UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SEPTEMBER 2014

It is recommended that the report of this practical training provide

By

NUDZUL AIREENA BT ZULEFLI

2012645738

Raft Foundation

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

Report Supervisor	Sr. Anas Zafirol Bin Abdullah Halim
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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 MSN Construction for duration 5 month starting from 2nd May and ended 29th September 2014. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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Name : Nudzul Aireena Bt Zulkefli

UITM ID No : 2012645738

Date : 30th September 2014

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ABSTRACT

This practical report mainly focuses on methods and constructions which it about one types of foundation; Raft Foundation. Practical training on site construction under MSN Construction Sdn Bhd for total five months has given outrageous experiences and uncountable knowledge in completion of this report. For the beginning, this report is divided into several parts that starts with company background and project description. This report is conducted for the raft foundation at "Kerja-kerja asas rakit untuk 24 Unit Rumah Jenis Berkembar Di Atas PT 10738 Batu 6 Sg. Binjai, Mukin Kapar, Klang, Selangor Darul Ehsan". The objective of this report is to study the method construction for raft foundation and every material used. It is important aspects to evaluate a good quality and potential to give guarantee to the residential. Besides that, the objective is to discover the usage of machineries and tools during construction process.

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CIDB	Construction Industry Development Board	8

CHAPTER 1

PREFACE

1.1 INTRODUCTION

This project entitled ***"Cadangan Membina dan Menyiapkan 24 Unit Rumah Jenis Berkembar Di Atas PT 10738 Batu 6 Sg. Binjai, Mukin Kapar, Klang, Selangor Darul Ehsan".*** It located nearest with 'Pekan Meru' and alternative way to go 'KESAS Highway'. This project also contain two types which is type A and type B. The difference between the two types is the position of area in the house as plan A and B. The area of this house includes one master bedroom, two other bedroom, two toilet, kitchen, car porch, dining and living hall. Besides, the approximate budget for each unit is about RM60,000.00.

Foundation is an important part of every building, which interfaces the superstructures to the adjacent soil or rock below it. The superstructure loads will be transferred to the underlying soil or rock. Without a proper design and construction of foundation, problems such as cracking, settlement of building may occur and even to the extent, the whole building may collapse within its design life. Therefore, a proper foundation system is required to maintain the safeness of a building. (Hui, 2005)

1.2 OBJECTIVES

The objective mainly focuses on investigating and understanding deeply regarding the method of construction of the foundation in construction industry. The objectives are:-

I. To study the construction method of raft foundation and material used.
II. To discover the usage of machineries and tools during construction process.

1.3 SCOPE OF STUDY

The purpose of this report is to analyse and identify the differential progress method of the slab work. Different method can examine the strength and endurance of the concrete slab. Otherwise, the cost, duration and production of a quality concrete slab may be affected. By the key areas that have been identified as the most critical to achieving a satisfactory result, proper guidelines need to be followed. Foundation also includes the usage of admixtures that can provide range of benefits including water reduction, paste reduction, and therefore, reduced shrinkage, improved workability, finish ability and control of strength development.

Moreover, brief explanation given by the skilled workers regarding the application of dry shake and treatment of concrete surface while applying on it. They also mentioned about the benefits and usage of slab hardener compared to standard application. Besides, as constructions method of ground floor slab mostly focuses on the numbers of steel usage, thickness of concrete, and utilization of water proofing. So, most of the industrial buildings need it. In addition, the whole construction method will show the equipment and materials used.

1.4 RESEARCH

Methodology, there are four main area that be measured. There are:-

I. Work experiences

One of the preliminary methods is through work experiences. Less or more the construction methods of ground floor slab experienced is help in order to produce this practical report.

II. Observation

This report is comes out from observation method. Based on the observation, all the construction method can be seen in reality and feel the experience. It is obviously different from the theory. It also helps in the processed of this report.

III. Mass media and electronic media

The widely usage of mass media and electronic media such as internet, news paper and others are one of the searching tools and sharing information at a fast rate have been commonly used by the consumers since then. It is therefore also one of the applications that attribute in come out with this report.

IV. Interview and discussion

Interview and discussion with construction teams can tell more to contributing ideas related. Meanwhile, from these positive feedback from them, it is observed that the presence of each team have play their own responsible and task that have to be together in order to produce good quality of works. Below shows the answer from the selected parties:-

i. **Contractor** : Raft foundation helps in give short period of construction. Besides, this selected foundation also not need the huge amount of budget.

ii. **Workers** : How some work have to be done like spread the crusher run to all areas.

CHAPTER 2

COMPANY BACKGROUND

2.1 INTRODUCTION

MSN Group of Companies contains a few subsidiaries which are MSN Construction Sdn Bhd, MSN Development Sdn Bhd, MSN Property Sdn Bhd, BD Land & Properties Sdn Bhd and Masnawi Trading. The company is founded by individual known as En Masnawi Bin Ariffin with vast experience in both construction industry and management skills. Although it was started with a modest amount of capital but today MSN Construction Sdn Bhd is growing fast in every aspect in order to meet the demand of the fast growing industry. They are supported by a strong management team comprising people with relevant technical experience.

As MSN Construction Sdn Bhd believe that a high quality construction is conducive to the productivity hence would strive to provide excellent construction services to satisfy the challenging need of the clients. Entrusted with the task of construction services, MSN Group of Companies being a professional people in this industry would take full responsibility and ensure that will employ best effort in meeting client's requirement. Photo 2.1 is the company's logo MSN Group of Companies designed by the Directors of the Company

GROUP OF COMPANIES

MSN Development Sdn Bhd. (667265-T)

MSN Construction Sdn Bhd. (759006-H)

MSN Property Sdn Bhd. (744480-K)

BD Land & properties Sdn Bhd. (917518-P)

Bumi Harta Development Sdn Bhd. (001221446-D)

UNIT 13-4, NO. 2, JALAN SETIA
PRIMA S U13/S, SETIA ALAM,
SEKSYEN U13, 40170 SHAH ALAM,
SELANGOR DARUL EHSAN

TEL : **FAX : 03 – 3344 6637**

Photo 2.1 MSN Group Company Logo

Sources: MSN Group (2014)

2.1.1 COMPANY HISTORY

MSN Group of Companies are begin with germination of **MSN Development Sdn Bhd** on 25th SEPTEMBER 2004. The group become more expand with the establishment of **MSN Construction Sdn Bhd, MSN Property Sdn Bhd, BD Land & Properties Sdn Bhd and Bumi harta Development Sdn Bhd** onward year. It was published by En Masnawi Ariffin and also drived by Board of Director which is En Zunnasri Muhyiddin, Project & Development Manager, En Kaharul Ariffin, Property Manager, Pn Suhaila Ariffin as Marketing Manager, Pn Mahanim Mahmud , admin & HR Manager develop the company which have a wide experienced in Public Work Department, expertise in the field of construction quickly gain the company reputation of being a trusted, quality and competative together with creative in problem solving

To this end, MSN group of companies has extended its capabilities beyond the provision of services to include extensive plants and machinery, which enables to undertake most of assignment with minimal sub-contracting of third parties. Moreover, Construction Industry Development Board Malaysia (CIDB) has registered the MSN Development Sdn Bhd as a G3 and MSN Construction Sdn Bhd as a G4.

Locally, numerous projects by MSN Construction Sdn Bhd are focusing on housing construction comprise of several types of house like terrace, semi-d, bungalow and incoming project is apartment. With the commencement of the history of the company, various things need to be taken into consideration as the parties involved and needs to be done in establishing a company. The organizational structure designed to facilitate and expedite the company plus a good company management will reflect the determination of each employee in carrying out assigned tasks. This can be seen in the organizational chart. Individuals who are appointed to hold certain positions within a company have been in accordance with the organization. Combined with those who are working together in coordination to achieve a further objective of the project proceeds received. The purpose of the organization chart is to ensure that each member clearly and know the duties and responsibilities that they are holding.

Today, the company has a paid-up share capital about RM 6 million and work hard achieving for more. A successful performance given by the company have entrusted by various developer to continue handing in project to the company.

This is the company's certificate of registration and certificates received by the company MSN Construction Sdn Bhd:-

- Certificate of Construction Industry Development Board (CIDB) – G4

2.2 COMPANY PROFILE

MSN Group of Companies

NAME OF COMPANY	:	**MSN DEVELOPMENT SDN BHD**
REGISTRATION CERTIFICATE NO	:	667265-T
CORRESPONDANCE ADDRESS	:	UNIT 13-4, NO. 2, JALAN SETIA PRIMA S U13/S, SETIA ALAM, SEKSYEN U13, 40170 SHAH ALAM, SELANGOR DARUL EHSAN
TELEPHONE	:	
FAX	:	03 – 3344 6637
WEBSITES	:	www.msnhomes.com.my
DATE OF ESTABLISHMENT	:	25th SEPTEMBER 2004
TYPES OF BUSINESS	:	HOUSING DEVELOPMENT
CIDB REGISTRATION NO	:	0120060823-SL110487 GRADE: G3
AUTHORISED CAPITAL	:	RM 500,000.00
PAID UP CAPITAL	:	RM 1,000,000.00
PRINCIPAL BANKERS	:	- BANK ISLAM MALAYSIA BERHAD, KLANG. - RHB BANK, MERU. - PUBLIC BANK BERHAD, KLANG. - EON BANK BERHAD, SETIA ALAM.

Figure 2.1 MSN Development Sdn Bhd Profile

Sources: MSN Group (2014)

NAME OF COMPANY	:	MSN CONSTRUCTION SDN BHD
REGISTRATION CERTIFICATE NO	:	759006-H
CORRESPONDANCE ADDRESS	:	UNIT 13-4, NO. 2, JALAN SETIA PRIMA S U13/S, SETIA ALAM, SEKSYEN U13, 40170 SHAH ALAM, SELANGOR DARUL EHSAN
TELEPHONE	:	
FAX	:	03 – 3344 6637
WEBSITES	:	www.msnhomes.com.my
DATE OF ESTABLISHMENT	:	11th JANUARY 2007
TYPES OF BUSINESS	:	CONSTRUCTION CONTRACTOR
CIDB REGISTRATION NO	:	0120081031-SL120626 GRADE: G4
AUTHORISED CAPITAL	:	RM 150,000.00
PAID UP CAPITAL	:	RM 500,000.00
PRINCIPAL BANKERS	:	- RHB BANK, MERU.

Figure 2.2 MSN Construction Sdn Bhd Profile

Sources: MSN Group (2014)

NAME OF COMPANY	:	MSN PROPERTY SDN BHD
REGISTRATION CERTIFICATE NO	:	744480-K
CORRESPONDANCE ADDRESS	:	UNIT 13-4, NO. 2, JALAN SETIA PRIMA S U13/S, SETIA ALAM, SEKSYEN U13, 40170 SHAH ALAM, SELANGOR DARUL EHSAN
TELEPHONE	:	
FAX	:	03 – 3344 6637
WEBSITES	:	www.msnhomes.com.my
DATE OF ESTABLISHMENT	:	11th AUGUST 2006
TYPES OF BUSINESS	:	REAL ESTATE INVESTMENT
AUTHORISED CAPITAL	:	RM 100,000.00
PAID UP CAPITAL	:	RM 100,000.00
PRINCIPAL BANKERS	:	RHB BANK, MERU.

