



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

CONSTRUCTION OF DRAINAGE

**Prepared by:
MUHAMMAD AZMIL BIN ROSLI
2017213476**



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DECEMBER 2019

It is recommended that the report of this practical training provided

by

MUHAMMAD AZMIL BIN ROSLI

2017213476

entitled

CONSTRUCTION OF DRAINAGE

Be accepted in partial fulfilment of the requirement for obtaining the Diploma In Building.

Report Supervisor :
Encik Wan Akmal Zahri bin Wan Zaharuddin

Practical Training Coordinator :
En. Muhammad Naim Mahyuddin

Programme Coordinator :
Dr. Dzulkarnaen bin Ismail

DEPARTMENT OF BUILDING

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DECEMBER 2019

STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references are stated herein, prepared during a practical training session that I underwent at Rimbun Dermaga Sdn. Bhd for a duration of 20 weeks starting from 5 August 2019 and ended on 20 December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

.....

Name : Muhammad Azmil bin Rosli

UiTM ID No : 2017213476

Date : 13/12/2019

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

Thank you so much.

ABSTRACT

Drainage system is one of the most important structure for a building. The function of drainage is to flow the water and to avoid flooding happen in a housing area. This report contains the method of constructing the v-drain type. The objective for this report are to discuss the method of construction and the materials used, the problems faced when constructing the drain and the solution to solve the problems. There is no other buildings were constructed in this area as this project are just started just about a month ago. This reports focus on the step or method on constructing the drainage and contains the materials and machineries used.

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CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Drainage can be either natural or artificial. Many areas have some natural drainage. This means that excess water flows from the buildings to swamps or to lakes and rivers. Natural drainage, however, is often inadequate and artificial or man-made drainage is required. There are two types of artificial drainage. It is surface drainage and subsurface drainage.

Surface drainage is the removal of excess water from the surface of the land. This is normally accomplished by shallow ditches, also called open drains. The shallow ditches discharge into larger and deeper collector drains. In order to facilitate the flow of excess water toward the drains, the field is given an artificial slope by means of land grading.

Subsurface drainage is the removal of water from the root zone. It is accomplished by deep open drains or buried pipe drains. The excess water from the root zone flows into the open drains. The disadvantage of this type of subsurface drainage is that it makes the use of machinery difficult.

Pipe drains are buried pipes with openings through which the soil water can enter. The pipes convey the water to a collector drain. Drain pipes are made of clay, concrete or plastic. They are usually placed in trenches by machines. In clay and concrete pipes (usually 30 cm long and 5 - 10 cm in diameter) drainage water enters the pipes through the joints. Flexible plastic drains are much longer (up to 200 m) and the water enters through perforations distributed over the entire length of the pipe.

Open drains use land that otherwise could be used for crops. They restrict the use of machines. Open drains require frequent maintenance. In contrast to open drains, buried pipes cause no loss of cultivable land and maintenance requirements are very limited. The installation costs, however, of pipe drains may be higher due to the materials, the equipment and the skilled manpower involved.

2.2 Company Profile

Table 2.1: Company Profile

Name of Company	Rimbun Dermaga Sdn. Bhd.
Registration No.	867682-U
Address	No. 35, Jalan S2 B16, Dataran Centrio, 70300 Seremban, Negeri Sembilan Darul Khusus.
Date of Establishment	7 th August 2009
Board of Directors	Mohd. Asna bin Amin Mohd. Abrar bin Amin
Authorised Capital	RM 1, 000, 000.00
Paid-up Capital	RM 1, 000, 000.00
Bumiputra Status	100% Bumiputra
Company Phone No.	06-601 2513

1.2 Objectives

As for the topic for this report is about the installation of drain, there are several objectives that can be relate to the topic which are:

1. To determine the installing method of constructing the drainage
2. To identify the problems occur when constructing the drainage and recommendation on solving the problem

1.3 Scope of Study

This report contains information about the construction method and materials used to construct the open drain. The title of the project is Cadangan Membina Dan Mendirikan Perumahan Yang Mengandungi 18 Unit Rumah Berkembar 2 Tingkat (40'x80') Dan 1 Unit Banglo 2 Tingkat Di Atas Lot 1562, Sungei Landak, Mukim Ampangan, Daerah Seremban, Negeri Sembilan. The report also include the process of first stage of the project to the final stage on the construction of drainage system from setting out and levelling, excavation the soil, compaction of soil, levelling of mortar, installing of drain block and types of materials and machineries had been used to complete the construction of drainage system

1.4 Research Method

1. Observation

By having the opportunity to be placed at the site, the information gained by observed all the works that occurred. As an example, the process or method from the first step of installing the drain. To make sure this method stay in the memory and as a record, writing short notes, taking picture and recording video were applied

2. Interviews

To ensure it was more understand about the works, short interviews between site supervisors and skilled workers was done. All the important points such as the advantages and disadvantages of the type drain used were written in short notes and by taking pictures.

