



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

PAD FOUNDATION CONSTRUCTION

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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 Jabatan Kerja Raya Jajahan Pasir Mas for duration of 20 weeks 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 fulfilment of the requirements for obtaining the Diploma in Building.

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Last but not least, my special thanks to my beloved parents for their sacrifices over the years.

Thank you so much.

ABSTRACT

Bottom base of a structure is a very supreme portion as it joins the main body superstructure to the soil known as foundation. Different types of foundation bases are used in many sorts of constructions; each one has a distinct design and layout that contributes to the durability and firmness of the structure. This report is about one type of foundation which defined as pad footing. The objective of this report is to explicate the procedure of the construction, to investigate which method is convenient and study the problems occur during construction and their solutions. This report is conducted by observations on site, interviews experienced staff and some journal to gain more information about pad footing.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

A foundation is the main vital structural part for a building which is it allows to support the structure by transferring the live and dead loads to the layers of soil or rock. It is constructed underground level in solid surface and connected to the superstructure. They are usually constructed using concrete with rebar reinforcement that has been poured into an excavated trench. Foundation is divided into two types which is shallow and deep foundation. Shallow foundation is typically used when the load force by a structure is low compared to bearing capability of the surface soils. Deep foundation is constructed where the loads need to be transfer to deeper layer which is more than 3 meters from the surface. In construction industry, deep foundation is more expensive compared to shallow foundation.

Shallow foundations have various types, for instance, raft footing, strip footing, and pad footing. The construction of a footing must be followed by their requirements, such as the strength and suitability of subsoil settlement. Footing construction is best left to the professionals, who can examine the soil conditions and determine the necessary depth and breadth for the footings, as well as their placement (Brent Anderson, 2020). Pad footing is designed in rectangular, square, and circle forms. They are provided to support localised single point loads such as columns, stumps, or frame structures. Pad foundation design entails sizing the base slab to meet geotechnical requirements while also providing appropriate thickness and reinforcement to meet structural requirements (Ubani Obina, 2020). Figure 1.1 shows the design of a pad foundation.

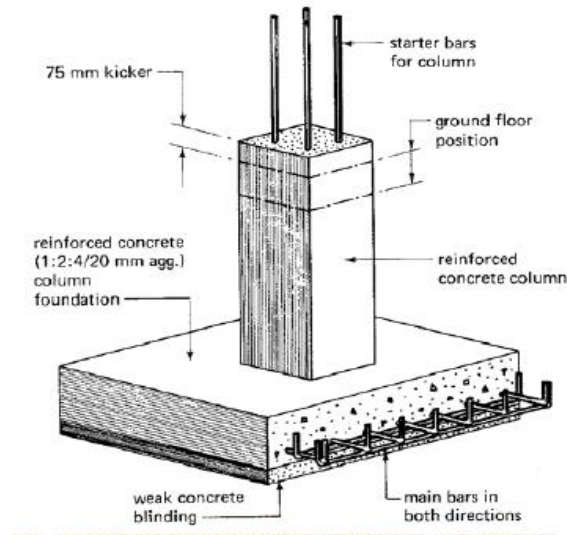


Figure 1.1 Design of a pad foundation

Source:

https://www.academia.edu/37760172/Blinding_concrete_layer_Reinforcement_of_pad_footing

Aside from, raft foundation or alternatively referred as mat footing are composed of reinforced concrete slabs of uniform thickness which require (usually 150 mm to 300 mm) that span a large area, often the whole of a building's footprint. They distribute the weight exerted by several columns or walls throughout the foundation area and may be seen of as 'floating' on the ground in the same way as a raft float on water. It is appropriate to use when a basement is required. Another type of foundation is called strip foundation. It provides a continuous level or stepped support strip for a linear structure, such as walls or closely spaced rows or columns placed in the centre above. The footing is rectangular in shape. Figure 1.2 shown the design of a raft foundation meanwhile figure 1.3 shown design of a strip foundation.