Figure 2.3 MSN Property Sdn Bhd Profile

Sources: MSN Group (2014)

NAME OF COMPANY	:	**BD LAND & PROPERTIES SDN BHD**
REGISTRATION CERTIFICATE NO	:	917518-P
CORRESPONDANCE ADDRESS	:	UNIT 13-4, NO. 2, JALAN SETIA PRIMA S U13/S, SETIA ALAM, SEKSYEN U13, 40170 SHAH ALAM, SELANGOR DARUL EHSAN
TELEPHONE	:	
FAX	:	03 – 3344 6637
WEBSITES	:	www.msnhomes.com.my
DATE OF ESTABLISHMENT	:	10th OCTOBER 2010
TYPES OF BUSINESS	:	ESTATE DEVELOPER

Figure 2.4 BD Land & Properties Sdn Bhd Profile

Sources: MSN Group (2014)

NAME OF COMPANY	:	**BUMI HARTA DEVELOPMENT SDN BHD**
REGISTRATION CERTIFICATE NO	:	951680-U
CORRESPONDANCE ADDRESS	:	UNIT 13-4, NO. 2, JALAN SETIA PRIMA S U13/S, SETIA ALAM, SEKSYEN U13, 40170 SHAH ALAM, SELANGOR DARUL EHSAN
TELEPHONE	:	
FAX	:	03 – 3344 6637
WEBSITES	:	www.msnhomes.com.my
DATE OF ESTABLISHMENT	:	6th JULY 2011
TYPES OF BUSINESS	:	ESTATE DEVELOPER

Figure 2.5 Bumi Harta Development Sdn Bhd Profile

Sources: MSN Group (2014)

2.2.1 COMPANY OBJECTIVE

MSN Group of Companies has company objectives on achieving target as to deliver and provide the best services in transfer a quality job to client. In order to attain client's aspiration and entrust with project, each employer as well as employee both distributes their strength and skill to ensure this company still active and maintain an excellent performance for future. Their hardworking and consistency towards responsibilities has proven as they have been awarded by Public Work Department (PWD) for their excellence performance. The company vision, mission and activity are:-

2.2.2 COMPANY VISION

MSN Group of Companies appoints to become as a viable company and capable equivalent with Multi National companies. Continue to be preferred & awarded Class A and CIDB G7 (active) contractor. We as a well-established contractor and believe our ability to deliver a high quality job to our client with a strategic plan and management throughout the entire time frame.

2.2.3 COMPANY MISSION

- Develop potential land for homes with basic amenities, high-tech line with the needs of modern society.
- Provide an opportunity for landowners to develop and enhance the value of properties.
- Implement the development of environmentally friendly concept.
- Ensure that each project at the highest level at all times through a planned investment.
- Provide a one stop center for customers.
- Provide quality service to customers.
- Conduct on-site oil palm - the location is less potential for development.

2.2.4 COMPANY ACTIVITY

- Property and Housing Development
- Property & Real Estate Investment
- Construction & Infrastructure
- Specialist for Bungalow design & Build contractor
- Specialist Interior Design & Build Contractor
- Renovation & Maintenance
- Construction Material Supply & Trading

2.3 CHART ORGANISATION

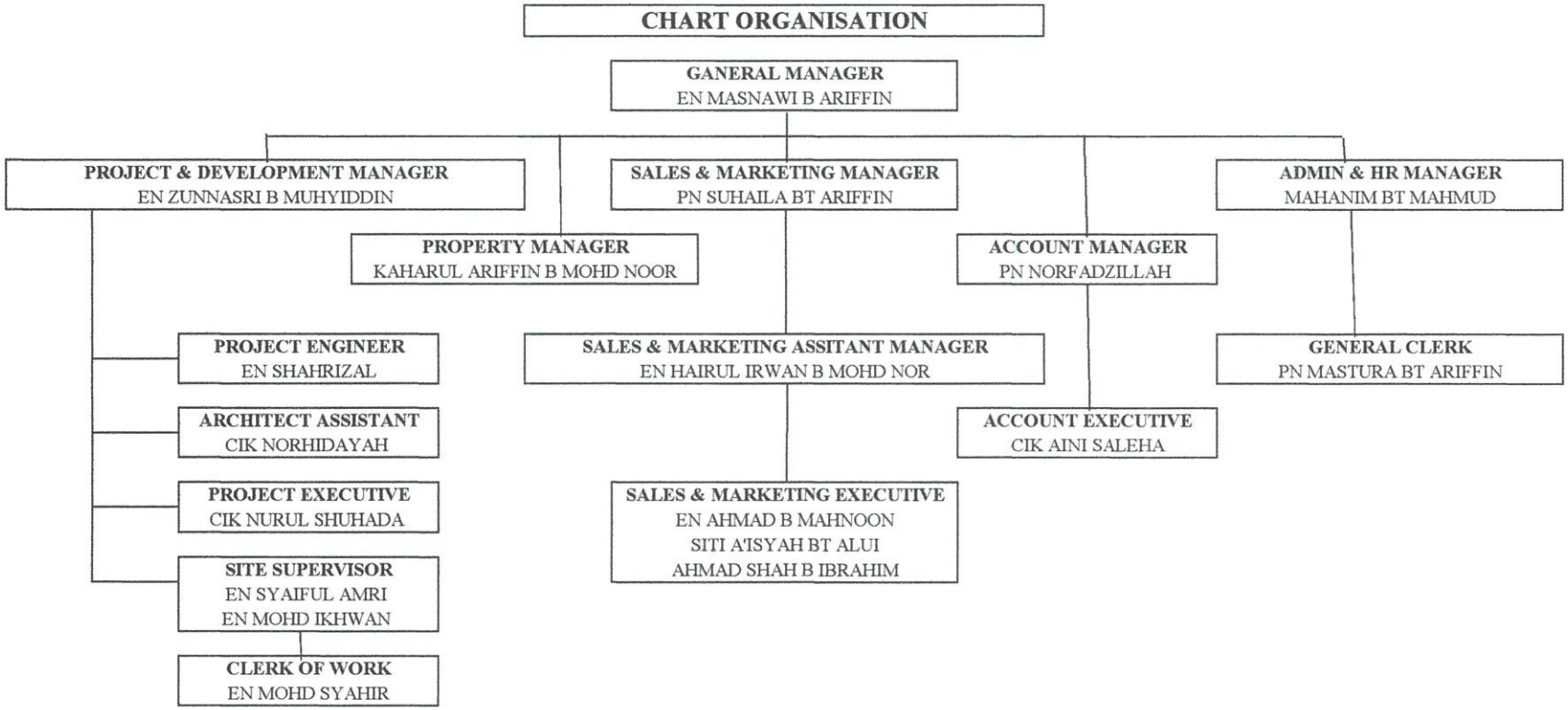

Figure 2.2 Organisational Chart MSN Group
Source: MSN Group of Companies (2014)

2.4 LIST OF PROJECT

2.4.1 COMPLETED PROJECT

Photo 2.2 Site Lorong Ciku – 2 Units of Semi-D Single stories

Source: MSN Group (2014)

Photo 2.3 Site Taman Desa Meru – 12 Units Double Stories of Terrace

Source: MSN Group (2014)

Photo 2.4 Renovation at Jalan Khamis (Adding Car Porch, Landscaping)

Source: MSN Group (2014)

Photo 2.5 Site Jalan Nenas – 16 Units Single Stories of Semi-D

Source: MSN Group (2014)

2.4.2 ONGOING PROJECT

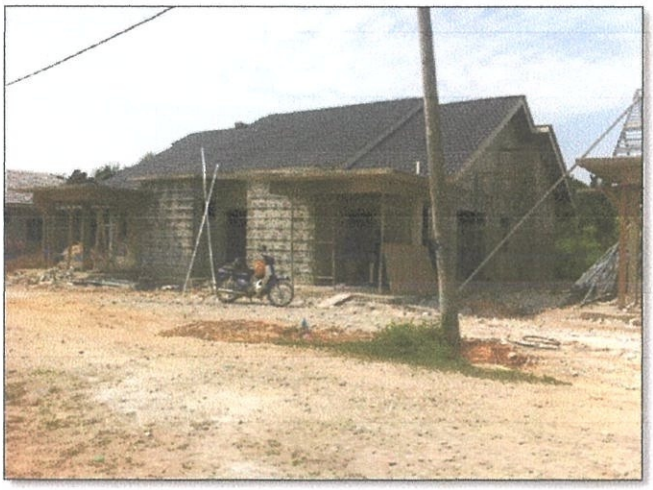

Photo 2.6 Site Batu 7 ¼ – 2 Units of Bungalow Single Stories, 3 Units of Semi-D Single Stories

Source: MSN Group (2014)

Photo 2.7 Site Jalan Kebun – Single Stories of Terrace house

Source: MSN Group (2014)

Photo 2.8 Site Lorong Ciku – 1 unit of Bungalow

Source: MSN Group (2014)

Photo 2.9 Site Jalan Tap - 12 Unit Semi-D

Source: MSN Group (2014)

CHAPTER 3

CASE STUDY

3.1 INTRODUCTION

3.1.1 RAFT FOUNDATION

A raft foundation consists of a raft of reinforced concrete under the whole of a building as shown on figure 3.1. This type of foundation is described as a raft in the sense that the concrete raft is cast on the surface of the ground which supports it, as water does a raft, and the foundation is not fixed by foundations carried down into the subsoil.

Raft foundation may be used for building on compressible ground such as very soft clay, alluvial deposits and compressible fill material where strip, pad or pile foundations would not provide a stable foundation without excessive excavation. The reinforced concrete raft is designed to transmit the whole load of the building from the raft to the ground where the small spread loads will cause little if any appreciable settlement. (Mishra, 2012)

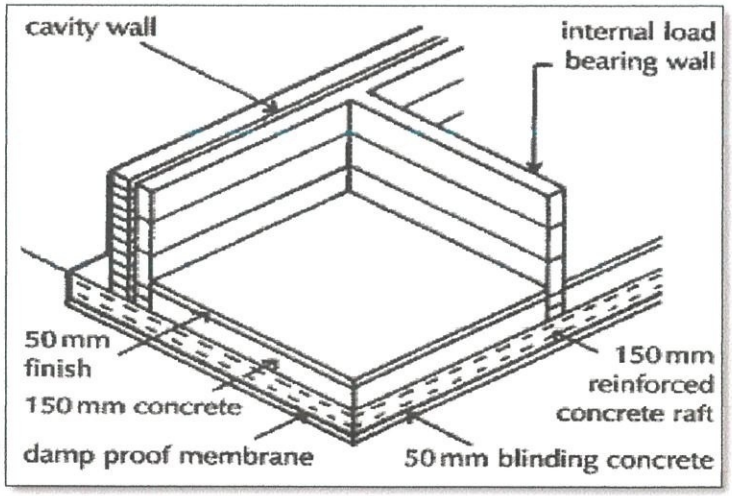

Figure 3.1 Flat Slab raft

Sources: http://civilconstructiontips.com/2011/06/raft-foundation.html (2014)

Consideration of the design is affected if the loads transmitted by the structure of the column are so heavy or the allowable soil pressure so small that individual footings would cover more than about one-half of the area, it may be better to provide a large footing under all columns and walls. Such a footing is called a raft or mat foundation. Raft foundations are also used to reduce the settlement of structure located above highly compressible deposits. Since rafts are usually at some depth in the ground, a large volume of excavated may be required. If weight of the excavated soil is equal to the weight of the structure and that of the raft, and the centres of gravity of excavation and structure coincide, settlement would be not important. Where complete compensation is not feasible, a shallower raft may be accepted if the net increase in loads in small enough to lead to tolerable settlement. A raft foundation may be rectangular or circular and may be with or without an open as shown in figure 3.2, figure 3.3, and figure 3.4. (Mishra, 2012)

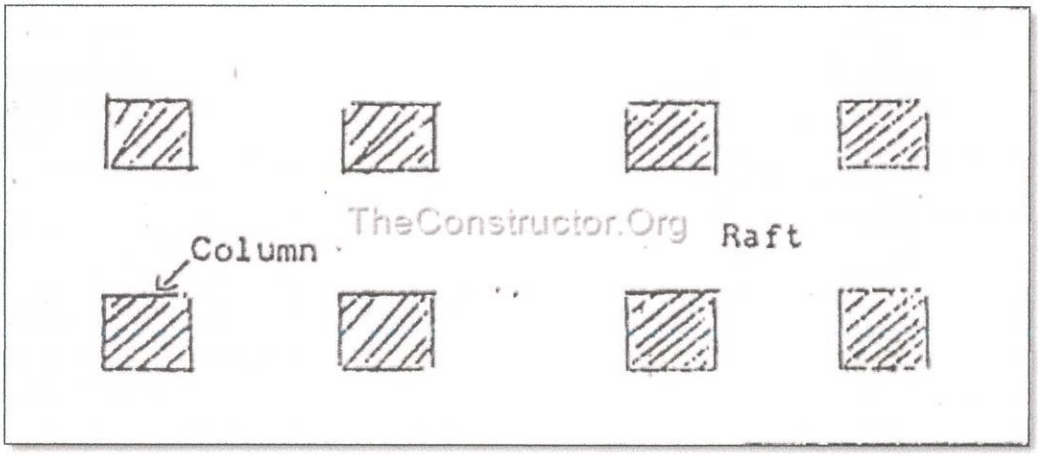

Figure 3.2 Solid Raft Slab

Sources: http://theconstructor.org/structural-engg/design-of-raft-foundation(2014)

