



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

METHOD CONSTRUCTION OF PAD FOUNDATION

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DECEMBER 2018**

It is recommended that the report of this practical training provided

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Entitled

METHOD CONSTRUCTION OF PAD FOUNDATION

Accepted in partial fulfillment of requirement has for obtaining Diploma in Building

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STUDENT 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 AC-DA Capital Sdn Bhd for duration of 14 weeks starting from 3 September 2018 and ended on 7 December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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ABSTRACT

A concrete pad foundation is the simplest and cost-effective footing used for the vertical support and the transfer of building loads to the ground. The pad foundation also one of the types of the Foundation in the construction. This pad foundation one of the part of the substructure. This reported conducted for the process to construct the pad foundation for pavilion. The objective for this report are to discuss the process involved to construct the pad foundation and to identify the important and problem facing during construct the pad foundation. Only one building has been construct to its superstructure is Surau but the others only for its substructure. In this report it focusing on Pavilion's pad foundation. The main findings for this report is the process involved to construct the pad foundation in this Kompleks Sukan Rembau. To complete a building, the substructure for its base was the important part that needs to be give full attention when to construct it. It was start from the setting out the building, excavation, Install the formwork and reinforcement bar and also concrete. All workers need to know the important of pad foundation and the problem facing when construct the pad foundation. This report contains all the process involved to construct the pad foundation, the important and problem facing during construct the pad foundation.

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CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Pad foundation tend to be the simplest and cheapest foundations type and are used when the soil is relatively strong or the column loads are relatively light. They are usually in square or rectangular on plan, pf uniform thickness and generally of reinforced concrete. (W. G. Curtin, 2008). Pad foundation is important to ensure that the structural loads are transmitted to the subsoil safely, economically and without any unacceptable movement during the construction of the pad foundations period. It is also design to support high loads over the limited area (Illingworth, 2002).

There are several types of pad foundations that are plain concrete, reinforced concrete, combine column foundation, continues pad and pad and ground beam foundations. Plain concrete is non- reinforced concrete pad foundation which is an economic option where the loading is relatively light otherwise excessively thick pads are needed which is not economic. The selected depth of the pad must be equal to the distance between the vertical element face and the edge of the pad on both the sides. (Arjun, 2017)

The pad foundation has its own advantages. One of them is economical due to the control of foundation size. This is because it's cheaper that pile foundation. Second is it is a shallow form of foundation that only needs a little excavation. Lastly, it shaped can be design to the accommodate tight at the sites.

Another type of pad foundation is reinforced concrete foundations. The addition of reinforcement allows for relatively wide but shallow pad foundations. In order to make the reinforcing cage easier to be construct and place, the pads tend to be designed as a square plan area. The reinforced concrete base is designed to span in one direction, with the main bars longitudinal in the bottom. Where the width of the base is restricted or where there is eccentric/inclined loading, rectangular pads can be designed.

Next is continuos pad foundation. The pad foundations are combined together as a single long structural element of pad foundation. This is where the pads and the columns they support are closely spaced. By extending the reinforcement between the pads, differential settlement can be resisted and longitudinal stiffness can be improved. This continuous pad foundation is same with pad and ground beam foundation but differs in that smaller isolated pads are connected by ground beams. This is to help to improve structural rigidity.

Combined column foundations also one of the type of pad foundation. These are where two pad foundations are combined into a longer one and can be used where the outer column is close to a site boundary. The purpose of this foundation to balancing effect of the internal column can be incorporated. Usually the shape is rectangular. The aim of the study is to discuss the method construction of the pad foundation. So in future also have experience on how to construct the pad foundation.

1.2 Objective

The aim of this report is to discuss on construction of pad foundation for Pavilion at Kompleks Sukan Rembau, Negeri Sembilan.

The objective of this report, as stated below:

- a) To identify the important of building foundation
- b) To investigate the process, involve in construction of pad foundation.
- c) To identify the problem facing during construct the pad foundation.

1.3 Scope of Study

This report contains information about the process involved, the important of pad foundation and the problem facing during construct the pad foundation of pavilion at Kompleks Sukan Rembau, Lot Baharu 6264 Hak Milik: Hsd 6333, Mukim Pedas dan Pekan Chembung, Daerah Rembau, Negeri Sembilan Darul Khusus. The process involved also included the first stage to the final stage on the construction of pad foundation to column stump of pavilion from setting out and levelling, excavation the soil, install pad foundation, stump, the important of pad foundation and also the problem facing during construct the pad foundation for pavilion.

1.4 Method of study

i. Interview

Interview had been made with the project manager, quantity surveyor, architect and site supervisor on how they run the construction and on how they construct the pad foundation of the pavilion while doing the observation. The sub-contractor also gives information about the important of the pad foundation and the problems occur during the construction. This interviews have been made at the site construction and also at the official office of the company. All the data had been record by writing the short notes in the book and record for an audio.

ii. Observation

Observation had been made every day on activity been doing by the workers on the site construction. The process involved to construct the pad foundation of pavilion had been observed. On Monday and Friday have tool box meeting by the site safety supervisor that can give information to contractor and workers about the safety for the workers on the site construction. All activity that important on the site had been record by pictures, videos and write in the daily report for the company such as the progress of construct the pavilion from pad foundation, stump and ground beam and the number of works on the site.

iii. Document reviews

The literature studies are from the construction drawing of pavilion, the bill of quantity document and progress report and the pictures that have in the site office at the site construction. All the data had been given by the site supervisor and project manager, on the site construction. All the data show the detail on construction of pad foundation and column stump of the pavilion.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

ACDA Capital Sdn Bhd is the main contractor of its own company since 27 May 1995. It is located at No. 243-2, Jalan Haruan 5/6, Pusat Komersial Oaklan II, 70300 Seremban, Negeri Sembilan from 2007 until now. Before this, ACDA Capital Sdn Bhd had run their business at Kedah from 1995 until 2006 and then started their business in Seremban Negeri Sembilan with 3 staff. This company is own by Eliwaty binti Ellias and Emirina binti Ellias. They are sisters that have shareholder in this company. Ir Hj Md Nazar bin Ujang is the project director of this company that take over all the works in the company.

ACDA Capital Sdn Bhd is a contractor register with CIDB in gred G7 and in categories of B (building construction), CE (Civil Engineering works) and ME (mechanical and electrical). The number of registration of CIDB is 1961113-KD014272 on 13 November 1996. This company is a Bumiputera company and get many job on construction from government project. ACDA Capital Sdn Bhd also had done many projects in that involve in build a school and office.

The current project for this company on going is at Rembau (Cadangan Pembangunan Kompleks Sukan Rembau Di Atas Sebahagian PT 2540(Lot Baharu 6264) Hak Milik: HSD 6333, Mukim Pedas dan Pekan Chembong, Daerah Rembau, Negeri Sembilan) and also at Nilai (Pembinaan Sekolah Baharu 24 Bilik Darjah Dan Lain Kemudahan Sekolah Kebangsaan Nilai Impian, Nilai, Negeri Sembilan).

