UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

THE CONSTRUCTION OF PAD FOOTING

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

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DECEMBER 2018

It is recommended that the report of this practical training provided

By

AHMAD DANIAL BIN AHMAD TARMIJI

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entitled

THE CONSTRUCTION OF PAD FOOTING

Accepted in partial fulfilment of requirement has for obtaining Diploma in Building.

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Khairi Consult Sdn. Bhd. for duration 17 weeks starting from 13 August 2018 and ended on 7 December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfilment of the requirements for obtaining the Diploma In Building.

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ABSTRACT

A foundation is that part of the structure that is in direct contact with the ground (Gopi,2010). Pad footing tend to be the simplest and cheapest foundation type and are used when the soil are relatively strong or when the column loads are relatively light(Seward,2006). The aim of this study is to explore reinforced concrete pad footing. The methods that are being used in the report are by observation, interview and document analysis. From the report, the construction method of reinforced concrete pad footing was discovered slightly the anti-thermite spraying on the concrete was not mention in theory plus the advantages and disadvantages of pad footing that was discovered was so many such as size of foundation, price, and size of building in construction. The conclusion is reinforced concrete pad footing is popular among the contractor to be used in the construction because of it price.

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CHAPTER 1.0 : INTRODUCTION

In civil engineering, the foundation may be defined as that part of a structure which transmits loads directly to the underlying soil and/or rock safely (Baban,2016). A foundation is that part of the structure that is in direct contact with the ground (Gopi,2010). Foundations range from straightforward simplicity to great complexity (Illingworth,2002). In the majority of cases, foundations for building and civil engineering structures are constructed of plain or reinforced concrete (Whitlow,2004).

Foundation can be classified into two major categories – shallow foundations and deep foundations (Das,2017). Shallow foundations are the common type of foundations designed for many important structures (Saran,2018). For reasons of economy, shallow foundations are the first choice of a foundation engineer for a structure unless they are considered inadequate (Ranjan,2000).

The ordinary footing used under concentrated loads such as those developed in columns is a square pad of concrete (Ambrose,1988). Pad foundations tend to be the simplest and cheapest foundation type and are used when the soil are relatively strong or when the column loads are relatively light (Seward,2006). The use of pad foundation system can be advantageous where the bedrock or bearing stratum is deep and cannot be reached economically with a deep foundation system (Chen,2000). The aim of this report is to explore the reinforced concrete pad footing at Toll Plaza 1 Complex at Denai Alam.

1.1 Objectives

The following are the objectives of this study:

i. To determine the construction methods of reinforced concrete pad footing for Proposed Building a Toll Plaza 1 Complex Containing one-storey of 1 Level of Surveillance Building, 1 Surau, 1 Public Toilet, 1 Fitment Center, 1 Guard House and 1 TNB Sub-station at Denai Alam Puncak Perdana Area, Mukim Bukit Raja, District Petaling for Damansara - Shah Alam Expressway Privatization Project - Shah Alam (Puncak Perdana to Kota Damansara for Meter Damansara Trajectory Project - Shah Alam Sdn Bhd).
ii. To identify the advantages and disadvantages of using pad footing.

1.2 Scope of study

The study that was carried out is located at Denai Alam site which is in Selangor. It also fall under jurisdiction of Shah Alam City Council. The focus of this study is the construction methods of reinforced concrete pad foundation.

What were studied in this report were concreting works for reinforced concrete pad footing, formwork size for pad footing and also reinforcement bars that help reinforce the concrete for pad footing. What not been studied were the cost for material involved in reinforced concrete pad footing and the quantity of labours involved because there are many workers there.

1.3 Methods of study

i. Observation

The construction methods of the reinforced concrete pad foundations was observed. The observation last 7 days until it completely finished. The observation was recorded by taking picture on the process.

ii. Interview methods

The interview method in this study was unstructured-interview. The person that been interviewed were site manager, site engineer, surveyor and also the workers. The interviews were recorded by taking short notes about what being asked.

iii. Document analysis

Document analysis also crucial method in this study. The documents that were referred to include the construction drawings to identify the place of the building and company profile to make report about company background.