(raft foundation, 2011)

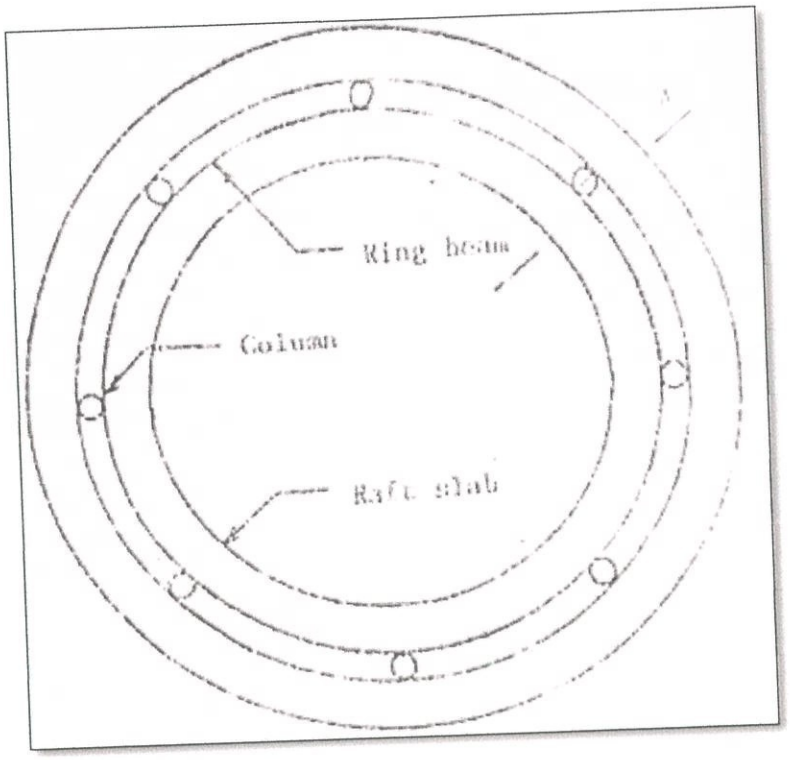

Figure 3.3 Circular Raft Foundation (Plan)

Sources: http://theconstructor.org/structural-engg/design-of-raft-foundation(2014)

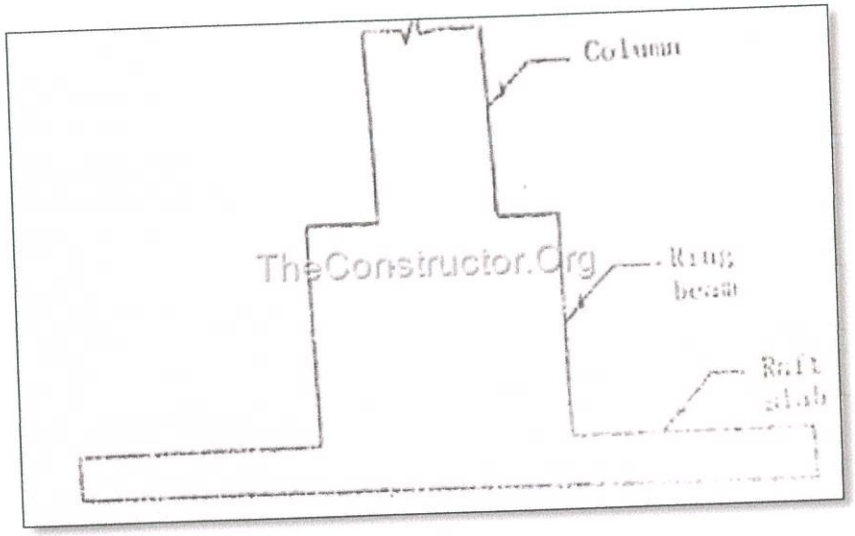

Figure 3.4 Circular Raft Foundation (Front Elevation)

Sources: http://theconstructor.org/structural-engg/design-of-raft-foundation

Based on the figure 3.2, the columns are equally spaced and loads are not very heavy, a raft may be designed as having uniform thickness. The flat slab raft is of uniform thickness and reinforced under the whole of the building to spread the loads from the walls uniformly over the under surface to the ground. These types of raft may be used under small buildings such as bungalows and two storeys houses where the comparatively small loads can be spread safely and economically under the rafts foundation.

Raft is known as the conventional design because consists of establishing its dimensions, from which the soil pressure at various locations beneath the slab may to calculate. The raft is divided into a series of continuous strips centred on the appropriate columns and rows in both directions as shown in figure 3.5. The shear and bending moment diagrams may be drawn using continuous beam analysis or coefficients for each strip. The depth is selected to satisfy shear requirements. The steel requirements also will vary from strip to strop. This method gives a conservative design since the interaction of adjacent is neglected. (Mishra, 2012)

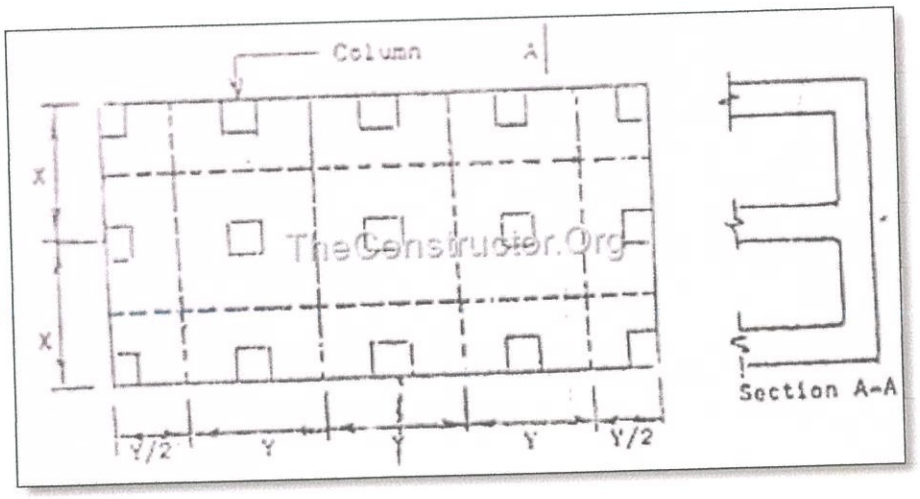

Figure 3.5 Raft Foundation with Strip Centres On Columns

Sources: http://theconstructor.org/structural-engg/design-of-raft-foundation/

3.2 PROJECT BACKGROUND

3.2.1 RAFT FOUNDATION

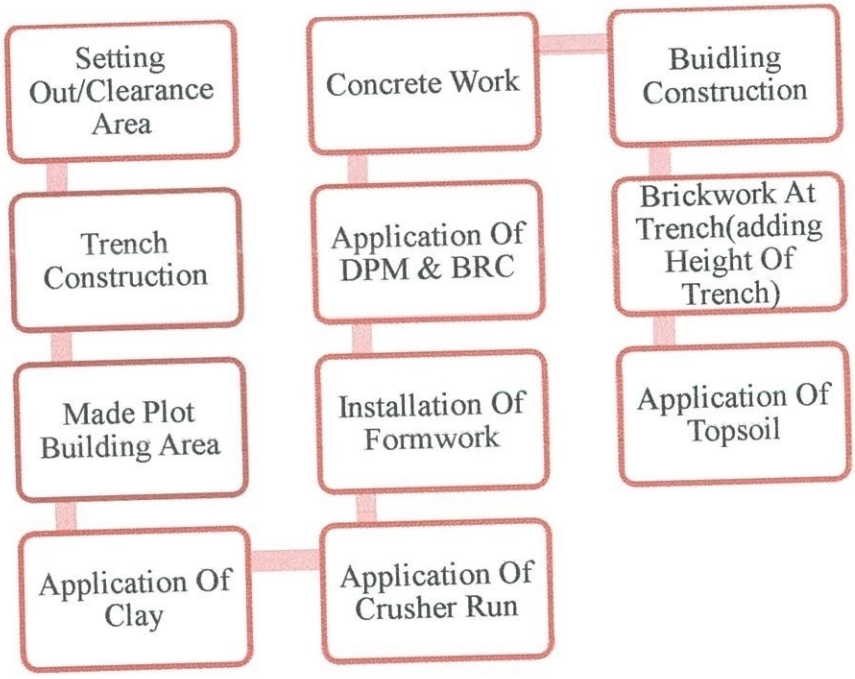

Figure 3.6 Raft Foundation Method

Sources: Nudzul Aireena Zulkefli (2014)

Based on the figure 3.6, MSN Construction used this method as their foundation. As usual, primary work like setting out and clearance area are going be in arranged. Then, trench construction is being constructing to provide water drainage and avoid from inundation happen at site. Cultivated peg is followed for produce 12 plot areas equal to 24 unit of house.

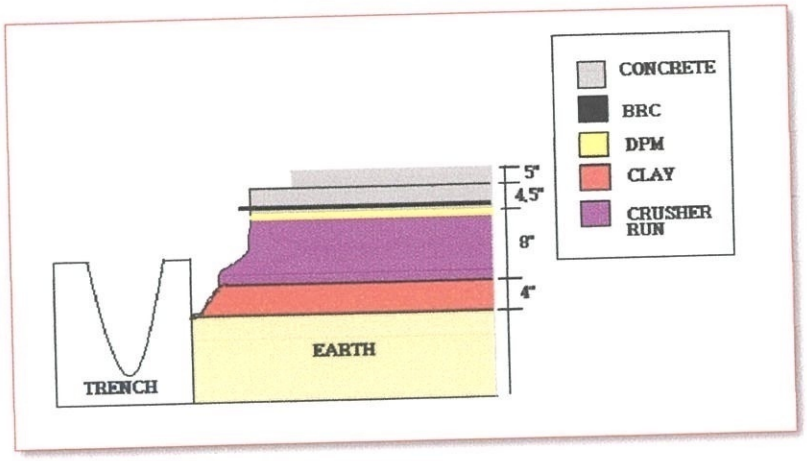

Figure 3.7 Level of Raft Foundation

Sources: Nudzul Aireena Zulkefli (2014)

Pushing soil work is started with received a harsh clay. This work is done by using the backhoe and company have to rent a back pusher. The plant is handling by the skill operator. Same goes with crusher run or aggregates after harsh clay is done. Basically, it will be compact until 8 inch in height as shown on figure 3.7. Installation of piping is need a small excavation for water down pipe system.

Then, formwork will take part to make a form of the reinforced concrete under the whole of a building. Load of raft foundation will go from the roof to the beam, then to the column and from column will spread to the floor which that is the foundation. After timber work is done, it continue with application of DPM. DPM is helped to ensure that the entire interior of the building is protected from moisture by a continuous, impervious barrier. Before going to concrete, installation of BRC A6 must be apply to give long lasting strength and that is the basic of the structure. Then, concreting work is started with use concrete grade 25 from the ready-mix concrete. As shown figure 3.7 above, have a small hill between the trench and plot area.

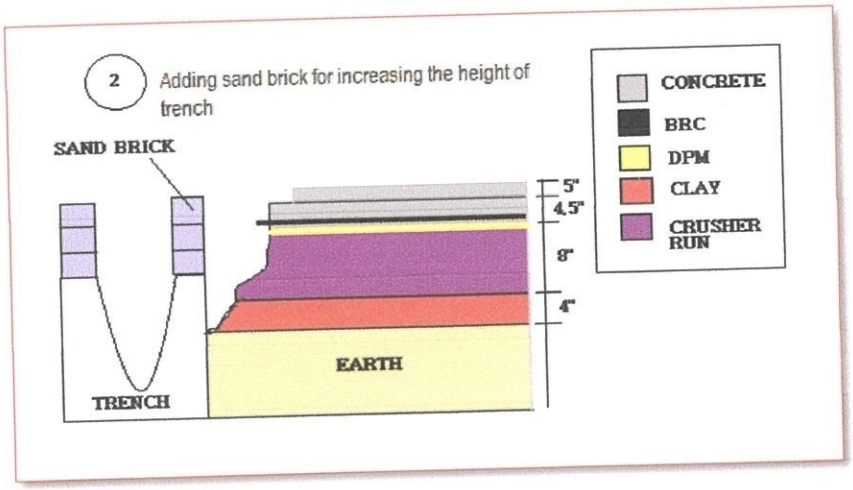

Figure 3.8 Adding Height of Trench

Sources: Nudzul Aireena Zulkefli (2014)

The different level of the structure and the trench will causes bad water drainage. It is because abundant of soil will enter the trench. Problem will be started if raining, leakage water pipe and others causes. The solution is increases the height of the trench with brickwork. Increases will be added almost 1 feet of height is equal with adding the 3 layer of brick as shown on figure 3.8.