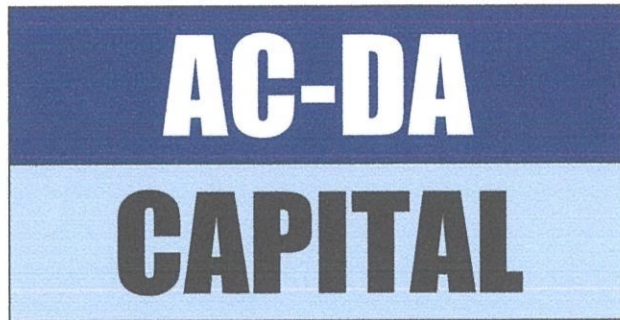


Figure 2.0 Company logo

Source: ACDA CAPITAL Sdn. Bhd

The current project for this company on going is at Rembau (Cadangan Pembangunan Kompleks Sukan Rembau Di Atas Sebahagian PT 2540(Lot Baharu 6264) Hak Milik: HSD 6333, Mukim Pedas dan Pekan Chembong, Daerah Rembau, Negeri Sembilan) and also at Nilai (Pembinaan Sekolah Baharu 24 Bilik Darjah Dan Lain Kemudahan Sekolah Kebangsaan Nilai Impian, Nilai, Negeri Sembilan). Now this company is intensifying their company in Negeri Sembilan. ACDA Capital Sdn Bhd always maintain their reputation as a construction company. They not only build a new houses or a building but also do reconstruction works.



Figure 2.1 ACDA Capital Sdn Bhd main office

2.2 company profile

Table 2.0 Company profile information

1.	Company name	AC-DA CAPITAL Sdn. Bhd
2.	Company address	No. 243-2A, Jalan Haruan 5/6, Pusat Komersial Oakland II, 70300 Seremban, Negeri Sembilan Darul Khusus
3.	Owner	1. Eliwaty binti Ellias 2. Emirina binti Ellias
4.	Year of establishment	27th Mei 1995
5.	Contact	Tel No: 06-6323322 & 06-6333322 Fax No: 06-6313322 Email: acdacapital@yahoo.com
6.	CIDB registration number	1961113-KD014272
7.	Scope of work	1. Building Construction 2. Civil Engineering works 3. Mechanical and Electrical works
8.	Company Vision	We committed to provide timely completion of project, meeting customer requirements and satisfaction at all time, produce skilled and competent employees and towards improvement initiative.
9.	Company mission	1. Competency To improve employees' knowledge of all levels through training minimum 1 day per employee per year. 2. Compliance To complete 100% of all projects with all contract terms & condition, statutory &

		<p>regulatory</p> <p>3. Customer satisfaction</p> <p>To achieve 85% customer satisfaction through customer survey response.</p>
10.	Prime bank	<p>Bank Muamalat Malaysia Berhad</p> <p>Wisma Great Eastern</p> <p>No. 105, 107 & 109</p> <p>Jalan Yam Tuan</p> <p>70000 Seremban</p> <p>Negeri Sembilan Darul Khusus</p>

Source: ACDA CAPITAL SDN BHD

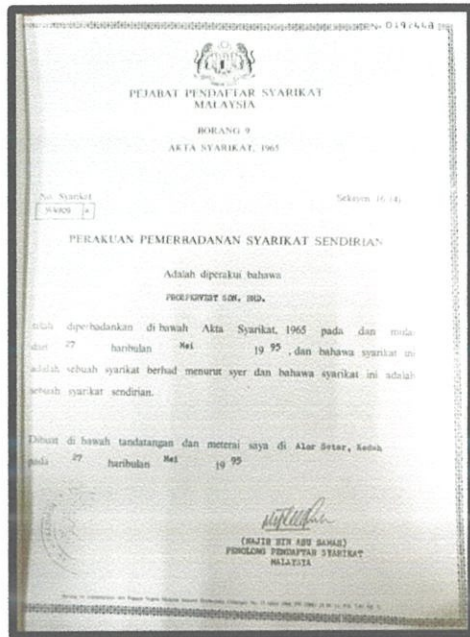


Figure 2.2 Certificate of corporation incorporation



Figure 2.3 SSM certificate

Source: ACDA CAPITAL Sdn. Bhd

2.3 Organization Chart

This organization chart is describing the position each of the employer in the company ACDA Capital Sdn Bhd and RC Metal Sdn Bhd. At the site construction have one team had mix together from this two company to complete the project in 2 years from 2017 until 2019. The Project director is Ir. Md Nazar bin Ujang as the Chairman for this project. Then followed by En Azhiri bin Ali as the Project Coordinator and Cik Nurul Aina bin Ab Rahman as the QS Manager.

As Site Coordinator is Cik Nor Fazlia binti Sabran. The Resident Engineer is the person who supervise the planning, coordination and implementation of construction projects is En Nik Zulkifli bin Dato Nik Omar. To make sure the construction doing with planning, Project Manager will play the lead role in planning, executing, monitoring, controlling and closing projects with his Assistant Project Manager that is En Zaliman. En Asraf bin Muslim as the site supervisor and Mr. Deva as the Site Safety Supervisor at the construction. The organization chart as shown in figure 6.