CHAPTER 2.0 : COMPANY BACKGROUND

KHAIRI CONSULT (KC) was incorporated in 1994 with the objective of providing Consulting and Management services in all fields related to Civil, Mechanical and Electrical Engineering. Since then, KC has broadened and strengthen its areas of expertise tremendously and is capable of undertaking feasibility study, planning, detail design, supervision and management of projects of sizable proportion.

KC has also progress in its field of knowledge to include the assessment and rehabilitation of roads, bridge structures and geotechnic. This covers special investigations, detail assessment and formulating the right solutions in the most cost-effective manner.

KC has, within its organization, a team of dedicated personels at management and executive levels who possess vast experience in their respective fields of engineering. Their policy is to be proactive in their approach towards continuous improvement in the engineering capabilities. Currently KC is one of the fastest growing Engineering Consulting firm with a clear vision towards achieving the goals of becoming one of the leading firm in Malaysia.

KC headquarter is located No 76, Jalan SG 4/8, Taman Sri Gombak, 68100, Batu Caves, Selangor, Malaysia. KC can be call by 03-78597670 or 03-78597671. Among the scope of service that being provided by KC are preliminary study, engineering design and project management.

In preliminary study, KC performs preliminary planning and early studies to determine the project proposal. For the engineering design, KC provides the design to all related activities in engineering. For project management, KC provides overall management and administration of project.

2.1 List of project

2.1.1 Completed Projects

Table 1: Khairi Consult Sdn Bhd Completed Project

NO.	PROJECT NAME	NATURE OF WORK	CLIENT	PROJECT COST (RM)	YEAR COMPLETED
1	Menyiapkan Kerja Terbengkalai Hospital Shah Alam (330 katil) Selangor, Pakej 2 (Reka dan Bina)	CIVIL & STRUCTURE (Design & Supervision)	Gadang Engineering Sdn Bhd / Kementerian Kesihatan Malaysia	410.0M	2013
2	Constructed of Elevated Interchange at Jalan Pudu / Jalan Imbi / Jalan Hang Tuah Junction	ROAD	DBKL	160.0M	2014
3	Cadangan Membina Jalan Segambut Dari Jambatan KTM Hingga Ke Jalan Mont Kiara, Kuala Lumpur (Package A)	ROAD (Design & Supervision)	DBKL	69.0M	2014

2.1.2 List of Ongoing Project

Table 2: Khairi Consult Sdn Bhd Ongoing Project

NO	PROJECT NAME	NATURE OF WORK	CLIENT	EXPECTED COMPLETION DATE
1	Projek Penswastaan Lebuhraya Bertingkat Damansara – Shah Alam (DASH)	ROAD	PROLINTAS	May2020
2	Propsed upgrading of Main Arterial Road and Associated Infrastructure for KLGCC Resort Real Estate (RRE) Development Along jalan 1/40D, Off Jalan Bukit Kiara, K.Lumpur	INFRASTRUCTURE	Sime Darby Property Sdn Bhd	Oct 2019
3	Proposed Development of Taman LTAT on Lot PT5321,5322, 5323 Bukit Jalil, Mukim Petaling, Kuala Lumpur	INFRASTUCTURE	Perbadanan Perwira Harta Malaysia	Mac 2020

2.2 Organization chart

The Principal, Directors and Engineers of KC have wide experience in their respective engineering discipline. The organization consist of Directors, Managing Director, Executive Director, Associate Directors and Associate Consultant like in *Figure 1* below. This organization chart was taken from KC company profile and it is for the whole company.