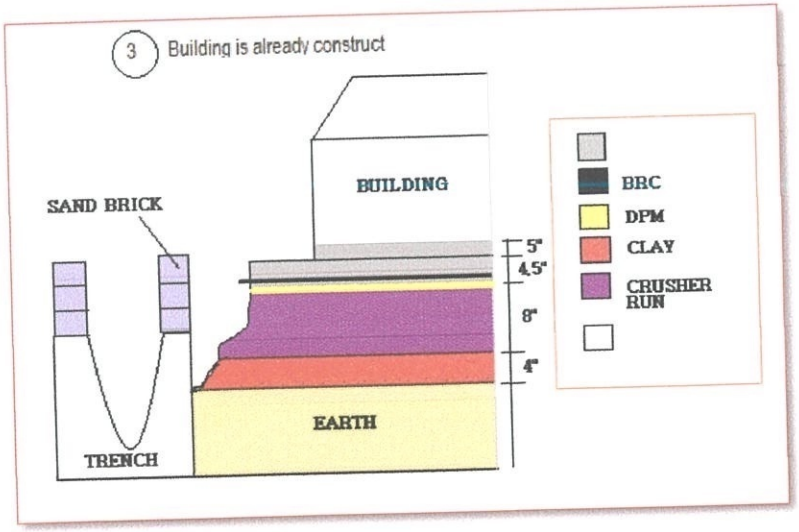

Figure 3.9 Building on Raft Foundation

Sources: Nudzul Aireena Zulkefli (2014)

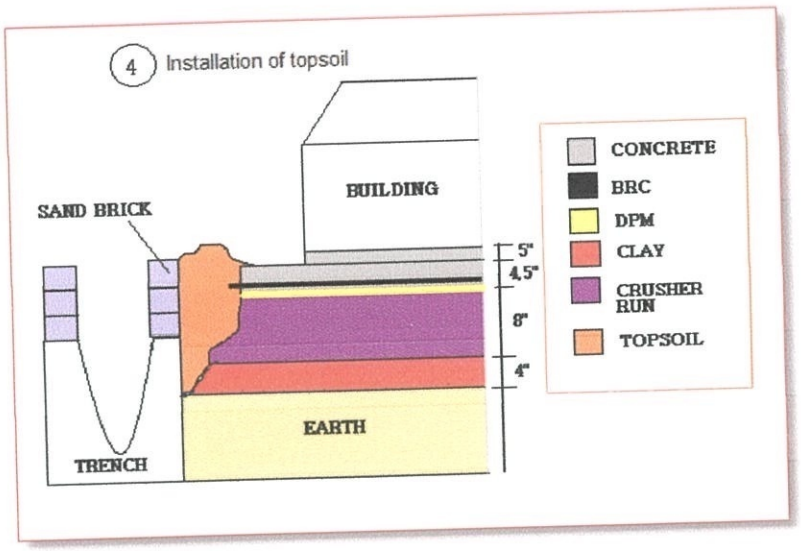

Figure 3.10 Installation of Topsoil

Sources: Nudzul Aireena Zulkefli (2014)

As usual, after a few days, reinforcement concrete is hard. Open formwork will be in order and foundation is arranged in a formation. Building is being constructing as shown on figure 3.9. Based on figure 3.10 also, application of top soil to the ambient of the building will be apply considered as final work. This application is to bring the same level with raft foundation and to support the bases from settlement.

3.3 METHOD STATEMENT

Working methods is a work of a process or procedure that is presented in tabular form. It describes in general related to construction work from the beginning to the end. In principle, this working method table only describes the work carried out for the construction of structures such as the construction of the frame. However, things are more detailed as construction costs, material costs and others not included in this working method. There are several items that can be found in the tables of this working method.

Among the items that can be found in the tables is part of the operation. This section is the main part where it shows the title of a work in progress. In addition, there are also operational space acts as the most important space in the schedule for work methods used to express a more detailed description of the main topics of an operation carried out with picture inserted.

Next, the number of employees and the type of material or machinery used in each work carried out will also be entered in this working method. However, the time required for the completion of the work will not be recorded because it depends on several other factors such as weather, number of employees and others.

Finally, the method of this work can be seen as one of the important things because it can help, thus faciliting the various parties in the course of a job. This is because, it is very easy to be referred compared with other methods. Thus, it is clear that this is important to all parties.

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	PLANT/EQUIPMENT	REMARKS
1.	Setting Out/Clearance	Clear and clean the site project. - Measure the size of the site and mark with cultivated the peg. - Gathered the entire tree and others disposal by using backhoe. - Backhoe will lifting the disposal into the lorry.	 	- 1 person as skill operator backhoe. - 1 person as operator lorry. - 2 person clearance, measure and mark the project area. - 1 person as skill operator backpusher.	- Backhoe - Lorry - Shovel - Back pusher - Measurement Tape - Peg	

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
	Setting Out/Clearance (con't)	- Lorry will transfer the disposal to the disposal area. - Pushing soils work is done by back pusher.				

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
2.	Trench Construction	Trench construction is built to produce water drainage and to avoid from inundation happen at site. The method is:- i. Excavate soil manually along the trench is carried out. ii. Put the trench into the excavate area. Use water meter to get stability.	 	- 2 people excavating the soil manually. - 2 people install the trench and do the brickwork.	- Shovel - Trench - Trowel - Wheelbarrow - Bucket - Water meter	

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
	Trench Construction (con't)	iii. Lay the mortar (cement,sand,water) to brickwork until the height is achieve 2 feet from ground.				

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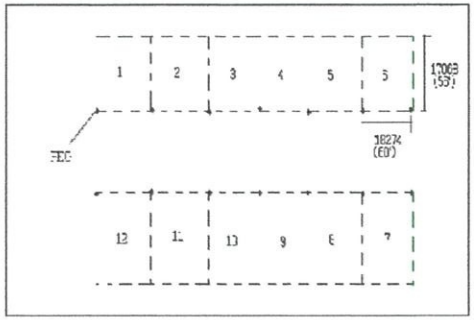
NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
3.	Mark Building Area	Cultivated peg followed by the marking building with area 60' x 56' for 12 plots.		- 2 people measure and cultivated the peg.	- Measurement Tape - Peg - hammer	

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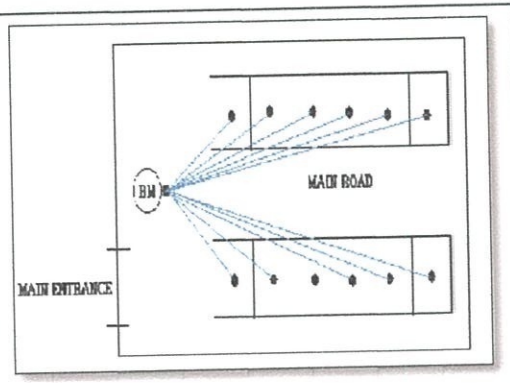
NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
4.	Levelling	Levelling is to establish a point at a given elevation with suitable reading of level. - Based on site plan, reading is taken from bench mark to 12 areas.		- 1 person known as Site Engineer collect the reading of the level. - 1 person hold the staff - Collect the reading	- Theodolite - staff	

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
5.	Application Of Harsh Clay And Compacting	After a few primary processes, foundation work is start with application of harsh clay. The clay will deliver by sand supplier to the site. For this project, it almost 350 kg of harsh clay is use. Back pusher is played their role with pushing the soil equally. From the earth, height of clay is 4 inch.	 	- 1 person is compacting the clay. - 1 person as operator of a back pusher.	- Compactor Machine - Back Pusher	

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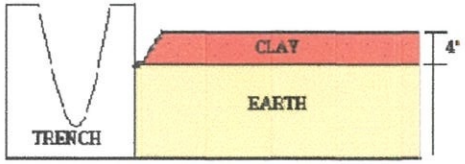
NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
	Application Of Harsh Clay And Compacting (con't)	Based on diagram, level of clay is not exceeding the height of the trench. After that, compacting work will take over.			-	

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
6.	Application of Crusher Run and compacting	Then, followed by the application of crusher run with 8 inch of thickness. Crusher run is delivered by the Changsi Hardware, sand supplier. Back pusher is played their role with pushing the crusher equally. From the clay level, height of crusher is 8 inch.		- 1 person as the driver backhoe - 1 person compacting the crusher run - 2 people assist in equally the crusher run to all area.	-	

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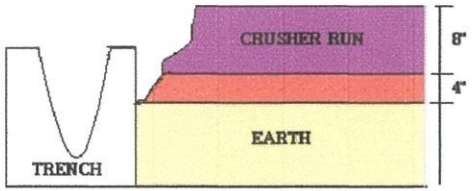
NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
	Application of Crusher Run and compacting (con't)	Based on diagram, level of clay is not exceeding the height of the trench. After that, compacting work will take over.	2 Adding sand brick for increasing the height of trench 			

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
7.	Install the sewerage water down pipe	Before go to the next step, digging the holes for pipe installation. There use 4 inch pipe. After that, filled in back. They repeat for another plot.		- 1 Person digs for water down pipe - 1 person unskilled labour	- Shovel - Pipe 4 inch & 3 inch	

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
8.	Formwork Application	Formwork is begin with cutting the plank wood based on the thickness of the reinforcement concrete foundation, 9.5 inch. The other wood such as 1"x 2" and 2"x 2" is need as support to the surrounding plank wood. There repeat the step for another plot.	 	- 3 people measure and cutting the wood. - 2 people helped in installation of formwork.	- Plank wood - Wood 1" x 2" - Wood 2" x 2" - Wood nail. - Hammer - handsaw	

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
9.	Application Of DPM & BRC	After that, install the sheet of Damp proof membrane (DPM). The sheet will cut and put to the whole in area of formwork. Then, followed by the application of BRC A6 and steel for column. Installation the BRC also to the whole area in formwork. The overlapping of BRC will bind and cut the BRC for existing pipe.		- 1 Person cutting the BRC - 2 person apply the DPM - 2 person install the BRC - 1 person bind the overlapping of BRC.	- Cutter - Wire - BRC A6 - DPM	

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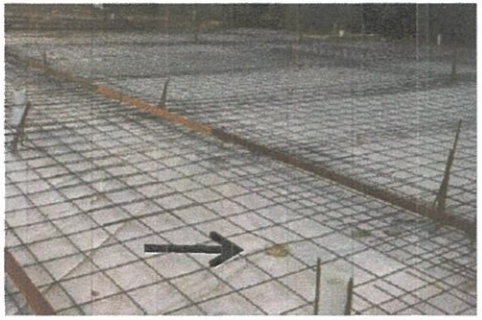
NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
	Application Of DPM & BRC (con't)	They also put stone under the BRC because it important to concrete filled in and grab the BRC.				

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
10.	Reinforce Concrete Raft Foundation And Vibrating	Steps of reinforcement concrete raft foundation:- 1. Pour the ready-mix concrete grade 25 into the bases area equally. 2. Then, vibrating the concrete work take place 3. Use the bull float and straight 2x4 screed to get a perfect flat surface.	 	- 1 person as a Driver of Concrete Mixer Truck - 1 person holds the bucket while the concrete pour from the truck. - 2 people use the Bull float and Straight 2x4Screed.	- Bull float - Concrete Mixer Truck - Bucket - Straight 2x4 Screed - Vibrator	

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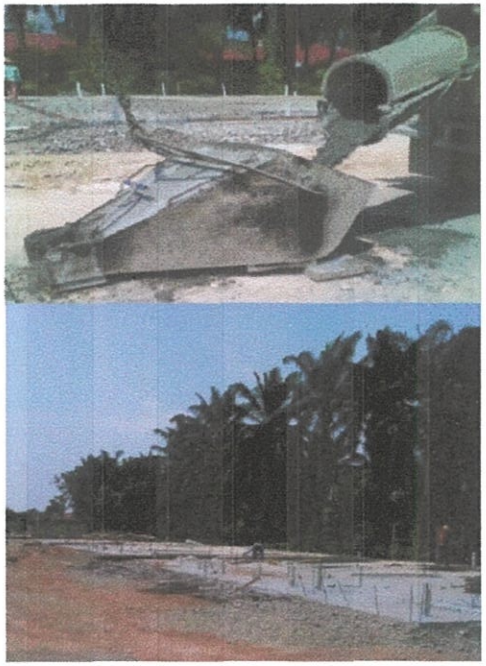
NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
	Reinforce Concrete Raft Foundation And Vibrating (con't)	4. Let the reinforced concrete raft foundation dry for 1 day. 5. Then, lifted the formwork. 6. Do the same step to another plot.		- 1 person as a vibrating the concrete - 1 person is helped to equally the concrete. - 2 person for opened the formwork.		