Site Organization Chart

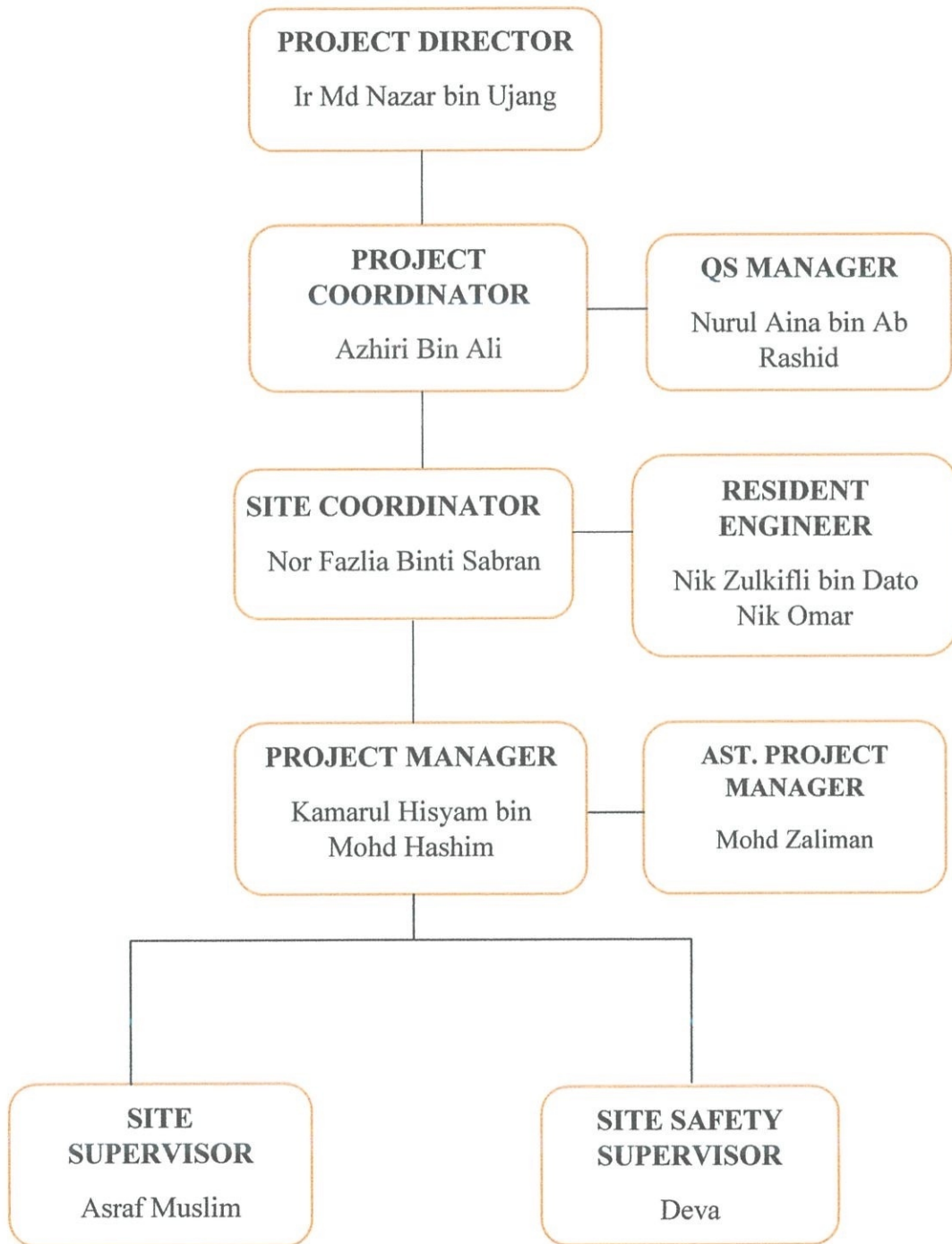


Figure 2.4 Site organization chart

Source: ACDA CAPITAL Sdn Bhd

2.4 List of Project

ACDA Capital Sdn Bhd have done works related to building construction in Kedah and Selangor fom 2004 until 2006. After 2006 this company join the tendering in private and public sector in Negeri Sembilan.

2.4.1 Complete Project

There are 3 latest complete project from ACDA Capital Sdn Bhd from 2004 until 2006. There are all building and civil works.

Table 1.1 Complete project

No.	Name of Completed Project	Cost	Client	Date Done
1.	Cadangan Kerja-kerja Pengubahsuaian Bangunan Dewan Perniagaan Melayu Malaysia Negeri Kedah Di Atas Lot 156 Dan 157, Bandar Alor Star, Kedah Darul Aman. DPMM/KED/3/2006	RM 4,093,810.00	Dewan Perniagaan Melayu Malaysia Negeri Kedah	31 September 2006
2.	Cadangan Merekabentuk, Membina Dan Meyiapkan Bangunan Pejabat 4 Tingkat, D.ewan serbaguna Serta Kerja-kerja Sampingan di Lembaga Lebuhraya Malaysia. LLM/167/2004	RM 15,356,356.00	Lembaga Lebuh Raya Malaysia	6 August 2005

3.	<p>Cadangan Membina dan Menyiapkan 4 Unit Rumah Sesebuah Satu Tingkat, 37 Unit Rumah Link 2 Tingkat (20' x 70') Type 1 Dan 30 Unit Rumah Link 2 Tingkat (20' x65') Type 2, Sebuah Pencawang Elektrik Dan Kerja-kkerja Yang Berkaitan Di Atas Lot 123 Tanah Rezab Malayu Mukim Ijok Bukit Badong Kuala Selangor, Selangor Darul Ehsan</p> <p>PKNS/IP/TRM/KS/KON-1/2005</p>	<p>RM 19,696,969.00</p>	<p>Perbadanan Kemajuan Negeri Selangor</p>	<p>16 Jun 2007</p>
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Source: ACDA CAPITAL Sdn. Bhd

2.4.2 Project in Progress

The current project for this company at Rembau and Nilai Negeri Sembilan. The project is Construct the “Kompleks Sukan Rembau” and “Pembinaan Sekolah Baharu 24 Bilik Darjah Dan Lain Kemudahan Sekolah Kebangsaan Nilai Impian”

Table 2.3 Current project

No.	Name of Completed Project	Cost	Client	Date Done
1.	Cadangan Pembangunan Kompleks Sukan Rembau Yang Terdiri Daripada : i. 1 Blok Dewan Badminton ii. 1 Blok Astaka iii. 1 Blok Surau iv. 2 Unit Gelanggang Futsal Beserta Gelanggang Sukan Terbuka, Pondok Pengawal, TNB Sub-Station, Rumah Sampah dan Sistem Rawatan Kumbahan Kecil (SSTS) Di Atas Sebahagian PT 2540(Lot Baharu 6264) Hak Milik: HSD 6333, Mukim Pedas dan Pekan Chembong, Daerah Rembau, Negeri Sembilan. KBS.KEW.S.4-14/52 (T.21/2017)	RM 25,158,111.95	Kementerian Belia dan Sukan	8 July 2019

2.	Pembinaan Sekolah Baharu 24 Bilik Darjah Dan Lain Kemudahan Sekolah Kebangsaan Nilai Impian, Nilai, Negeri Sembilan. KPM/BPP/2018/21	RM 22,896,000.00	Kementerian Pendidikan Malaysia	8 July 2019
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Source: ACDA CAPITAL Sdn. Bhd

CHAPTER 3.0

CASE STUDY

3.1 Introduction of Project

Ministry of Youth and Sports had own a project in Rembau that is Cadangan Pembangunan Kompleks Sukan Rembau Yang Terdiri Daripada : i. 1 Blok Dewan Badminton ii. 1 Blok Astaka iii. 1 Blok Surau iv. 2 Unit Gelanggang Futsal Beserta Gelanggang Sukan Terbuka, Pondok Pengawal, TNB Sub-Station, Rumah Sampah dan Sistem Rawatan Kumbahan Kecil (SSTS) Di Atas Sebahagian PT 2540(Lot Baharu 6264) Hak Milik: HSD 6333, Mukim Pedas dan Pekan Chembong, Daerah Rembau, Negeri Sembilan. The signboard of this project as shown in appendix C.

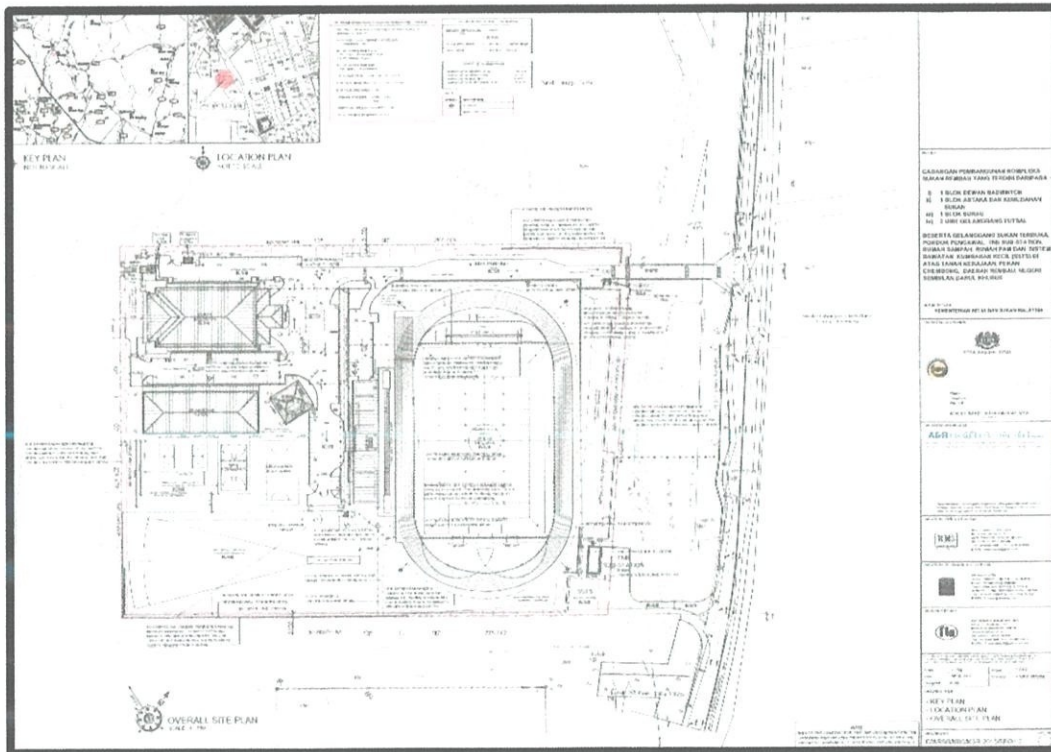


Figure 3.0 Key plan for Kompleks Sukan Rembau

Source: ACDA CAPITAL Sdn. Bhd

This project is located in front of the SRJK Tamil and besides to TNB Substation. The location of this project is near to the grocery store and also have a private clinic. This is easier for the workers if have an emergency. This project cost (RM 25,158,111.95) in the contract sum. The duration of this project is 2 years started from 10 July 2017 and expected completion follows in the contract is 8 July 2019.

