off level is the actual level concrete piles that placed underneath the pier so the pile can retain at the same level. Pile cut-off level around 75mm which is normally provided in the specification drawing. The length of stripping and reinforcement to be provided shall be sufficient to anchor the pile into the pile cover to be constructed. Pile plug also used to avoid the concrete poured into the pile.



Figure 3.3.1: Cut-off Level Piling



Figure 3.3.2: Pile Plug installation

3.3.2 Rebar installation

Rebar is the commonly used name for reinforcing bar that is used to strengthen concrete. Rebar is made from different alloys and grades of steel and is manufactured with ridges so that the concrete that is poured onto the bars can adhere easily to them. Stainless steel rebar is resistant to rust and is often used in the construction of buildings and in poured concrete driveways. Poured concrete is extremely strong and does very well under compression, but when there are tension stresses placed on it, it can fail. This stress can be relieved by strengthening the concrete with reinforcing steel bars or rebar. The rebar absorbs the tension stress and thereby prevents the concrete cracking or breaking.

Rebar placed in a grid pattern throughout project area. Always keep your rebar the same distance from each edge of the project. Rebar tied together using tie wire. Wrap the wire securely around any area with two or more rebar sections intersecting or overlapping. Use a rebar hand-tying tool to tie them together securely.

Install bent rebar at all corners. Tied corners are weak, so bent rebar will be stronger and hold up better in the corners of your project. Place rebar supports, bricks or stones under your rebar to keep it at the same level while the concrete is poured. Push the rebar into the center of the concrete surface using a rod with a hook on the end after the concrete is poured and before it is smoothed out.



Figure 3.3.3: Installation of pilecap rebar



Figure 3.3.4: Inspection rebar for pilecap

3.3.3 Formwork

As fresh concrete is in plastic state when it is placed for construction purpose so, it becomes necessary to provide some temporary structure to confine and support the concrete till its gain sufficient strength for self- supporting. This structure is called form work. Concrete form work or called as mold to produce concrete elements that having a desired size and configuration. It is usually erected for this purpose and then removed after the concrete has cured to a satisfactory strength. In some cases, concrete forms may be left in place to become part of the permanent structure. For satisfactory performance, form work must be adequately strong and stiff to carry the loads produced by the concrete, the worker placing and finishing concrete and any equipment or materials supported by the forms.

In the site the form work material we use was the wire-mesh flat sheet retention or called as Pecaform. Pecaform is flexible and versatile formworking material perfect for those radius specifications. The strength and versatility of Pecaform makes it the natural choice for applications such as ground beams, footings and bases, pile caps, construction joints (stop ends), special shapes or curves, void formation, ribbed and waffle slabs, penetrations, recesses, temporary fencing and safety screens. Pecaform will tied together with spacing block to the rebar and backfill with sand around the pecaform.



Figure 3.3.5: Installation of pecaform to pilecap rebar

3.3.4 Concrete

Concrete is a composite consisting of the dispersed phase of aggregates (ranging from its maximum size coarse aggregates down to the fine sand particles) embedded in the matrix of cement paste. This is a Portland cement concrete with the four constituents of Portland cement, water, aggregates and sand. The basic components remain in current concrete but other constituents are now often added to modify its fresh and hardened properties. This has broadened the scope in the design and construction of concrete structures. It has also introduced factors that designers should recognize in order to realize the desired performance in terms of structural adequacy, constructability and required service life. These are translated into strength, workability and durability in relation to properties of concrete. In addition, there is the need to satisfy these provisions at the most cost effective price in practice. Since our building is a reinforced concrete structure the concrete work was commenced every day for constructing or development of every part of the structure.



Figure 3.3.6: Concreting Pilecap



Figure 3.3.7: Finish Concreting pilecap work

4.0 Conclusion

During my internship at Kerjaya Prospek (M) Sdn. Bhd, lots of experienced I had learnt which that I could not get through class learning session. The exposure on real field of construction was such a precious opportunity that I have been through.

The industrial training program provides opportunity to work with other different background levels of people within the company. The wide usage of professional communication skills is being applied daily and extensively which shape the person to think professionally. The basic knowledge on contractual and construction subject which I had learned at the university are being used extensively at this department, which has helped me to understand deeper on the process of pre-contract, progress work and post-contract.

I also learned on how to think and deal with a problem that happen on construction site if there is an issue arrive. It has improved my problem-solving skills and taught me to come out with a relevant decision on how to tackle the problem that occurred. To sum up, I also able to develop a better version of myself in terms of communication skills, multi-tasking skills and managing skills. It was an interesting process throughout the learning process during my industrial training as it widens my view, knowledge, perception, and skills related to construction field.

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