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NO	OPERATION	EXPLANATION	SEQUENTIAL / DIAGRAM	LABOUR	MACHINARIES / PLANT	REMARKS
11.	Application Of Top Soil After Building Construction	Installation of topsoil to the surrounding area of the building after building construction. It one of the closing works. Adding height of trench with brickwork to allow the application of the topsoil and avoid from soil blockage in the trench.		- 2 people push and equally the soil. - 1 person as unskilled labour. - 2 people do the brickwork	- Wheel barrow - Shovel - Trowel - Bucket	

3.4 PLANT, EQUIPMENT & MATERIAL

Table 3.1 Plant Used

No	Name	Figure	Function
1.	Theodolite	 **Photo 3.1** Theodolite Credit photo: Nudzul Aireena Zulkefli (2014)	- Theodolite is used to get a reading of level. - The reading is taken by our Site Engineer, En Rizal, to make sure all plot get a same level.
2.	Concrete Vibrator	 **Photo 3.2** Concrete Vibrator Credit photo: Nudzul Aireena Zulkefli (2014)	- Concrete Vibrator is used to vibrate the concrete of bases and slab. - Energy of vibrator is from fuel and batery. - This machine will maintain once a month.

3.	Compactor Machine	 **Photo 3.3** Compactor Machine Credit photo: Nudzul Aireena Zulkefli (2014)	- Compactor Machine is used to compact a soil in medium area. - It suitable for all kind of soils, sub-grades, and dry concrete. (Compactor Machine Model, 2004) - It used to compact plot per plot
4.	Bucket	 **Photo 3.4** Bucket Credit photo: Nudzul Aireena Zulkefli (2014)	- Bucket is used to transfer concrete from readymix lorry to the concrete place.

5.	Back Pusher	 **Photo 3.5** Back pusher Credit photo: Nudzul Aireena Zulkefli (2014)	- Backpusher is used to pushing soil, sand, rubble, and gravel on a wide range of small or large construction area and others uses. - It need a skill operator to generate this plant. - It rent from the other supplier of tractor. The charges is RM 250 per day.
6.	Soil Compactor Roll	 **Photo 3.6** Compactor Credit photo: Nudzul Aireena Zulkefli (2014)	- Soil Compactor Roll is used to compact varying soils and aggregates in application such as highway or in a large residential. - It need a skill operator to generate this plant. - It rent from the other supplier of tractor. The charges is RM 200 per day.

7.	Concrete Mixer Truck	 **Photo 3.7** Concrete Mixer Truck Credit photo: Nudzul Aireena Zulkefli (2014)	- Concrete Readymix Truck is carry concrete grade 25 with volume $8m^3$. - It help in reduce time which make a fast construction. - VIMIX is one of MSN supplier of concrete.
8.	Crane	 **Photo 3.8** Crane Credit photo: Nudzul Aireena Zulkefli (2014)	- Crane is used to carry the bucket filled with fresh concrete to the area of concrete slab. - It need a skill operator to generate this plant. - It rent from the other supplier of tractor. The charges is RM 200 per day.

Table 3.2 Material used

No	Name	Figure	Function
1.	UPVC Pipe 4 inch & 3inch	 **Photo 3.9** UPVC Pipe 4 Inch & 3 Inch Credit photo: Nudzul Aireena Zulkefli (2014)	- UPVC pipe is for sewerage water down pipe. - Buy from Centinel Hardware. The grade used is G6. - Install during bases construction.
2.	Sheet of Damp Proof Membrane	*in searching **Photo 3.10** DPM Credit photo: Nudzul Aireena Zulkefli (2014)	- DPM is used to prevent moisture from underground. - Buy from Centinel Hardware. - It install before application of BRC.

3.	BRC A6	 **Photo 3.11** BRC A6 Credit photo: Nudzul Aireena Zulkefli (2014)	- BRC is used for floor to give strength. - Buy from steel supplier (SPM Steel Sdn Bhd) if need in a large quantity and Centinel Hradware is small quantity. - It install before concrete application.
4.	Crusher Run	 **Photo 3.12** Crusher Run Credit photo: Nudzul Aireena Zulkefli (2014)	- Crucher Run is used as the layer of the raft foundation; give strength to foundation. - Supply from sand supplier (Changsi Sdn Bhd).

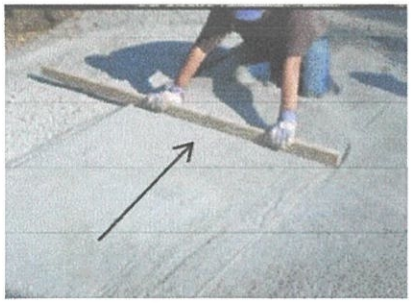
5.	Topsoil Clay	 **Photo 3.13** Topsoil Clay Credit photo: Nudzul Aireena Zulkefli (2014)	- Topsoil is a arable soil. - It also suitable for planting. - This apply to the surrounding area of the house. - Supply from sand supplier (Changsi Sdn Bhd).
6.	Harsh Clay	 **Photo 3.14** Harsh Clay Credit photo: Nudzul Aireena Zulkefli (2014)	- Harsh Clay is used as the bases of the building; - Supply from sand supplier (Changsi Sdn Bhd).

7.	Nail	  **Photo 3.15** Nail 2 inch & 2.5 inch Credit photo: Nudzul Aireena Zulkefli (2014)	- Nail is used to tie between the wood. - Usually, it is use to wood work like formwork. - Buy from Centinel Hardware.

Table 3.3 Equipment used

No	Name	Figure	Function
1.	Formwork	 **Photo 3.16** Formwork Credit photo: Nudzul Aireena Zulkefli (2014)	- Formwork is used to form a concrete of a slab, column or beam. - Usually sources of timber is buy from hardware or take from the other site project to reduce the budget.
2.	Sledgehammer	 **Photo 3.17** Sledge Hammer Credit photo: Nudzul Aireena Zulkefli (2014)	- Sledgehammer is used to cluck something hard.

3.	Shovel	 **Photo 3.18** Shovel Credit photo: Nudzul Aireena Zulkefli (2014)	- Shovel is used to dig and transfer the soil.
4.	Handsaw	 **Photo 3.19** Handsaw Credit photo: Nudzul Aireena Zulkefli (2014)	- Handsaw is used for complement the timber work.
5.	Cutter	 **Photo 3.20** Cutter Credit photo: Nudzul Aireena Zulkefli (2014)	- Cutter is used to cutting steel.

6.	Wire	 **Photo 3.21** The Wire Credit photo: Nudzul Aireena Zulkefli (2014)	- Wire is used to tie wire intersection the layer of BRC, to tie the link with Y12(column RC). - Buy at Centinel Hardware.
7.	Straight 2x4 screed	 **Photo 3.22** Straight Screed Credit photo: Nudzul Aireena Zulkefli (2014)	- Straight Screed is used to screeding the concrete.(flat surface)
8.	Bull float	 **Photo 3.23** Bull Float Credit photo: Nudzul Aireena Zulkefli (2014)	- Bull Float is used to provide a flat surface.

3.5 Budget and Estimating Project

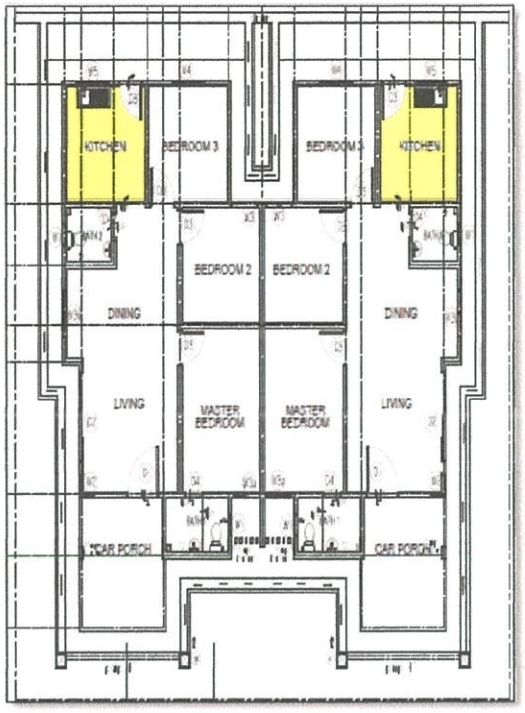


Figure 3.11 Plan Type B

Sources: MSN Construction SDN BHD (2014)

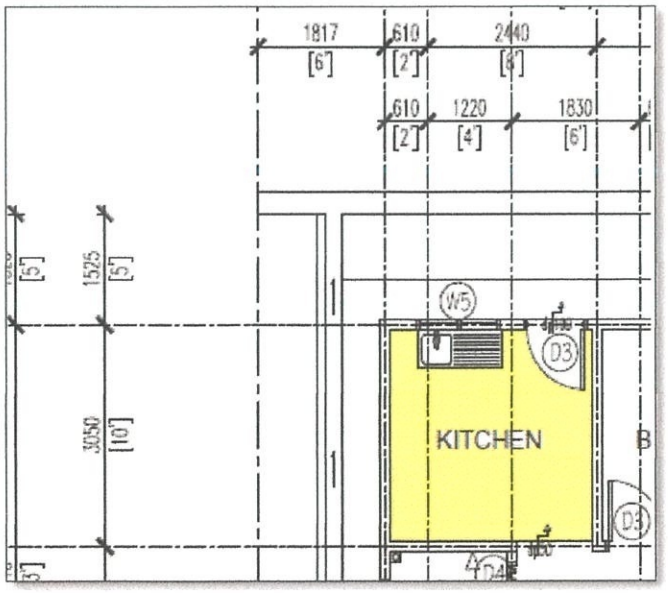


Figure 3.12 Plan Focuses Kitchen Area

Sources: MSN Construction SDN BHD (2014)

Based on the plan, and the calculation:-

Kitchen area

= Length x Width

= 0.610m + 2.44m x 3.05m

= 9.3025m^2

Price of Crusher Run

1m^3 of crusher run = 2.45 ton

1 ton = RM 33

2.45 ton x RM 33 = RM 80.85/m^3

2.2447m^3 x RM 80.85 = RM 181.48

Price of 'Tanah Merah'

2.08 ton = 1m^3

2.08 ton = RM 104

2.2447 m^3 x RM 104 = RM 233.45

BRC A6 = RM75 / Pcs

Wire = RM13 / Roll

Nail 2" = RM 5 / kg x 2kg

= Rm10

Volume at kitchen area

= L X W X D

= 3.05m x 3.05m x 0.2413m

= 2.2447m^3

Price of concrete at kitchen areas

1m^3 = RM 225

2.2447m^3 x RM 225 = RM 505.06

Price of Formwork

Kayu 2" x 1" x 10' = RM 11 / Pcs x 5 Pcs

= RM 55.00

Kayu 4" x 4" = RM 13 / Feet x 10 Pcs

= RM 130.00

Thickness of formwork

L x D = m^2

3.05m x 0.2413m = 0.736 m^2 x 4 Sides

= 2.944 m^2

Approximation calculation for kitchen area:-

RM 181.48 + RM 505.06 + RM 233.45 + RM 55.00 + RM 130.00 + RM 75 +

RM 13 + RM 10 = RM 1209.99

CHAPTER 4

CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

Based on the combined findings, we know the foundation is incredibly important in any construction especially for the safety of the building. The construction need to be attentiveness to avoid from the mistake. Have a several types of foundation such as raft, pad, strip, step and others. Selection is made based on the suitability of type of soil, weather, climate and type of the building that they construct.