The client for this project is Ministry of Youth and Sports and it is a government project. The consultants that involve in this project are A&R Architect Sdn Bhd (architectural consultant), RMS & Associates Consult Sdn Bhd (civil&structure), KR Associates Sdn Bhd (Mechanical and Electrical consultant) and FLA Jurukur Bahan (Quantity surveyor consultant). At the construction have clerk of work for architect En. Zulkhairi and for Electrical and Mechanical is En Johari. En Nik as the Resident Engineer for this construction.

The main contractor for this project is ACDA Capital Sdn Bhd. They totally sub to RC Metal Sdn Bhd. The main contractor only monitors the works doing by the sub-contractor. Person in charge in this construction at the site are En Kamarul Hisyam as the Project Manager and En Zaliman as the Assistant Project Manager. En Asraf as site supervisor that will monitor all the workers on the site. The activities that being carried out in this construction are focus to the substructure work. Only Surau have built for its superstructure.

For futsal court, it is waiting for the Maintained load test (MLT) and had peg the grid line. For Badminton's hall has been concrete the ground beam and now focusing on lay the crusher run for the slab and its superstructure. The TNB Substation also in progress of laying on the crusher and get ready for its superstructure. The netball, basketball and takraw court had been done for its construction. For javelin throw is not been construct yet also with the guard house. The football field and running track is now works on half round concrete drain 250 mm and then will continue for the running track.

And lastly, the pavilion is ongoing for its substructure and waiting for the reinforcement to be inspect by the resident engineer before continue for the superstructure. In this report is focusing on the construction of pad foundation of pavilion from the beginning until the column stump at grid line 4A TO 2A1 and F to C (p 54) as

shown in drawing in the appendix A. The size of the pad foundation is 5650 x 5650 mm with high 650mm. the size of the stump is 500 x 800 mm (C 27). In this report also focusing on equipment, materials and machineries used to construct the pad foundation. The actual look for this Project as shown in appendix B.



Figure 3.1 The actual location of Kompleks Sukan Rembau

3.2 The Important of Building Foundation

Building foundation is the bottom part of the substructure which transmit load of the structure along with its own weight into the soil underneath or surroundings. Foundations can be further classified as deep and shallow foundation. This classification also depends on the depth of load transfer from structure to the ground. The main purpose of the foundation is to distribute the structural load over a large bearing area without causing any bearing capacity failure and excessive settlement to obtain a level for building operations to increase the stability of the structure. The building foundation is always being constructed below the ground level so as to increase the lateral stability of the structure.

The building foundation is important to safely transmit and sustain to the ground which it rests the combined dead, wind and imposed loads in such a manner as not to cause any settlement or other movement which would impair the stability or it can damage to any part of the building or crack the building.

Other important of the building foundation is to increase the stability of the structure as a whole against sliding, other disturbing forces or overturning like wind. If the base of the building is not strong, within 5 years it will crack all the structure in the building and can make the building collapse. It is also for the safety of all the people in the building.

Next is, to provide a leveled and hard surface for supporting the superstructure of a building. If the foundation already has it strong strength, it can support the load from the superstructure and can effort all loads that will transfer to the ground through the foundation. The strong superstructure depends on the strong of the substructure of a building.

Lastly, to hold the structure above it and keep it upright. A poorly constructed foundation can be dangerous to the occupants and the neighborhood. With high-rise buildings touching the sky these days, it has become all the more important to have powerful foundations. Therefore, it is highly essential to determine the quality of construction when looking for office complexes and outlets for retail stores

3.2.1 Types of Building Foundations

Building foundation has two types of foundations. There are Shallow foundation and Deep foundation. All types of foundation have their own function and important for their strength. The different between this 2 types of foundation it refers to the depth of soil in which the foundation is made.

Shallow foundation depth of as little as 3ft (1m). it is also can called as spread footings or open footings. For Shallow foundation have 3 types of types. There are,

A) Individual Footing or Isolated Footing

Individual footings are the most and common types of foundations use in construction. This type of foundation only be used when the load of the building is carried by the columns. The columns will have their own footing in the ground. The shape of the footing can be square or rectangular of concrete on which the column sits on. To get the size of the footing, the engineer will take the total load on the column and will divide it by the safe bearing capacity (SBC) of the soil.



Figure 3.2 Pad foundation

B) Strip Foundation

Strip footing will be only found in load bearing masonry construction and act as a long strip that can supports the weight of an entire wall. This footing has base wider than a typical load bearing wall foundation and have better stability. This strip footing will be used only when the buildings loads are carried by the entire walls rather than isolated columns like an older building of masonry. Strip footings are used for individual columns, walls and bridge piers where the bearing soil layer is within 3m (10 feet) from the ground surface. To support the weight of the structure the soil bearing capacity must be sufficient.

C) Raft or mat foundation

Raft foundation can be called as mat foundation that most often used when basements are to be construct. In a raft foundation, the entire basement floor slab acts as the foundation the weight of the building is spread evenly over the entire footprint of the building. This foundation has name as raft foundation because the building is like a vessel that floats in a sea of soil. Mat or raft foundation usually been used where the soil is week and therefore building loads have to be spread over a large area, where the columns are closely spaced, which means that if individual footings were used, they would touch each other.

Deep foundations can be made depths of 60 - 200ft (20 - 65m). Shallow foundations are used for small, light buildings, while deep ones are for large, heavy buildings. Deep foundations are to be construct deeply below the finished ground surface for their base bearing capacity to be affected by surface conditions, the usually depths is >3 m below finished ground level. There are 2 types of deep foundation. There are,

A) Pile Foundation

Pile foundation is the deep foundation which is used to transfer heavy loads from the structure to hard rock strata to the deep below the ground level. They used column to transfer heavy loads of structure to hard soil strata which is much below ground level which shallow foundation cannot be used. This is to prevent uplift of structure due to lateral loads such as earthquake and wind forces. Generally, pile foundation been used

where the soils conditions near the ground surface is not suitable for heavy load. The depth of hard rock strata may be 5m to 50m (15 feet to 150 feet) deep from the ground surface level. This pile foundation has two types there are end bearing pile and friction pile.

B) Drilled Shafts or Caisson Foundation

Drilled shafts can also call as caisson foundation and it is also type of the deep foundation in the construction. It is also as the pile foundation but high capacity cast-in-situ foundations. It resists loads from structure through shaft resistance or combination of both of these. This type of drilled shafts is done using an auger. It can be function to transfer column loads larger than pile foundation. It will be used where the depth of hard strata below ground level is location within 10 m to 100m (25 feet to 300 feet). It cannot be used for soft clays and loose, water bearing granular soil exists. It is not suitable for soils where caving formations are difficult to stabilize and soils made up of boulder.