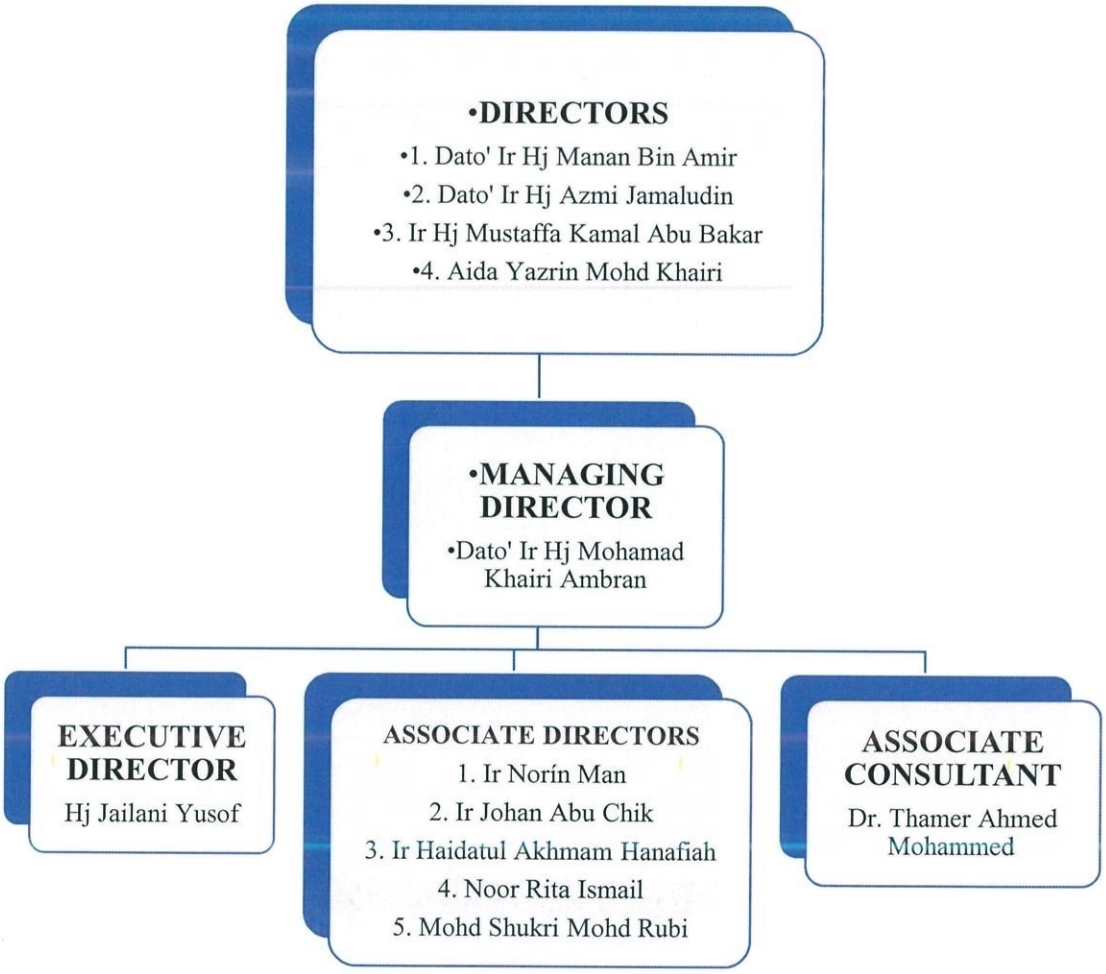

Figure 1: KC Organization Chart

CHAPTER 3.0 : CASE STUDY

The project that was carried out was Proposed Building a Toll Plaza Complex Containing one-storey of 1 Level of Surveillance Building, 1 Surau, 1 Public Toilet, 1 Fitment Center, 1 Guard House and 1 TNB Sub-station at Denai Alam Puncak Perdana Area, Mukim Bukit Raja, District Petaling for Damansara - Shah Alam Expressway Privatization Project - Shah Alam (Puncak Perdana to Kota Damansara for Meter Damansara Trajectory Project - Shah Alam Sdn Bhd). The site is located at Denai Alam in the state of Selangor. Total cost of the construction project is RM 5.6 million. The duration of the construction contract and the completion of this project is 18 months starting from 25 June 2018 and to be expected finish by 24 December 2019.