Raft foundation is a thick concrete slab reinforced with steel which covers the entire contact area of the structure. It is required where solids have low bearing capacity and have to support heavy structural loads. The designed is transmitting the whole load of the building from the raft to the ground where the small spread loads will cause little if any appreciable settlement. The advantages of using this foundation are there is an economical project.

Concrete ground slab is continuous with the bases of foundation. Slab is receiver of load transfer to the ground soil. After the application of formwork, install the DPM and BRC. Poured the concrete, than drag and level the concrete to all area. After that, vibrate the concrete to get the high quality of strength, screeding, floating and last but not least is doffed the formwork. Provided sufficient attention is paid to the selection of materials, mix proportions, preparation of substrate surfaces and the application of the plaster, the results should be serviceable and aesthetically acceptable.

A good foundation is the guarantor of a good future; this is not just true for wittily character but also for man made objects. Anything that is based on goodness reflects goodness in the long run, e.g. just like a child who has receives proper guidance, mental strength and education in the starting of his life can be sure of a successful life ahead a building which has been constructed on a sound base will also able to stand through a number of future weathering and catastrophe.

4.2 RECOMMENDATION

Subsequent from research that carried out about the foundation, a recommendation was issued to improve this method. Recommend about the raft foundation is attracted to a few things such as about the itinerary of work, material & equipment, workers, condition of soil, and needed in future. The best recommend is giving the high quality on the productivity.

Itinerary of work is based on the scheduling made. Schedule help to get a maximum activity of work and produce the fastest product with a high productivity of workers. It gives more attention to a certain work such as brickwork, concrete works and others. Different progresses in everyday give meaning that the itinerary is going well. The activity of work can be stuck because condition of weather or insufficiency of workers.

Strength of structure or foundation is influences by the uses of material. For example damp proof membrane is avoided from the moisture absorb to the surface of the concrete slab. The different quantity also gives a different result such as the volume of crusher run is depending on the area of the construction. Usually, the engineer of the project will give the full specification needed of the project. The MSN Construction method is embankment the soil with 2 feet of soil and 8 feet of crusher run for increasing the height of level from the original level.

Besides that, cooperation of construction members is really needed. Communication and welfare requirement is the important to prevent from any negative issue. Supervisor must keep on eyes on work progress for achieve the optimum result. Labour also is the asset of project because construction is depending on their energy and skill.

Condition of soil helps to determine the material uses and the types of building that are built. It shows the moisture contain, durability, settlement and others that influence the duration time to the building. The correct way of plant either equipment, ratio of material, or the construction can facing the condition of soil which give problems to future. Well planning in every aspect is approach from poser.

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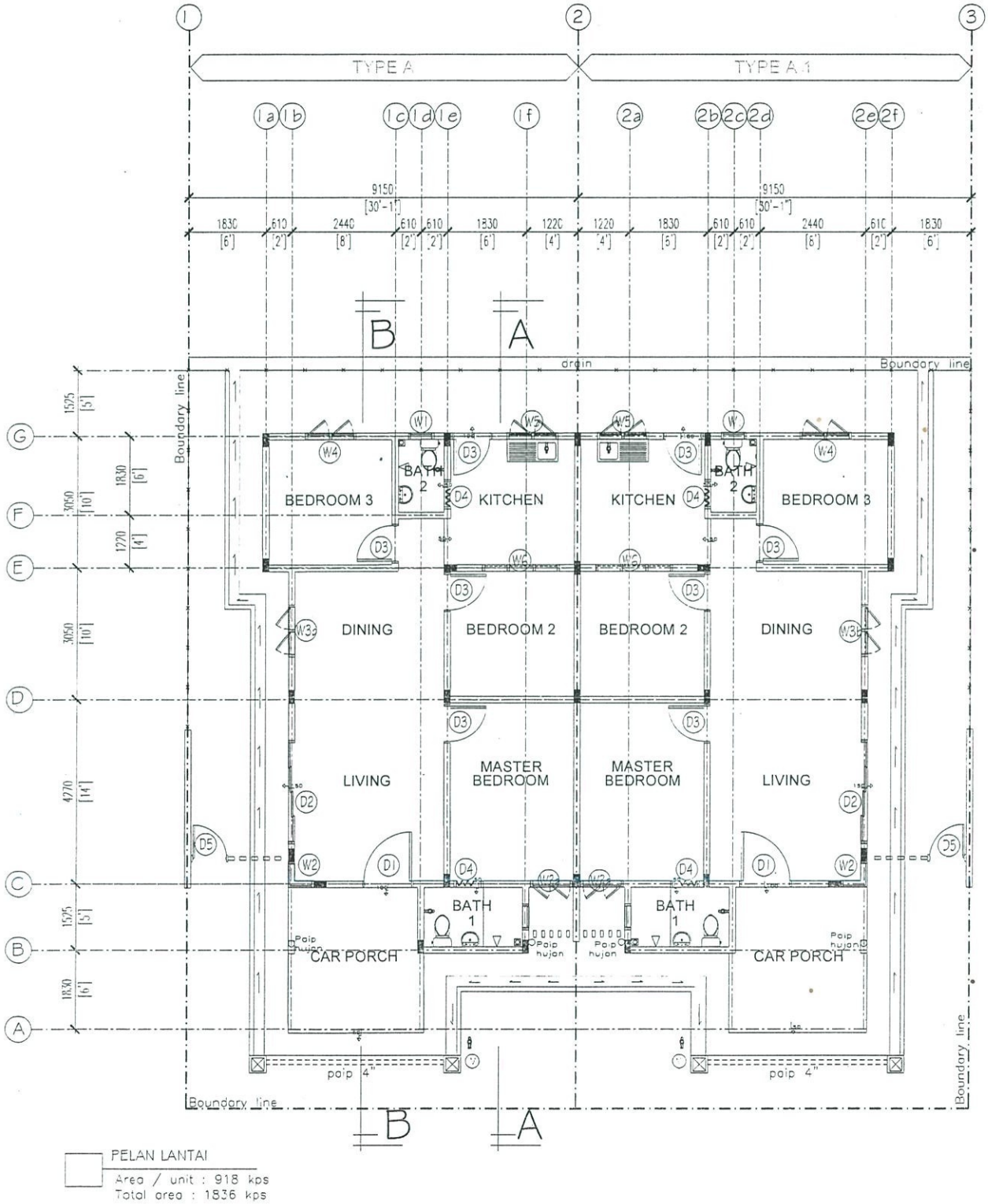
APPENDIX A



CADANGAN MEMBINA DAN MENYIAPKAN 24 UNIT RUMAH JENIS BERKEMBAR DI ATAS PT 10738 BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG, SELANGOR DARUL EHSAN

DATE : 18 APRIL 2014

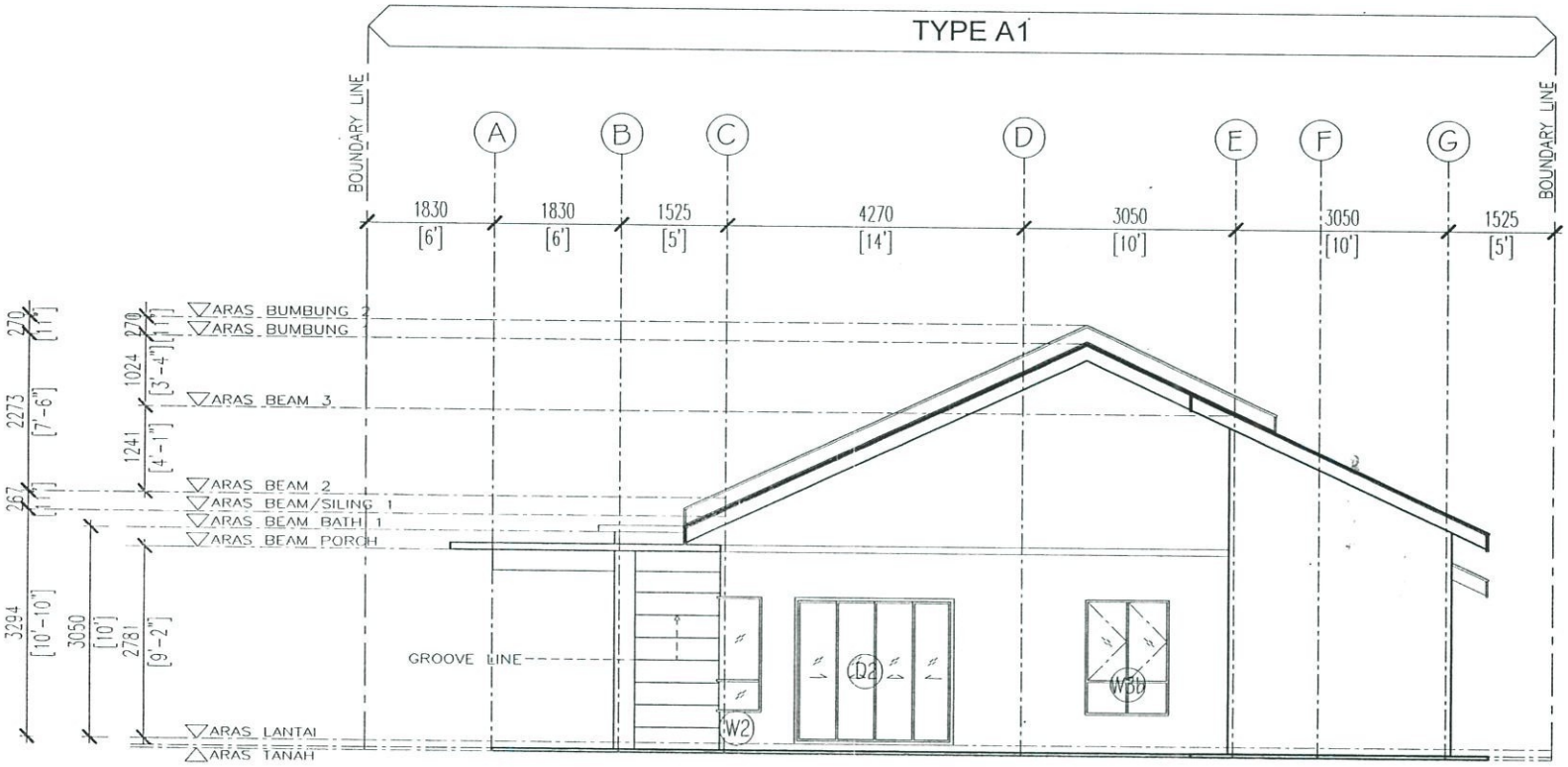
PREPARED BY : NURHIDAYAH RAZAK

APPROVED BY :

DRAWING NO. : 1/13

REFERENCE NO. : 2

APPENDIX D



CADANGAN MEMBINA DAN MENYIAPKAN 24 UNIT RUMAH
JENIS BERKEMBAR DI ATAS PT 10738
BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG,
SELANGOR DARUL EHSAN