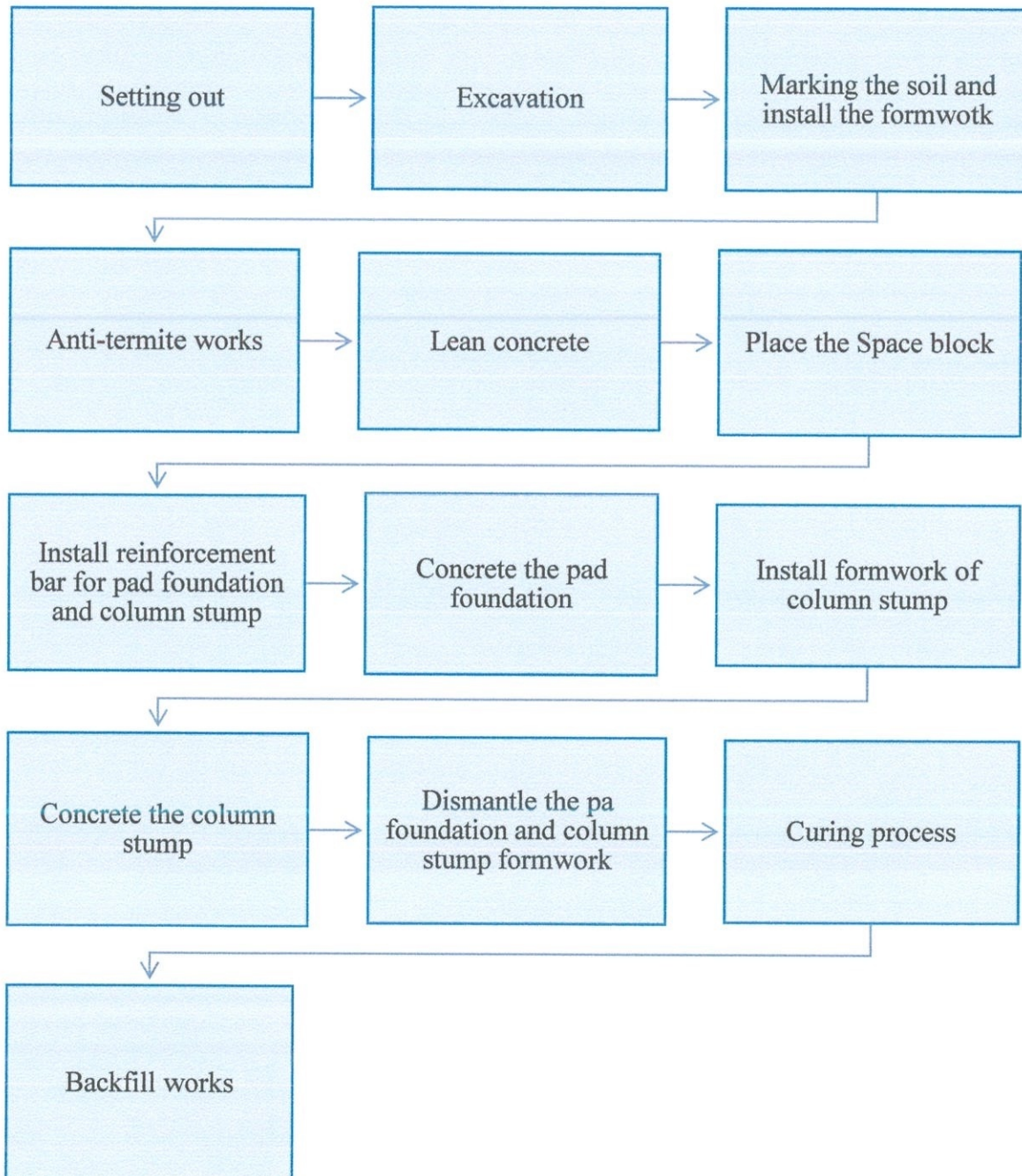
3.2.2 Pad Foundation

Pad foundation are design to support high loads over a limited area. This foundation is common where the structural form brings loads to the ground by the columns. This pad foundation is capable to pre-cast concrete, reinforced concrete and structural steel design solutions. This pad foundation can be found in low-rise industrial plants requiring large clear areas and higher rise building or office. For design purposes, this pad foundation is treated as if it were an inverted cantilever carrying the soil pressure and supported by the column. This is an economic solution to construct the foundation, although there may be construction problems involved with casting the slope.

3.3 Process Involved in Construction of pad Foundation

This is the flow chart process for construct the pad foundation in construction. This process is the common process doing by all the contractors.

Figure 3.3 Flow chart process to construct pad foundation



3.3.1 Preliminary Work

A. Setting out and levelling process

In this stages the surveyor will come to peg the gridline and baseline to determine and located the actual corners of the pad foundation, so that the pad foundation can easily to be install according to the site layout plan that been prepared at the site. The main instrument that been used is Theodolite, Steel and Linen Tapes, Arrows, Wooden pegs, Wire nails and Nylon threads. After the base line had been establish, the main shape of the pavilion is rectangle is being set up using the pegs and theodolite.



Figure 3.4 Setting out work

Steel tape is important to measure the long distance and it must be tightly stretched when taking the reading for the pavilion. Then, use the wooden peg atop by a wire nail to complete the grid line of the pavilion. This is to make sure the pavilion is straight follow the measurement in the drawing. The theodolite will give the accuracy place to construct the pavilion without any false measurement. Nylon threads are stretched between the pegs to obtain the gridlines when necessary. Then the workers will start marking and peg the grid line using the wooden peg and nylon threads. This is to easier for next activities which is excavate the soil.



Figure 3.5 The surveyor setting out the tools



Figure 3.6 The wooden peg with top of nail

3.2.2 Construction Work Stages

A. Excavation.

After done the setting out works, the worker excavates the soil using the excavator. The excavator digs the soil and put it in the dumpy truck and remove to the other side. This is because the soil need to be used again to backfill the pad foundation. They excavate the soil following the marking that had been done by the other workers. Then, the workers measured the depth of the soil so that the size of the hole for the pad foundation is following the measurement in the drawing which is 5650mm x 5650mm.



Figure 3.7 The excavators dig the hole for pad foundation



Figure 3.8 Placed the soil in the dumpy truck

B. Marking the soil to install formwork pad foundation.

Before the workers marking the soil, they will compact the soil to have a smooth surface before install the formwork. The workers will mark the place where they want to install the formwork. They will place the temporary rod so that others workers will know the place they should install the formwork. This is easier for the workers to install the formwork without any problem. This step is very important so that the place of the pavilion will not be tilted.



Figure 3.9 Compact the soil

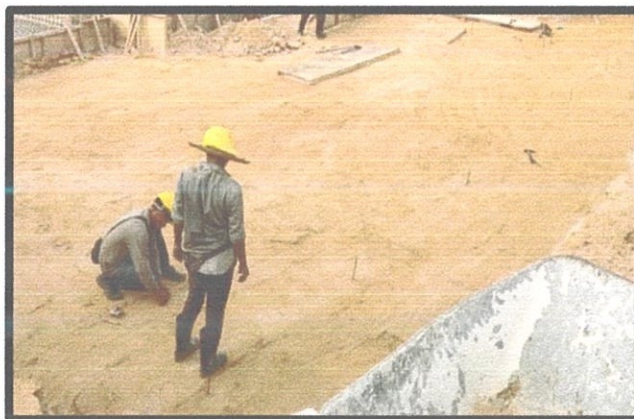


Figure 3.10 The workers mark the soil to install formwork

Before the workers install the formwork, they had prepared the formwork according to the measurement in the drawing that is 5650 x 5650mm. They will ensure the formwork is following the measurement so that the reinforcement bar will not have any problem to be install.