There are several parties that involved in this project. It is PROLINTAS as a client or owner, Azam Archi Tact (AAT) as architect, Khairi Consult Sdn Bhd (KCSB) as consultant, ARH Jurukur Bahan Sdn Bhd (ARH) as quantity surveyor and Pembinaan Aktif Gemilang (PAG) as the contractor.

Table 3: List of Consultant Involve

Position	Company	Address
Client	Prolintas	24 & 26, Jalan Apollo CH U5/CH, Bandar Pinggiran Subang, Seksyen U5, 40150, Shah Alam, Selangor.
Architect	Azam Archi Tact (AAT)	19 Jalan Badminton 13/29, Shah Alam, 40100, Malaysia
Consultant	Khairi Consult Sdn Bhd (KCSB)	76, Jalan SG 4/8, Taman Sri Gombak, 68100 Batu Caves, Selangor Darul Ehsan, Malaysia
Independent Checking Engineer (ICE)	Ranhill Bersekutu Sdn Bhd	Level 2, No 2, Jalan U3/6 (BK), Section U3, 40150 Shah Alam, Selangor.
Quantity Surveyor	ARH Jurukur Bahan Sdn Bhd (ARH)	224A, Jalan Negara 2, Taman Melawati, 53100 Kuala Lumpur
Main Contractor	Koperasi Peserta-Peserta FELCRA Malaysia Berhad (KPFB)	Wisma KPFB, No. 16, Blok B, Jalan 3/4C, Desa Melawati, 53100, Kuala Lumpur, Wilayah Persekutuan

Sub Contractor	Pembinaan Aktif Gemilang (PAG)	37a Jalan Pandan 3/3, Pandan Jaya Kuala Lumpur; Federal Territories; Postal Code: 55100

The site was located at Denai Alam and the whole project is about build the highway from Shah Alam straight towards Damansara. The site was near neighbourhood which is Kayangan Height. The focus for this site is to build the Toll Plaza for the highway. The total for Toll Plaza in this project are three (3). This is Toll Plaza 1 or known as TP1.

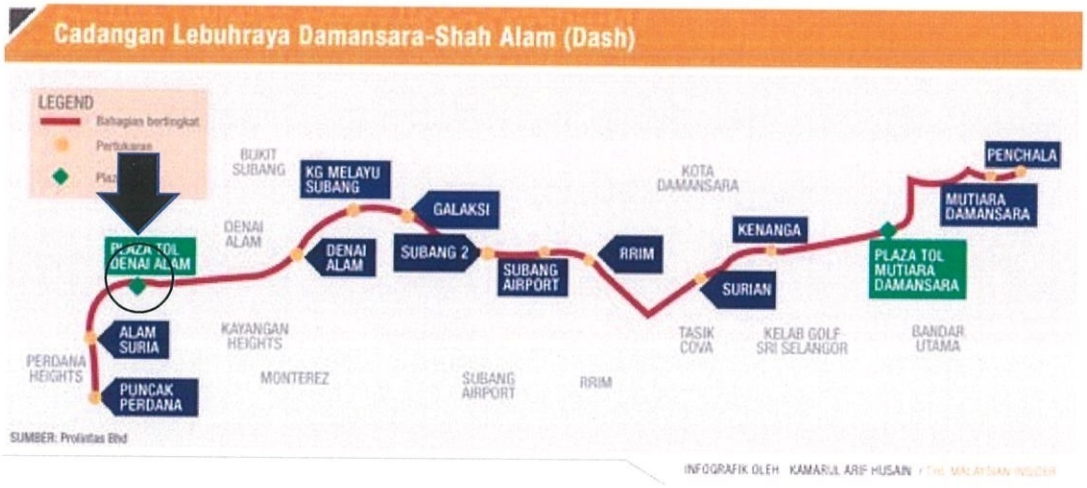

Figure 2: Site Location

3.1 Construction method of reinforced concrete pad footing

The first step in doing reinforced concrete pad footing was setting out and levelling as shown in Figure 3. This process was done by 2 surveyor. The equipment use in this process are 1 levelling, 1 tripod, 1 measuring tape and a few woods and nails. The purpose for doing this process is to know the exact place to excavate the soil for pad footing. First, the surveyors level the site according to the plan. Then, the surveyors put the woods in perimeter of construction site.