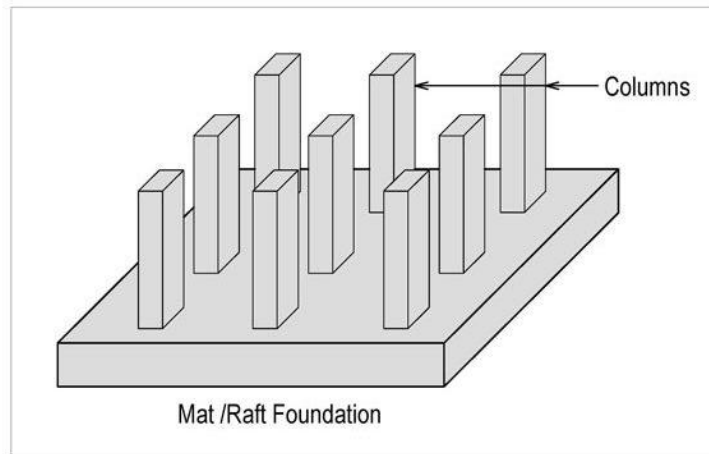


Figure 1.2 Design of raft foundation

Source: <https://gharpedia.com/blog/raft-foundation-types-advantages-disadvantages/>

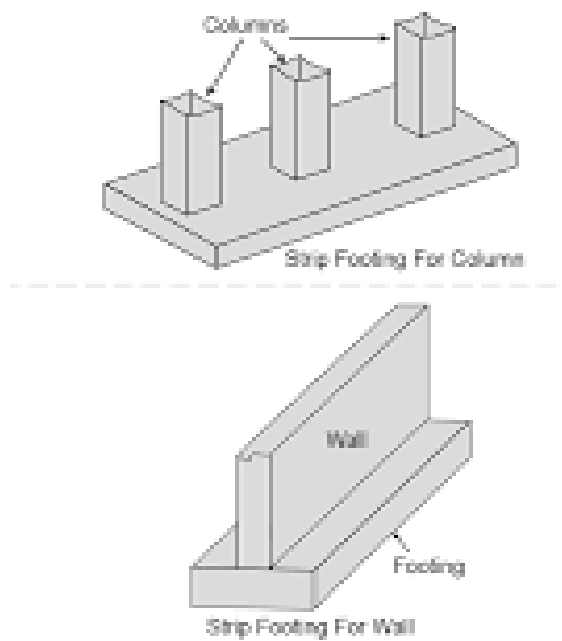


Figure 1.3 Design of a strip foundation

Source: <https://dreamcivil.com/continuous-footing>

1.2 Objectives

- i) To describe the procedure of pad footing construction
- ii) To define the machineries and equipment used in pad foundation construction
- iii) To study the problems during the process of pad footing construction and the solutions of the problems.

1.3 Scope of study

The case study is about a project named "Pembinaan Kem Wawasan Negara" that began in March 2021. It was carried out at Tanah Merah Kelantan, which is near Bukit Panau foothill. For this study, it will focus on pad footing construction, which is the methods of construction, and investigate problems that have arisen, including their solutions. Several issues have arisen during the construction process, for instance, rainy days causing stagnated water in the pad footing construction area. However, the person in charge has taken action to address this issue. Thus, there are two different ways to construct pad foundations, which are cast in situ concrete and precast concrete. Hence, this study elucidates the differences between both, and which method is used including their machineries and equipment used. The designer for this project had proposed building a pad foundation as the basis of the structure for each block, except for the compact sub, for which it used a raft foundation.

1.4 Methods of study

There are some methods of data collection that are used to achieve the objectives of this report such as:

1. Observation

This is the main method of collecting the information. During the site visit, some pictures were taken, and I have jot down some important notes so that it will not be missed to include the information in this report. By observing, the process that has been taken to build the pad foundation is clearer instead of reading a journal. Besides, the visual observation has been recorded by taking pictures besides taking the notes. By observing, it is easier to understand the process of pad footing construction.

2. Interviews

To collect more information, a non-directive interview is held with my supervisor, technical assistant who is in charge to monitor the project and site supervisor by asking questions directly and get the answer on the spot. The main keys during the interview were written as my references. Through interview session, it provides me some crucial information related to the project.

3. Document review

Another method of study is by reviewing document. This method used by looking through the site report, construction drawing and civil drawing. Thus, looking to the documents can avoid misunderstanding as it refers to the fact. Document provides graphic representation of the construction so that the result will be visualized.