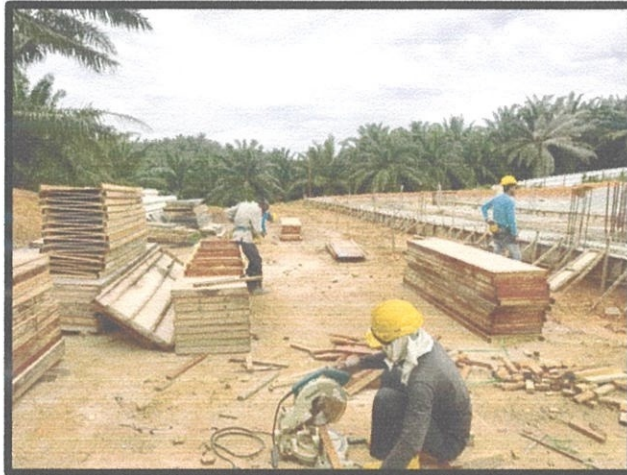


Figure 3.11 The workers prepared the formwork

When the formworks are ready, the workers will install the formwork of pad foundation following the marking that had been done before. They measurement of the pad foundation in the drawing that is 5650mm x 5650mm. For this works only needs 6 workers to complete one hole of the pad foundation.



Figure 3.12 The workers install the formwork of pad foundation

C. Anti-termite to the pad foundation

For pad foundation, 250ml from the anti-termite chemical will be mix with the water in the water tank and using the water jet to spread the anti-termite. 40m² are covered for this works. This is to ensure there are no damage on the pavilion and their finishes.



Figure 3.13 The anti-termite mix with the water

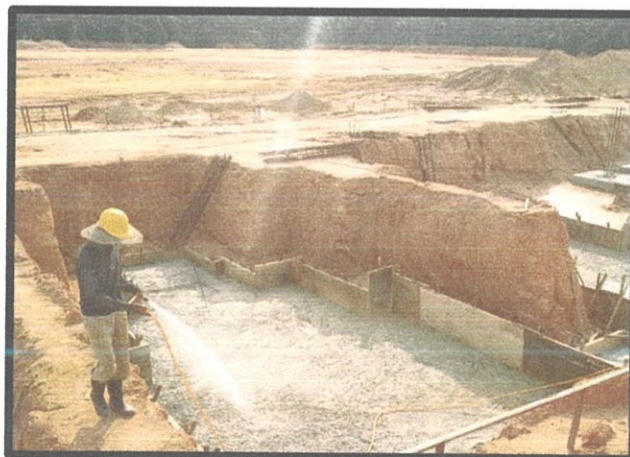


Figure 3.14 Spread the anti-termite



Figure 3.15 Using water jet to spread the anti-termite

D. Lean concrete to pad foundation

For lean concrete use grade 20 and 10 m³ for the pad foundation. This activity is being done after spread the anti-termite



Figure 3.16 Lean concrete to pad foundation

E. Spacer block

To install the reinforcement after the lean concrete has hardened, the spacer block need to be prepared first. This is because to avoid the reinforcement and formwork stick together. Between reinforcement bar and formwork need to have space in 50mm. The spacer bar is hand made by the workers using the concrete on the site construction and have wire in the middle to be tied to the reinforcement bar in the pad foundation. Then the concrete spacer block will be cut in a square.



Figure 3.17 The spacer block

F. Install the reinforcement bar

For this pad foundation, it uses T16 and T12. It is a high tensile steel and have 55 horizontals and 55 verticals. The size of the reinforcement is follows the drawing provided to avoid any problem occur. The spacer block was being place between formwork and reinforcement. The spacer block was tied with the reinforcement bar so that it will not move.

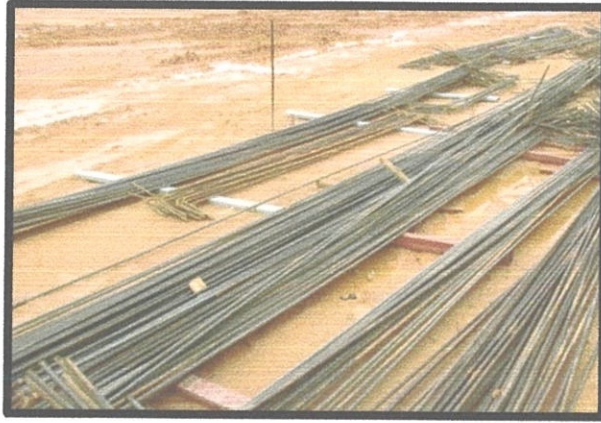


Figure 3.18 The reinforcement bar for pad foundation

The workers will tie each of the reinforcement bar tightly. This activity need many workers to complete the works faster.



Figure 3.19 The workers tie the reinforcement bar

G. Install the reinforcement bar of stump

The next step is install the reinforcement bar for stump. This step need to be done before concrete the pad foundation. The stump use T 25. It is also use high tensile steel. For the link. It uses with 24 pieces. It has 15 pieces of link at the stump. To make sure the stump is straight, they use bubble level tools on the reinforcement bar of stump.



Figure 3.20 They using the bubble levels tool

The workers will place the reinforcement stump in the middle of the pad foundation one by one and they tied the reinforcement with link. This activity needs many workers to stand the stump.

H. Concrete pad foundation

Request for information (RFI) must be sign by the Resident Engineer and get the approval to concrete the pad foundation. Before concrete the pad foundation, the workers will do the cleaning works at the pad foundation to remove all the soil because of heavy rain. For this pad foundation use concrete grade 35 for 37 m³ estimated. The slump test will be shown at the site construction before the concreter concrete the pad foundation. The slump high is 85 mm and cube on site.



Figure 3.21 Slump 85mm and cube on site

If the slump is fail, the concrete works on that day will not be allowed to be done. The resident engineer is the person will monitor the slump test and concrete works. The mobile crane will be ready first before the concrete mixer arrive. To make sure the concrete is compact in the pad foundation, the workers will use vibrator to spread all the concrete into the pad foundation.



Figure 3.22 Concrete works for pad foundation.

I. Install formwork for stump

To install the formwork for the stump, the workers have to make sure the concrete of the pad foundation had been hardened. The joints in the formwork need to be tight to against leakage of cement grout. The workers follow the measurement in the drawing that is 500 x 800mm.

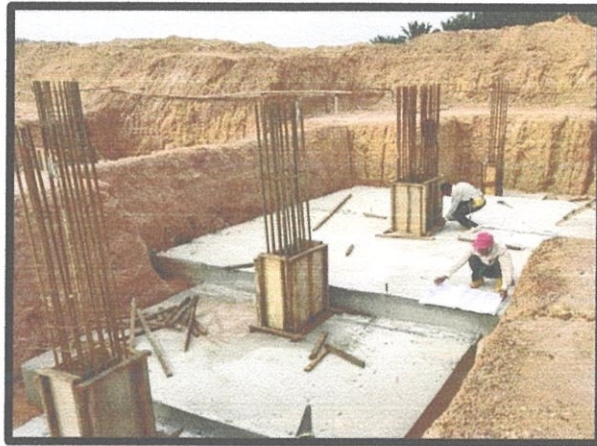


Figure 3.23 The workers follow the measurement in the drawing

The carpenter uses the bubble tools level to make sure the formwork is not tilted. It is very important to install the formwork tightly to easier to do concrete works.