DATE : 18 JUN 2014

PREPARED BY : NURHIDAYAH RAZAK

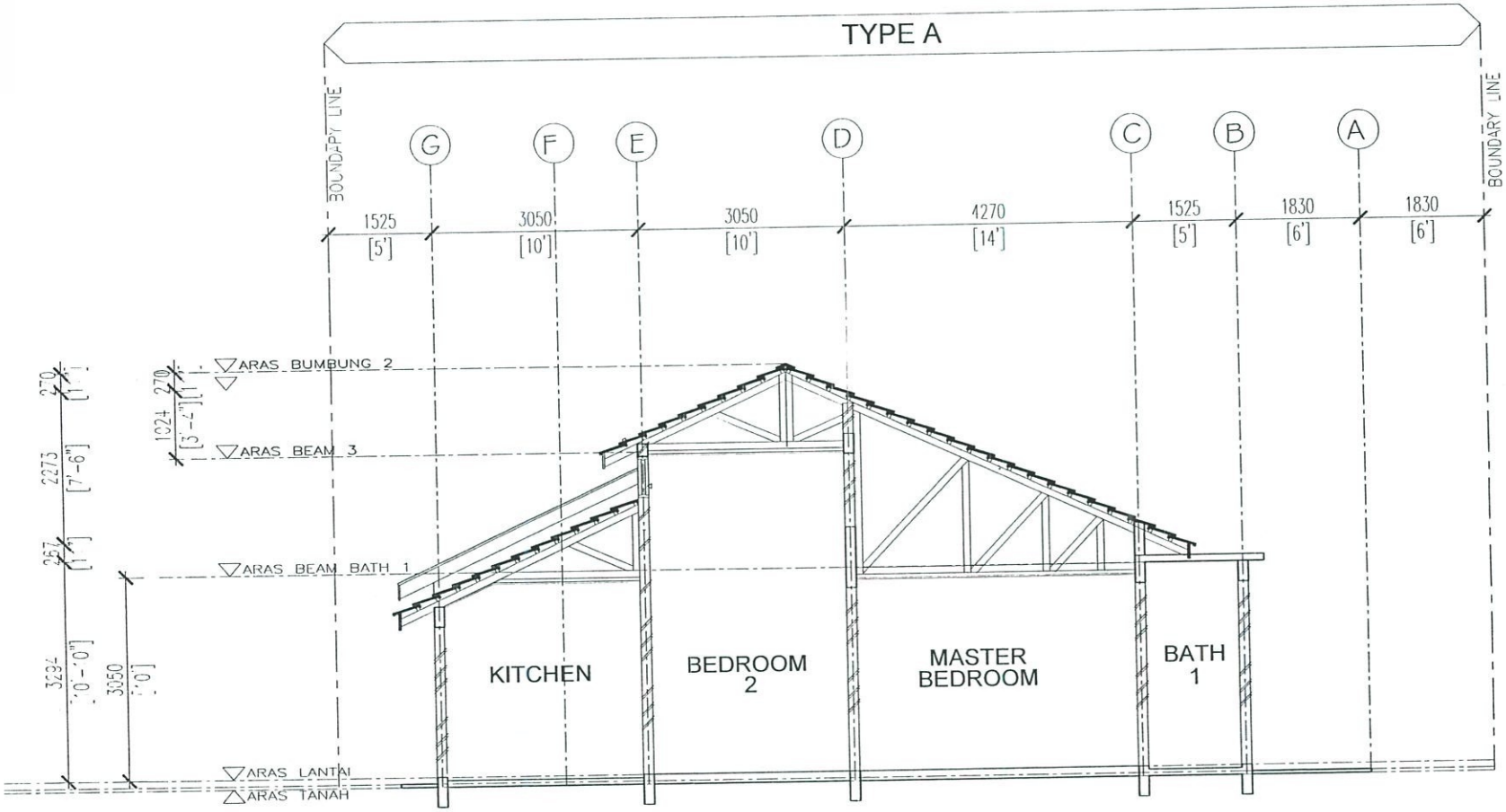
APPROVED BY :

DRAWING NO. :

7/15

REFERENCE NO. : 2

APPENDIX E



SECTION A-A

Area / unit : 918 kps
Total area : 1836 kps

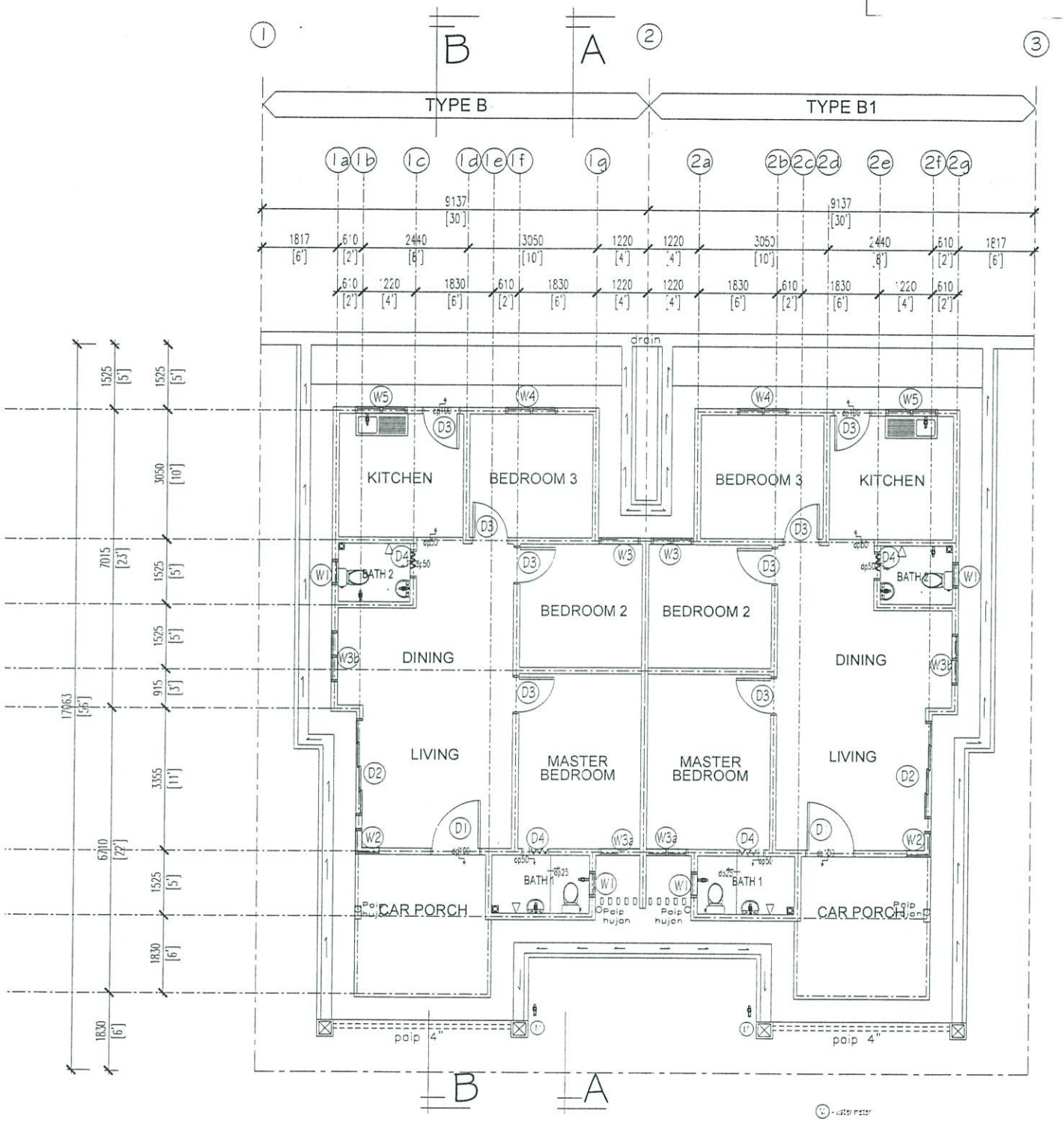
CADANGAN MEMBINA DAN MENYIAPKAN 24 UNIT RUMAH
JENIS BERKEMBAR DI ATAS H.S.(M). 8562, PT 10738
BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG,
SELANGOR DARUL EHSAN

DATE : 18 APRIL 2014

PREPARED BY : NURHIDAYAH RAZAK

APPROVED BY :

DRAWING NO. :
8/13
REFERENCE NO. : 2



PELAN LANTAI

Area / unit : 904 kps
Total area : 1808 kps

CADANGAN MEMBINA DAN MENYIAPKAN 24 UNIT RUMAH JENIS BERKEMBAR DI ATAS PT 10738 BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG, SELANGOR DARUL EHSAN

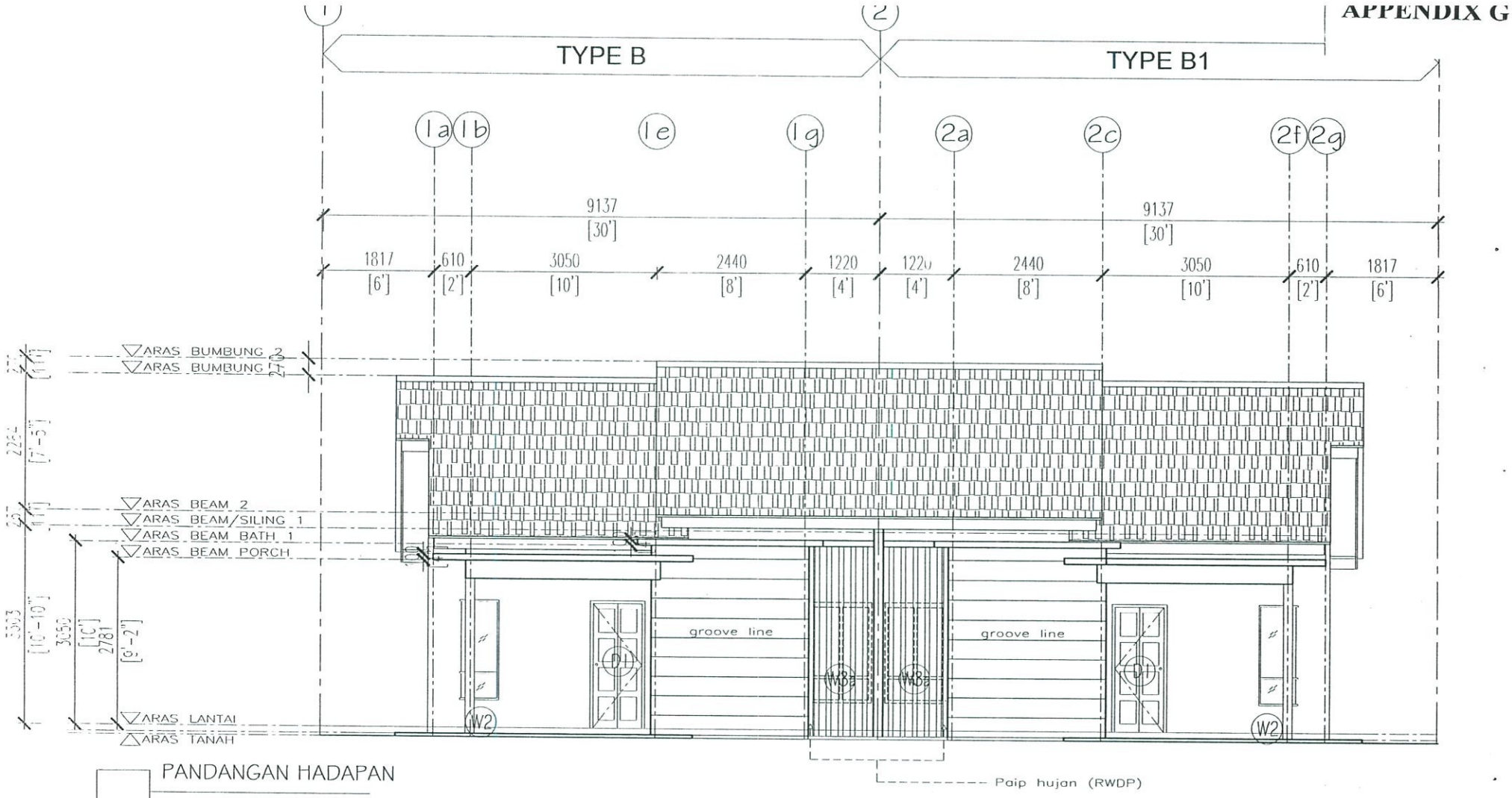
DATE : 4 AUGUST 2014

PREPARED BY : NURHIDAYAH RAZAK

APPROVED BY :

DRAWING NO. : 1/13

REFERENCE NO. : 2



PANDANGAN HADAPAN

Area / unit : 904 kps
Total area : 1808 kps

CADANGAN MEMBINA DAN MENYIAPKAN 24 UNIT RUMAH
JENIS BERKEMBAR DI ATAS PT 10738
BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG,
SELANGOR DARUL EHSAN