4. Journal

Apart from that, some journal also be my references to get some new knowledge. There are so many journals related to the topic that I can studied on the internet. Hence, it can avoid confusion by reading a journal.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Jabatan Kerja Raya (JKR) is a federal government department which is established under Ministry of Works Malaysia. In this days and age, their role is to manage the construction and maintenance for all the public infrastructure in west Malaysia and Labuan to fulfil the development of country. As a government department, JKR has touched many aspects of national life by providing the necessary infrastructure, such as roads and water supply systems. According from that, JKR has been divided into several branches that specialize in their own fields such as mechanical, building, electrical, and road work. For this training, I was assigned to JKR Pasir Mas that was established separately in February 1984.

JKR Pasir Mas is responsible to monitor and implement projects in 10 districts which are Rantau Panjang, Kangkong, Bunut Susu, Kubang Gadong, Gual Periok, Pasir Mas, Alor Pasir, Chetok and Kubang Sepat. As a government agency, the department has grown exponentially in terms of staff enhancement or terms of reference. JKR Pasir Mas currently consists of 76 staff led by Colonial Engineer. JKR Pasir Mas is divided into five mains unit which are administration unit, road unit, building unit, mechanical unit and electrical unit. It is located at the town of Pasir Mas. Figure 2.1 shows the location of the JKR Pasir Mas Office.

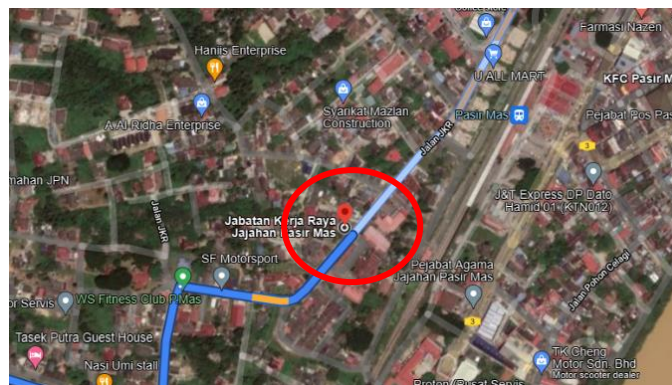


Figure 2.1 Location of JKR Pasir Mas office

2.2 Company Profile



Figure 2.2: Jabatan Kerja Raya logo

COMPANY NAME	JABATAN KERJA RAYA JAJAHAN PASIR MAS
OFFICE ADDRESS	JABATAN KERJA RAYA PASIR MAS, 17000, PASIR MAS KELANTAN DARUL NAIM
PHONE	09-790 8040
FAX NO	09-790 9203
EMAIL	pasirmas@jkr.gov.my

Table 2.1 Company Information

2.3 Company Organisation Chart

Below is the organisation chart of the building department in the Jabatan Kerja Raya Pasir Mas:

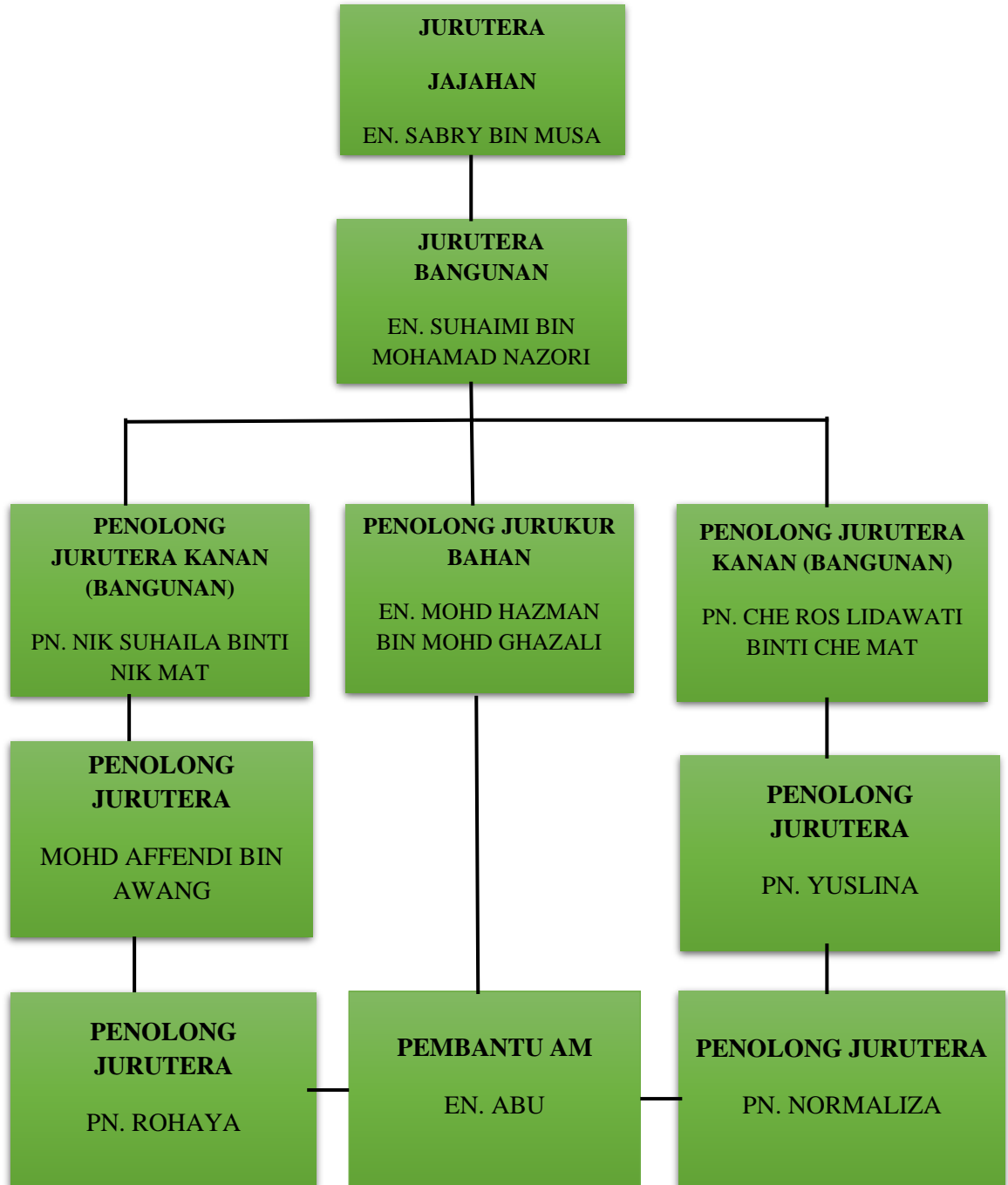


Figure 2.3 Building department of JKR Pasir Mas organization

2.4 Lists of Project

2.4.1 Completed Project

NO.	PROJECT TITLE	PROJECT VALUE (RM)	START DATE	COMPLETION DATE
1.	Klinik Kesihatan (Jenis 3) Dengan Kuarters Rantau Panjang, Pasir Mas Kelantan.	18,540,409.18	28/08/2017	17/7/2021
2.	Membaikpulih Infrastruktur Kereta Api Dan Lain-Lain Kerja Yang Berkaitan Di Stesen Keretapi Pasir Mas, Kelantan.	188,000.00	16/8/2021	18/10/2021
3.	Menaiktaraf Pusat Kegiatan Masyarakat Di Lubok Jong, Pasir Mas, Kelantan.	15/10/2021	09/05/2021	157,997.00
4.	Kerja-Kerja Menaiktaraf Dan Pemulihan Mahkamah, Pasir Mas, Kelantan	283,90.00	27/04/2021	03/10/2021

5.	Kerja-Kerja Pembaikan Bumbung Dan Kekuda Bumbung Di Sk Bakong, Pasir Mas, Kelantan.	03/09/2021	22/03/2021	349,938.00
6.	Pembinaan Gantian Surau di SK Lati, Pasir Mas, Kelantan	6/1/2022	11/03/2021	1,765,000.00
7.	Kerja-kerja Penyelenggaraan Tangki Kumbahan Di SMK Baroh Pial, Pasir Mas, Kelantan	17/5/2021	22/3/2021	95,000.00
8.	Kerja-Kerja Pembaikan Bumbung Dan Kekuda Bumbung Di SK Kampong Baru, Pasir Mas, Kelantan.	2/10/2021	20/04/2021	736,792.00