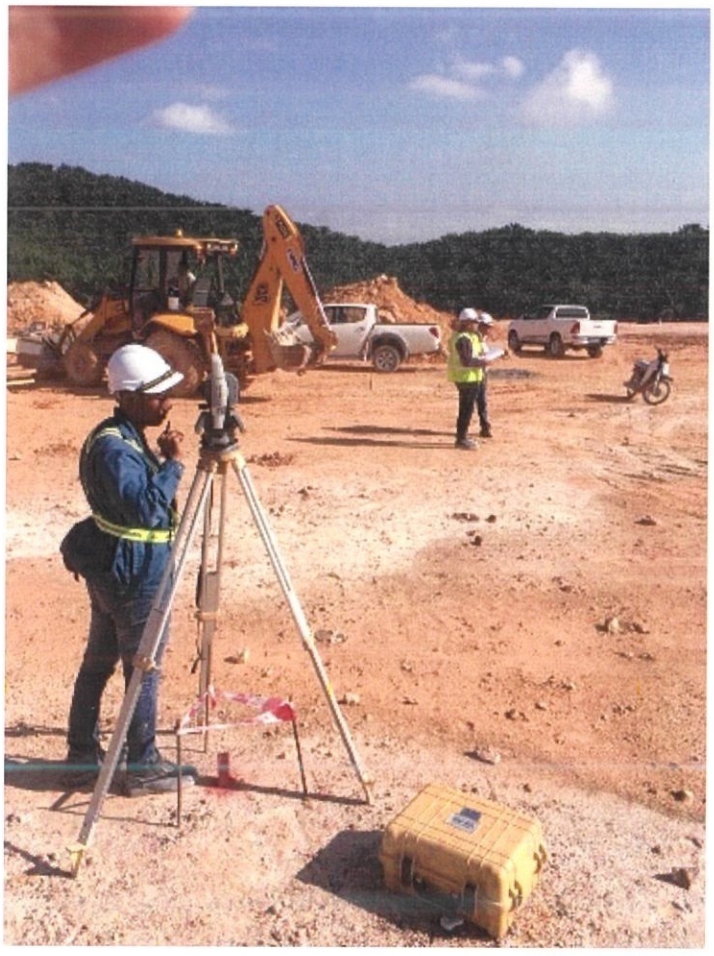

Figure 3: Levelling work

After the levelling was done, its time to excavate the soil for pad footing. The soil was excavate point which there are pad footing only as shown in Figure 4. The machine used in this work is backhoe.

Figure 4: Excavation Work

After finished excavate the soil, the worker spray anti-thermite as shown in Figure 5 and 6. It is important to spray anti-thermite to the soil so it can kill the bug hidden in the soil.

Figure 5: Anti-thermite

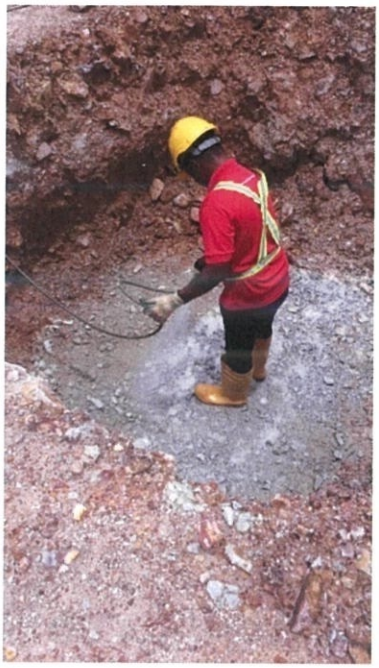

Figure 6: Spray anti-thermite unto crusher run and lean concrete

The next step is pour the crusher run and lean concrete into the hole that backhoe excavate as shown in Figure 7. The aim for pour the crusher run and lean concrete is to lap the pad footing so the pad footing not been destroy.