J. Concrete the stump

The stump need to be concrete after had done install the formwork. Concrete for stump use grade 35 same as the pad foundation for 1m³ estimated on site. When pour the concrete the workers will ready a plain formwork to prevent the concrete going out of the stump when the concrete is being pour.

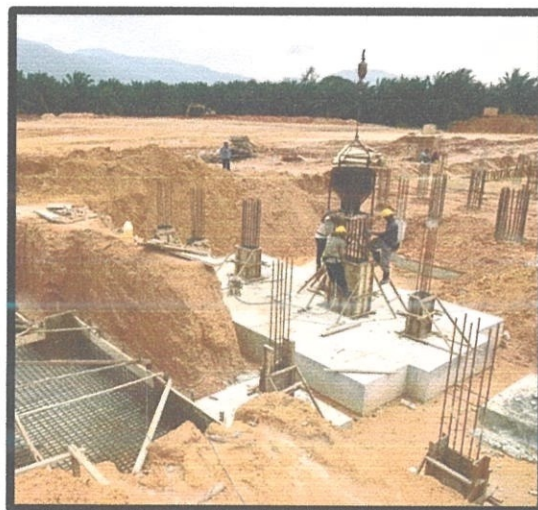


Figure 3.24 Concrete the stump

3.2.3 Post Construction Work Stages

A. Dismantle formwork of pad foundation and stump

The formwork of pad foundation was dismantling after 2 days and same with the stump. The formwork will be used again to another building to save the cost and time. When concrete has gained sufficient strength, at least twice the stress to which the concrete may be subjected to when the formworks are removed. It is also necessary to ensure the stability of the remaining formwork during formwork removal.



Figure 3.25 Dismantle the formwork of column stump

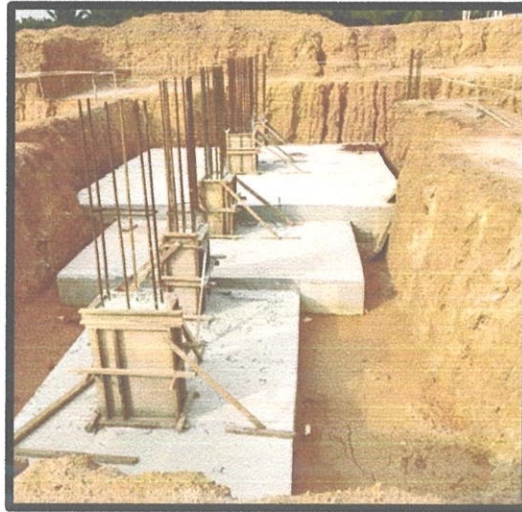


Figure 3.26 Dismantle the formwork of pad foundation

B. Curing process

Curing process is done after dismantle or removed the formwork of pad foundation and column stump. Curing process is important to maintain the moisture and temperature conditions of concrete for hydration reaction to normally so that concrete develops hardened properties over time. The main components which needs to be taken care are moisture, heat and time during curing process.



Figure 3.27 The curing process

C. Backfill the soil

After all the formwork of pad foundation and stump has been remove, backfill work will be doing by the excavator. It will backfill the soil until it reaches the proper level before install the ground beam.



Figure 3.28 Backfill to the pad foundation

3.4 The Problem Facing During Construct the Pad Foundation

A) Concrete

The concrete mixer did not come right on time. They should come at 10 a.m. but they arrive at 11 a.m. This had made the workers waste time waiting the concrete while doing nothing. There is also a problem when they arrive with the different grade of concrete from grade 35 to grade 30.



Figure 3.29 The concrete mixer

B) Workers

The number of workers for install the pad foundation must be more than 7 workers. This is because to make sure can save time to install the reinforcement and formwork and can quickly complete the pad foundation. The problem is the number of workers to install the pad foundation is small and take time to ties the reinforcement that have 55 vertical and 55 horizontal pieces. When the number of workers is small, the work become slow and will disturb the progress to install the pad foundation. If the reinforcement bar is slow to be install because of number of workers, the pad foundation cannot be concrete. Some of the workers have problem on communication. This is difficult to give instruction. They need to be guide while doing the works on pad foundation to prevent any problem occurs.



Figure 3.30 The small number of worker

C) Weather

The weather at the site can affect the works on the site. It is also can make the works delay and not following the planning had been made by the Project Manager. Heavy rain had causes the pad foundation full with soil and water. The workers need to pump out the water and do cleaning works before start another work. This has made the late to complete the building. When the heavy rain also cannot do the concreting works. The concrete will be canceled and return to the factory. This has made the company loss a lot of money.

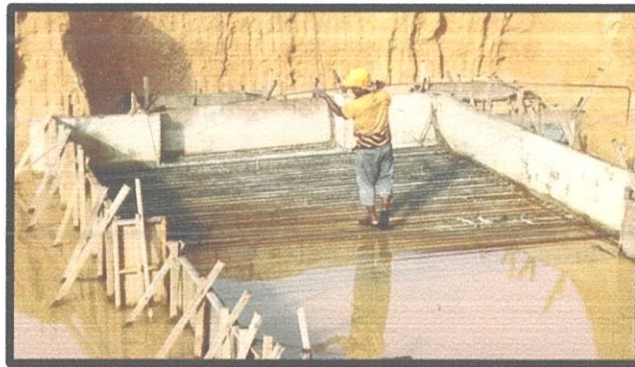


Figure 3.31 The water stagnant in the pad foundation

D) Materials

When the materials are not enough it is also a problem to complete the pad foundation. The column stump cannot be install if the reinforcement bar of pad foundation (T25) is not enough. The late to install the reinforcement, the more problem will occur. The stock of formwork also did not enough and cannot to be install to the ground for the pad foundation. Materials are the most important to construct the pad foundation.



Figure 3.32 T25 reinforcement bar

E) Safety

Safety for the workers on site are the most important things that need to be concern to. This problem occurs when the workers did not have the safety helmet and safety boot. They also did not wear the suitable clothes when construct the pad foundation. They wear a short pant that is not suitable on site construction. Some of them have the safety helmet, but they hang them on the reinforcement and only wear when the site safety supervisor or site supervisor come. Some of them also doing work when raining.



Figure 3.33 There are no safety helmets

F) Machineries

Machineries is also important to construct the pad foundation. The backhoe and excavator did not have the enough petrol and need the long time to wait for another trip of petrol arrive from the suppliers in the site. The bar bender also has a problem when it cannot to bend the reinforcements because one of the part in the bar bender had break. The small compacter also only has one and had waste time to wait the small compacter to compact soil at other building.