CHAPTER 2.0

COMPANY BACKGROUND

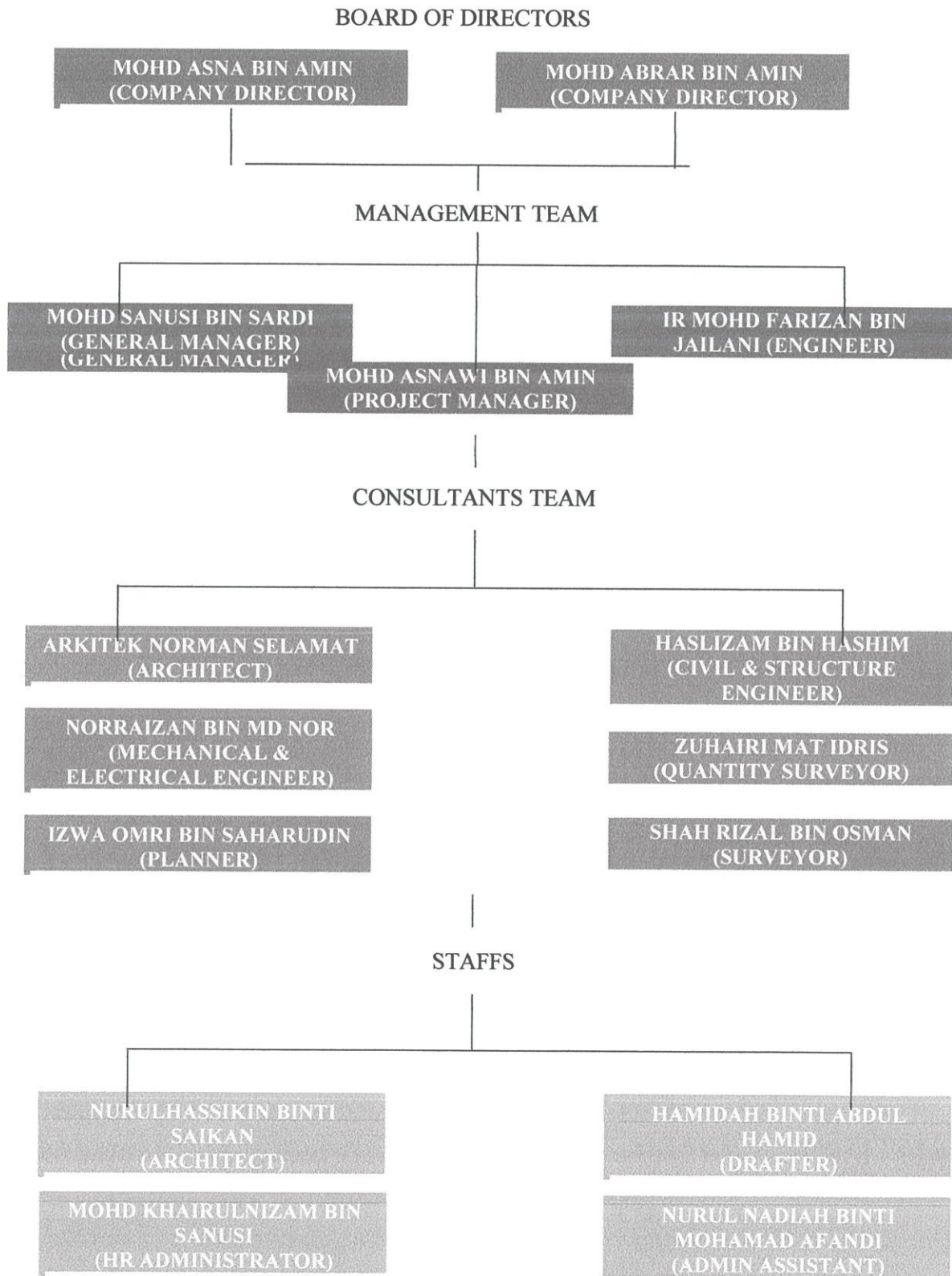
2.1 Introduction to Company

Rimbun Dermaga Sdn. Bhd. (RDSB) is a construction company that was founded by Mr. Asna bin Amin. RDSB is a Subsidiary of Dermaga Sari Holdings Sdn. Bhd. and was incorporated in Malaysia under the Companies Act on 7th August 2009 as a private company. It is fully owned by Bumiputra entrepreneurs.