Figure 7: Pour crusher run and lean concrete

After that, the workers install formwork for pad footing. The size of pad footing for this project is vary and it shape is square. The formwork of pad footing is using plywood.

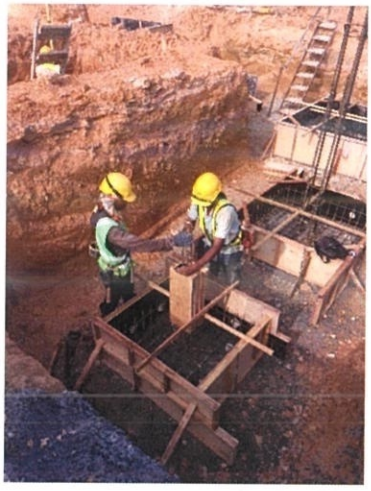

Figure 8: Installing formwork reinforced concrete pad footing

Next, the steel bar for reinforced concrete pad footing is install by using workers and crane as shown in Figure 9. The small one is using workers while the big one use crane. The size for steel bar is Y10.

Figure 9: installing steel bar reinforced concrete pad footing

After that, concreting work begin. The concrete use is concrete grade 30. Before concreting begin, the slump test was done so that the concrete will be approve by the consultant as shown in Figure 10. The slump test was supervised by consultant.

Figure 10: Slump test

Figure 11: Concreting works

After the concrete is dry, the formwork of reinforced concrete pad footing dismantle by the workers as shown in Figure 12. The duration for the concrete to dry is 1 day.

Figure 12: Dismantle formwork

Last step is backfilled pad footing which has been completed by using backhoe and compact it as shown in Figure 13.

Figure 13: Backfilled

3.2 Advantages and disadvantages of pad footing

There are no denying that the pad footing are usually use in 1 storey building because of the price. In this chapter, what was discussed were the advantages and disadvantages of pad footing. There are many advantages and disadvantages that can be found. *Table 4* below were the advantages and disadvantages that were discovered.

Table 4: Advantages and Disadvantages of Pad Footing

ADVANTAGES	DISADVANTAGES
1. Shallow foundation requires little excavation	1. Foundation size can be a very large to cope with point loads
2. Can be designed to accommodate tight sites	2. Limited foundation suitability to point loads of framed buildings
3. Economics due to control of foundation size	3. Separate foundations make this design weak against differential settlement that may affect the building
4. Reinforcement for tension and shear can be added	4. Deep excavation for foundations would require support to prevent caving in
5. Concrete mix can use SRPC in place of OPC	5. Weak against uplift forces, wind forces and earthquake forces

CHAPTER 4.0 : CONCLUSION

The report revealed the construction method of pad footing for the project Toll Plaza 1 which is located at Denai Alam. The construction method of pad footing in this project is very similar to that of theory.

The objective for this report which is to determine the construction method of reinforced concrete pad footing and to identify the advantages and disadvantages of using pad footing has been achieved. It can be seen in the report in chapter 3.

The problem faced during the construction work were malfunction machine and inconsistency of weather during the construction work. For the malfunction machine problem, the contractors has been told by the consultant to change the machine to meet the deadline of the project and the contractors followed the instruction from the consultant and the was continued. For the inconsistency of weather problem, the contractors cannot do anything and simply waiting for the weather to clear up and continue working.

In conclusion, the construction of pad footing in this project can also be apply in any construction site that using pad footing. This is because the construction method is very easy and similar to that of theory. It also can fasten the time for the project to be complete while reduce the cost of the construction.

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