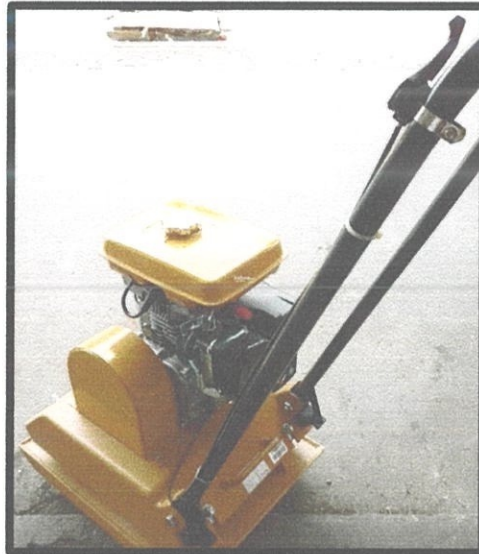


Figure 3.34 The small compacter



Figure 3.35 The Pin already broke



Figure 3.36 The bar bender machine

CHAPTER 4.0

CONCLUSIONS

Pad foundation is an important part in substructure. If the substructure of a building had failed, it will make the building collapse or the building will not strong enough. The construction of the pad foundation is the first stage must follow the right procedure to construct it. Besides that, it is important to the workers to know the important of the pad foundation so that when there are problems during construct the pad foundation they know how to solve the problem. Thus, without the equipment, this pad foundation cannot be done. Before construct the pad foundation, the equipment like formwork, and reinforcement must be ready first then followed by concrete the pad foundation.

The process involved to construct the pad foundation is same like the theory in the books. All the equipment and materials use are also same like what have been mention in the books and article. The problems occur only when there is not enough reinforcement bar for and need to be wait for few days. But it had been solving quickly by the company. the reinforcement manages to arrive only in one day.

To concrete the pad foundation, site supervisor must get permission from the resident engineer with provide the request for information (RFI) that need the Resident Engineer to sign and approve the RFI. The Resident Engineer will check the reinforcement bar of the pad foundation and give approval to concrete the pad foundation.

All the workers also follow the rule from the site safety supervisor by wearing the safety helmet, safety boots and suitable clothes on the site construction. All the workers know the personal protective equipment (PPE) when they are in the construction. Toolbox meeting will be held every Wednesday and Friday to give more safety information when on the site construction. All problems that occur on the site construction has been handle with successfully by the site supervisor and all workers on the site.

REFERENCES

BOOK

Greeno, R. C. (2016). Building Construction Handbook. Routledge.

Illingworth, J. (2002). Construction Methods and Planning. CRC Press.

W. G. Curtin, G. S. (2008). Structural Foundation Designers' Manual. John Wiley & Sons.

Roy Chudley, R. G. (1982). Building Construction 11th Editions.

Michael F. Atkinson (2003). Structural Foundations Manual for Low Rise Buildings. CRC Press

Stephen Emmitt (2010). Barry's Advances Constructions of Building. John Wiley & Sons

Hsai-Yang Fang (1990). Foundation Engineering Handbook. Springer Science & Business Media.

WEBSITE

Arjun, N. (2017). Retrieved from The Constructor:
<https://theconstructor.org/geotechnical/pad-foundation-design-principles-types-selection/7514/>

The Institution of Structural Engineers. (2018)
<https://www.istructe.org/thestructuralengineer>

Abis. (4 December 2018) Building and Pest Inspections Brisbane & Gold Coast. Website Design Brisbane:
<https://www.abis.com.au/footing>

Foundations and Footing. (2015) Topic 1.3 Foundations and footings CPCCBS6001 Ed 1.
https://yourdecision.oten.tafensw.edu.au/pluginfile.php/507/mod_page/content/129/P005

3717_LR_CPCCBNS6001_Ed1_loco_html/documents/topic1_3_foundations_footings_1
3.pdf

Tony Mansory. (2016) Essential Materials Used In Construction Of Foundations.
<https://tonysmasonry.com/essential-materials-used-in-construction-of-foundations/>

Appendix B The actual look of Kompleks Sukan Rembau



Source: ACDA Capital Sdn Bhd

Appendix C The singboard of the project

PROJEK

CADANGAN PEMBANGUNAN KOMPLEKS SUKAN REMBAU YANG TERDIRI DARIPADA :-

- i) 1 BLOK DEWAN BADMINTON
- ii) 1 BLOK ASTAKA DAN KEMUDAHAN SUKAN
- iii) 1 BLOK SURAU
- iv) 2 UNIT GELANGGANG FUTSAL

BESERTA GELANGGANG SUKAN TERBUKA, PONDOK PENGAWAL, TNB SUB-STATION, RUMAH SAMPAH, RUMAH PAM DAN SISTEM RAWATAN KUMBAHAN KECIL (SSTS) DI ATAS LOT 6277 (SEBAHAGIAN LOT 6264), PEKAN CHEMBONG, DAERAH REMBAU, NEGERI SEMBILAN DARUL KHUSUS.

PEMBINA
KEMENTERIAN BELIA DAN SUKAN MALAYSIA

PEGAWAI PENGUSAHA
KETUA SETIAUSAHA KEMENTERIAN BELIA DAN SUKAN

BAKIL PEGAWAI PENGUSAHA
SETIAUSAHA BAHAGIAN PEMBANGUNAN KEMENTERIAN BELIA DAN SUKAN

KONTRAKTOR
AC-DA CAPITAL SDN. BHD.

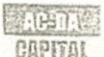
TARIKH MULA TAPAK 10 JULAI 2017 TARIKH SIAP 08 JULAI 2019

PERUNGGU SENBINA ACR	PAM	JURUTERA CIVIL & STRUKTUR RMS & ASSOCIATES CONSULT	RNS
JURUTERA MEKANIKA & ELEKTRIKAL KR ASSOCIATES	KR	JURUKUR BAHAN FLA JURUKUR BAHAN SDN. BHD.	FLA
PERUNGGU LANGSAKAP SITELINK (M) SDN. BHD.	SI	PERUNGGU PERANCANGAN SS PLANNING CONSULT	SSP

NO. KONTRAK NO. RENCANA PELAN

KBS KEW.S.4-14/52 (T.21/2017)

Appendix D Example of Request for Information (RFI) for concrete the Pavilion



AC-DA CAPITAL SDN BHD

REQUEST FOR INSPECTION

PROJECT : CADANGAN PEMBINAAN KOMPLEKS SUKAN RENIBAU	
TO : JMS & ASSOCIATES CONSULT	REF NO. :
ATTN : NIK SULFALI BIN DATO' NIK OMAR	
The following works / tests are ready for inspection / will be conducted at (time) on (date).	
DESCRIPTION OF WORKS	
Location : ASTAKA	
Nature of Work : CONCRETE PAD FOOTING (GL A-E/3) & STUMP (10 nos)	
Drawings / Sketches: RNSAC-15(40)/RBS/REMBAU/ASTAKA/STR/LAY/14.0.02	
<small>(Note: Where required, include details of products, labour and equipment to be used.)</small>	
Submitted by ACSB Sdn Bhd	Received by RE / RA / COW
Signature : MUHI MUSLIM A	Signature :
Name :	Name :
Time / Date :	Time / Date :
1.	3.
2.	4.
INSPECTION / TEST RESPONSE	
<input checked="" type="checkbox"/> Inspection acceptable / test passed* and with / without* comments. Work is allowed to proceed.	
<input checked="" type="checkbox"/> Inspection unacceptable / test failed*. Re-inspection / re-testing* required. Contractor to propose and carry out remedial works.	
All works for C/S is all in order as per drawing and specification.	
Signature : NIK SULFALI	(RE/RA/COW) Date: 30.10.2018
<small>* Delete whichever inapplicable.</small>	
<small>Doc. Ref. : ACSB/CON/REF</small>	<small>Rev. No. : 0</small>
	<small>Issue Date : 3AUG 2017</small>

Source: ACDA Capital Sdn Bhd