Table 2.2 List of completed project

2.4.2 Project in progress

Bil	Nama Kontrak/Projek	Nilai Kontrak (RM)	Tempoh Kontrak (Minggu)	Tarikh Siap Kontrak
1.	Pembinaan Kem Wawasan Negara	5,567,865.00	87	9/11/2022
2.	Projek pembaikan cerun dan kerja-kerja berkaitan di sekolah menengah baroh pial, pasir mas, kelantan	1,035,000.00	60	22/11/2022
3	Klinik kesihatan (Jenis 7) Sungai Keladi Pasir Mas Kelantan	3,500,365.00	73	10/2/2022
4	Pembinaan Masjid Pondok Tahfiz Al Taqwa Batu Karang. Rantau Panjang Kelantan	650,00.00	40	9/4/2022

Table 2.3: List of projects in progress

CHAPTER 3.0

CASE STUDY (PAD FOOTING CONSTRUCTION)

3.1 Introduction to case study

This project is about to construct a training centre named 'Kem Wawasan Negara' as requested by the client which is Ministry of Youth and Sports. For this project, Ministry of works is the implementing ministry. Besides, Encik Sabry Bin Musa (Colonial Engineer JKR Pasir Mas) is assigned as enforcement officer meanwhile Encik Suhaimi Bin Mohamad Nazori (Building Engineer JKR Pasir Mas) is responsible as representative of enforcement officer. The figure of the organisation chart is shown in figure 3.1.

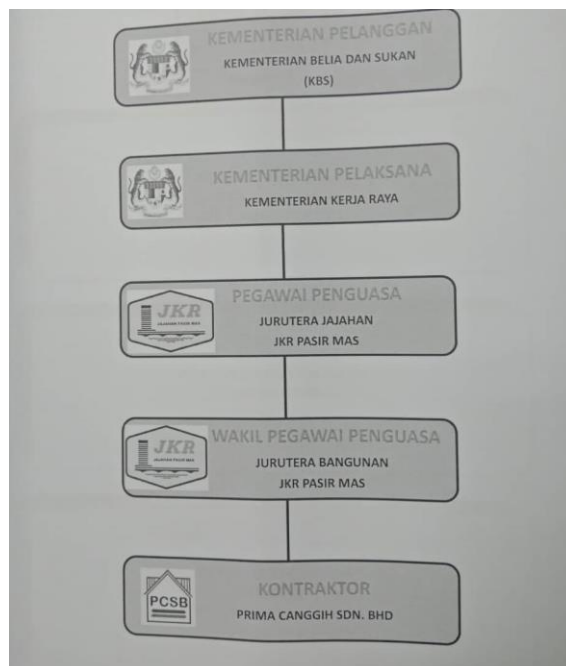


Figure 3.1: Organisation chart of the project

industrialised building system (IBS) are facing the issue of slow output. In view of the fact, that the IBS manufacturing factories are less, and it is in high demand. For this project, the footings are in different sizing which require dissimilar size of mould. Due from that, the production of IBS product is delay and it requires longer time. For this project, the designer chose to use cast in situ instead of precast concrete. Figure 3.3 shows the details of the cast in situ pad foundation in construction drawing plan.