DATE : 4 AUGUST 2014

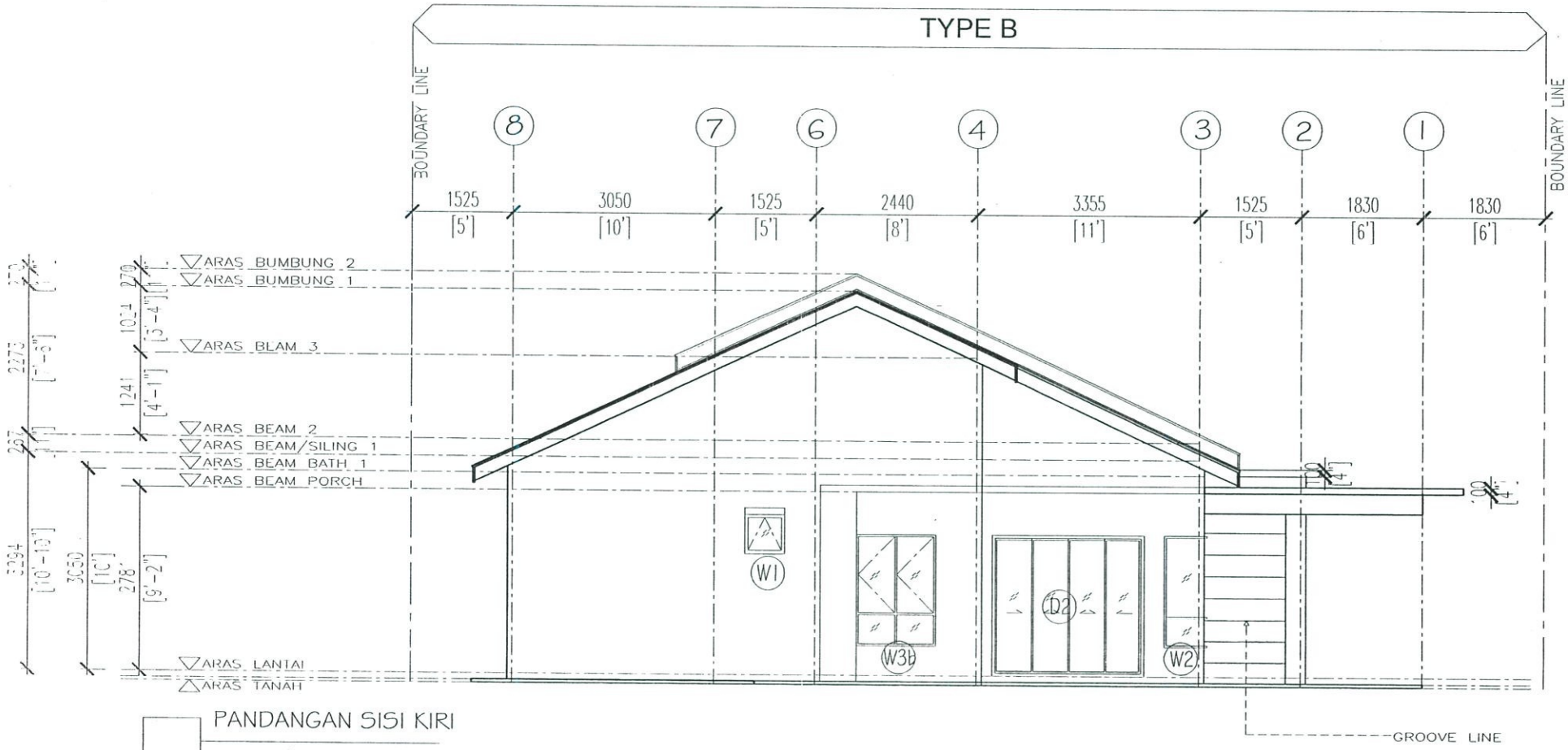
PREPARED BY : NURHIDAYAH RAZAK

APPROVED BY :

DRAWING NO. :

4/13

REFERENCE NO. : 2



PANDANGAN SISI KIRI

Area / unit : 904 kps
Total area : 1808 kps

CADANGAN MEMBINA DAN MENYIAPKAN 24ma UNIT RUMAH
JENIS BERKEMBAR DI ATAS PT 10738
BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG,
SELANGOR DARUL EHSAN

DATE : 4 AUGUST 2014

PREPARED BY : NURHIDAYAH RAZAK

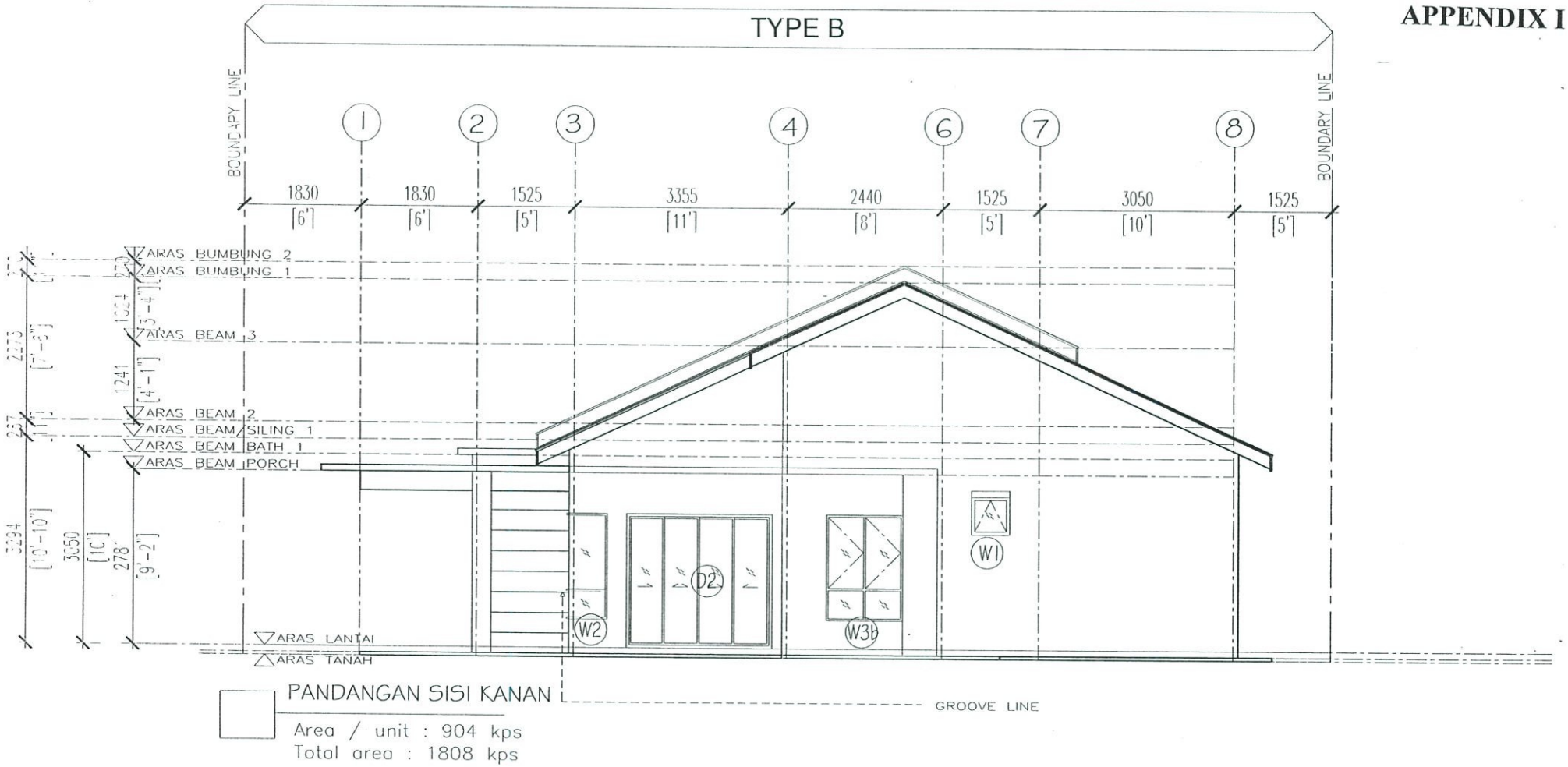
APPROVED BY :

DRAWING NO. :

6/15

REFERENCE NO. : 2

APPENDIX I



CADANGAN MEMBINA DAN MENYIAPKAN 24ma UNIT RUMAH
JENIS BERKEMBAR DI ATAS PT 10738
BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG,
SELANGOR DARUL EHSAN

DATE : 4 AUGUST 2014

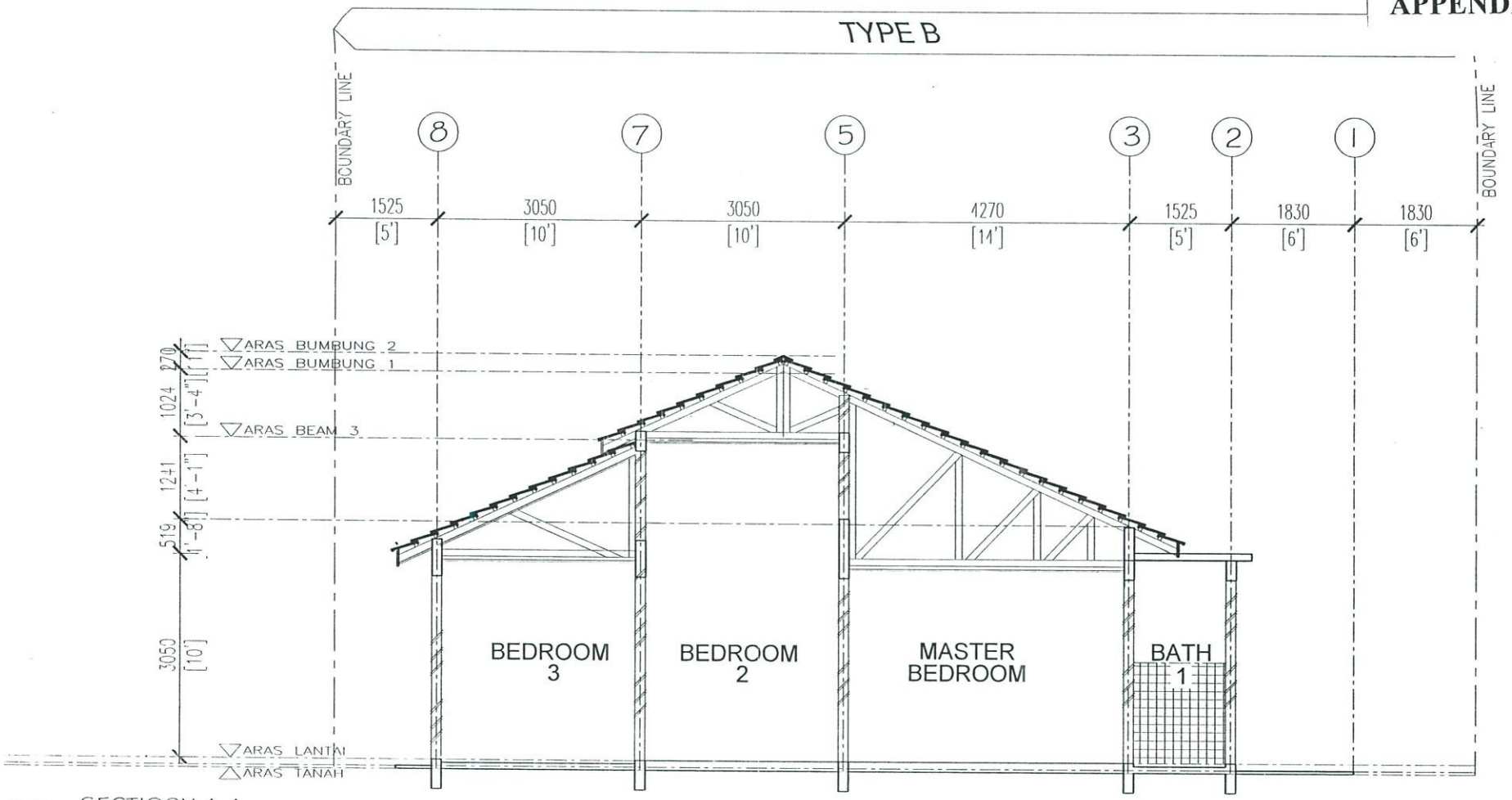
PREPARED BY : NURHIDAYAH RAZAK

APPROVED BY :

DRAWING NO. :

7/1·5

REFERENCE NO. : 2



SECTIOON A-A

Area / unit : 904 kps
Total area : 1808 kps

CADANGAN MEMBINA DAN MENYIAPKAN 24ma UNIT RUMAH
JENIS BERKEMBAR DI ATAS H.S.(M). 8562, PT 10738
BATU 6 SG. BINJAI, MUKIM KAPAR, KLANG,
SELANGOR DARUL EHSAN

DATE : 4 AUGUST 2014

PREPARED BY : NURHIDAYAH RAZAK

APPROVED BY :

DRAWING NO. :

8/13

REFERENCE NO. : 1