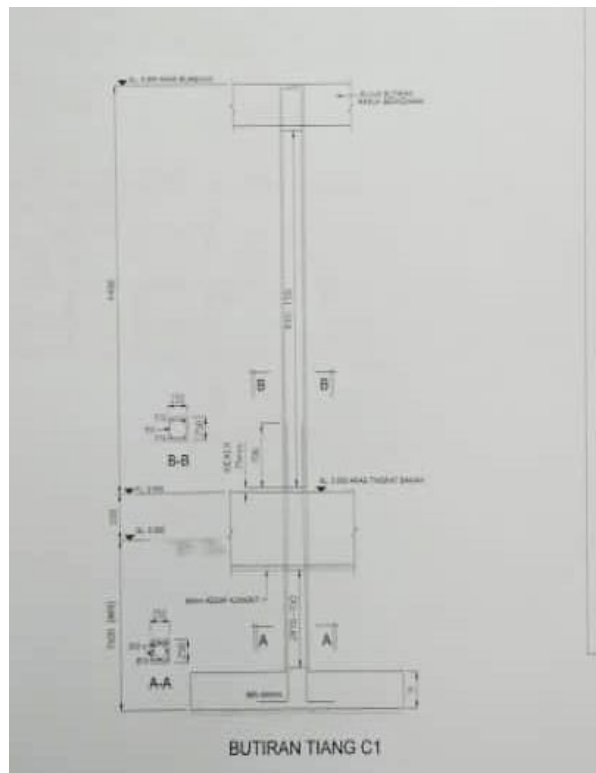


Figure 3.3: Details of Pad Foundation on Construction Drawing

3.2 The method of pad footing construction

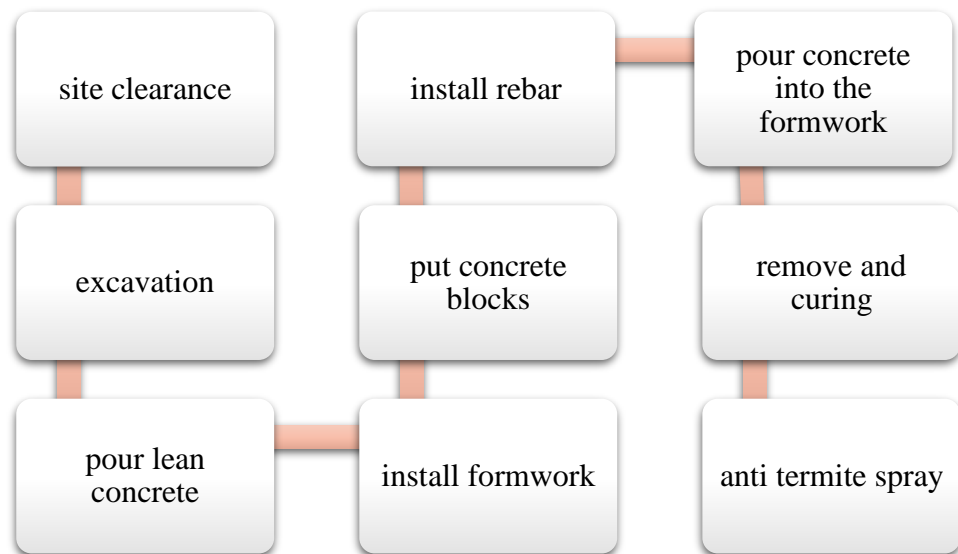













Figure 3.4: Pad foundation process

1. Firstly, the site clearance jobs were done to make sure the unwanted things were removed before conducting the work of construction.
2. Excavate the soil using excavator making a trench.
3. A layer of lean concrete was lay down to provide a uniform surface to the concrete foundation. Additionally, this helps to avoid direct contact between the foundation concrete and the ground.
4. The formworks were build using specific size that has been designed on drawing plan.
5. Then, concrete blocks are placed before the reinforcement were laid to make sure there is a space between steel rebar and the ground. If this way is not taken, the rusting on rebar will be occur.
6. Rebar installation was done using specified size and length according to the design on the drawing plan.
7. Concrete was poured into the formwork carefully. Vibrating the concrete is a must while pouring the concrete to make sure the concrete mix is perfectly compacted.
8. After 7 days, the formworks were removed.
9. The process of anti-termite treatment is done by spraying the insecticide towards the footing. The insects may ruin the structure.

3.3 Machineries and equipment used

No	Machineries / equipment	Function
1.	 <p data-bbox="592 824 810 862">Figure 3.5 Crane</p>	Used to transfer concrete from the concrete mixer truck into the formwork.
2.	 <p data-bbox="555 1317 810 1355">Figure3.6: Vibrator</p>	Used to vibrate the concrete mix in order to compact the concrete perfectly so that the air bubbles will be eliminated.
3.	 <p data-bbox="555 1749 911 1787">Figure 3.7: Concrete trowel</p>	Used to smooth the concrete surface after concrete is poured and vibrated.

4.	 <p>Figure 3.8: Hammer</p>	Used to drive and pull nails, bending and finishing the formwork.
5.	 <p>Figure 3.9: Shovel</p>	Used for digging lifting and transfer materials for instance soils, sands and so on.
6.	 <p>Figure 3.10: Concrete bucket</p>	Used to load the concrete mix to pour into the formwork.
7.	 <p>Figure 3.11: Measuring tape</p>	Used to measure the length and size of materials.

8.	 <p data-bbox="603 465 879 501">Figure 3.12: Grinder</p>	Used to remove excess material and cut the steel bar.
9.	 <p data-bbox="555 891 922 981">Figure3.13: Concrete mixer truck</p>	Used to transport, and combine the mix of cement, aggregates, water to form the concrete.
10.	 <p data-bbox="587 1370 890 1406">Figure 3.14: Excavator</p>	Used to excavate the soils and remove unnesscassary things.
11.	 <p data-bbox="555 1720 906 1756">Figure 3.15: Wheelbarrow</p>	Used to move the materials such as concrete mix.

3.4 Problems occurred during constructing the pad footing and the solutions

i. Negligence of labor workers

Poor workmanship is the major issue that occurred during the construction of the pad footing for this project. For instance, they install the incorrect size of reinforcement steel. The size should be the same based on the drawing plan. This error may lead to serious structural failure of concrete. Thence, to solve this problem, an engineer who oversees this problem checked the rebar measurement and placement before doing the concreting work.

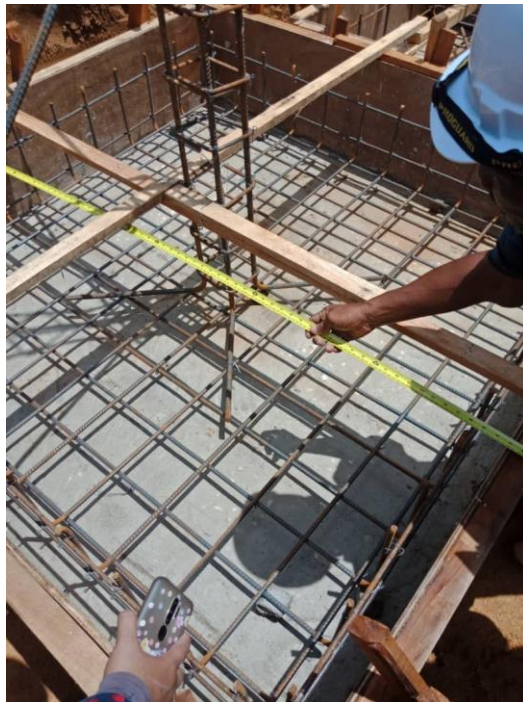


Figure 3.16: Checking on the length of the installed rebar

ii. The weather

The other difficulty during pad footing construction for this project is bad weather. As we know, December is the moonson season in Kelantan. Continuous rain results in the water stagnating in the excavated soil and inside the pad footing. Hence, to address this issue, the workers vacuumed the waterlogged area to remove the excessive water. The water may disturb the

concrete mixture ratio. If it is left unchecked, the strength of the concrete may decrease, and it could ruin the building's substructure.



Figure 3.17: Water stagnate during construction

iii. Language issues

Different languages used are also become an issue for this project. Majority of the workers is foreigners who are from Nepal, Bangladeshi, Myanmar, Indonesia, and Vietnam. In terms of time and cost management, good communication is vital to project success. They are unable to communicate with their supervisors in the local language, which may cause delays and safety precautions in their job. The solution that has been taken is explained to them clearly so that there will no misunderstanding between them.

CHAPTER 4.0

CONCLUSION

In a nutshell, a pad foundation is a common footing that is widely used in the construction industry as the design is quite simple. The process of construction does not require high costs and is very economic. Thus, the construction for this project was managed to finish successfully despite many obstacles during the process, for instance, bad weather and poor workmanship. Besides, the construction is not too complicated since it requires common machinery and equipment. However, the proper construction of pad foundation is vital as a foundation is a base for a structure that determines the strength of a building.

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