RDSB started out by providing consultancy and civil work for house and small building. RDSB also carried out electrical and mechanical work in a same time to gain more experience. In June 2017, RDSB granted to G5 (CIDB, SPKK & BPKU) grade in the category of Building Construction, Civil Engineering Construction, Mechanical and Electrical Work.

Currently, RDSB consists of an experienced team from a different background in order to cope up with current challenge in constructional area and hopefully they can emerge as one of the successful Bumiputra companies in the Development sector. RDSB is committed to be a reliable and competitive company in the construction industry by delivery quality products that satisfy clients' requirements and specifications.

2.3 Organization Chart



2.4 List of Projects

1. CADANGAN PROJEK PEMBANGUNAN PERUMAHAN YANG MENGANDUNGI 95 UNIT PERUMAHAN TERES SATU TINGKAT, 222 UNIT PANGSAPURI A&B, BANGUNAN KOMERSIAL DAN KEMUDAHAN ASAS LAIN YANG BERKAITAN DI ATAS LOT 3399 HAKMILIK PN 31948, PN 32170 DAN PN 31950 MUKIM RASAH, DAERAH SEREMBAN, NEGERI SEMBILAN. CONTRACT VALUE: RM 82,828,000.00
2. CADANGAN MENDIRIKAN 30 UNIT RUMAH TERES 2 TINGKAT (20'x60') DI ATAS LOT 19841 – LOT 19870, JALAN BELIDA 8, BUKIT CHEDANG FASA 2, BANDAR SEREMBAN, DAERAH SERMBAN, NEGERI SEMBILAN. CONTRACT VALUE: RM 12,970,000.00
3. CADANGAN PERUMAHAN YANG MENGANDUNGI 8 UNIT BUTIK BANGLO 2 TINGKAT DI ATAS LOT 17203 – 17210, MUKIM RASAH, NEGERI SEMBILAN. CONTRACT VALUE: RM 6,400,000.00
4. CADANGAN MENDIRIKAN 1 UNIT RUMAH BANGLO 3 TINGKAT TERMASUK 1 TINGKAT BASEMENT DI ATAS LOT 36695, PEKAN SENAWANG, DAERAH SEREMBAN, NEGERI SEMBILAN.
5. CADANGAN MEMBINA DAN MENDIRIKAN PERUMAHAN YANG MENGANDUNGI 18 UNIT RUMAH BERKEMBAR 2 TINGKAT (40'x80') DAN 1 UNIT BANGLO 2 TINGKAT DI ATAS LOT 1562, SUNGEI LANDAK, MUKIM AMPANGAN, DAERAH SEREMBAN, NEGERI SEMBILAN. CONTRACT VALUE: RM 9,435,183.00
6. CADANGAN REKABENTUK DALAMAN BAGI KEDAI EMAS DI NO. 9, JALAN BPS 2, BANDAR PRIMA SENAWANG, SEREMBAN, NEGERI SEMBILAN.

CHAPTER 3.0

CASE STUDY

3.1 Introduction of Project

Rimbun Dermaga Sdn. Bhd. is currently conducting a project at Seremban that is to build a housing residential area. The title of the project is Cadangan Membina Dan Mendirikan Perumahan Yang Mengandungi 18 Unit Rumah Berkembar 2 Tingkat (40'x80') Dan 1 Unit Banglo 2 Tingkat Di Atas Lot 1562, Sungei Landak, Mukim Ampangan, Daerah Seremban, Negeri Sembilan.



Figure 3.1 Key plan for this project.

Source: Rimbun Dermaga Sdn. Bhd.

The location of this project is near to Pusat Dakwah Islamiah Paroi, Kompleks Belia dan Sukan and Stadium Tuanku Abdul Rahman Paroi, Seremban. It took 20 minutes from our office to reach there. This project is located beside of Jalan Paroi-Senawang that is the main road connecting Paroi and Senawang. This may easier for the contractor to bring in and out the machineries and materials used for this project because it is located beside the main road.

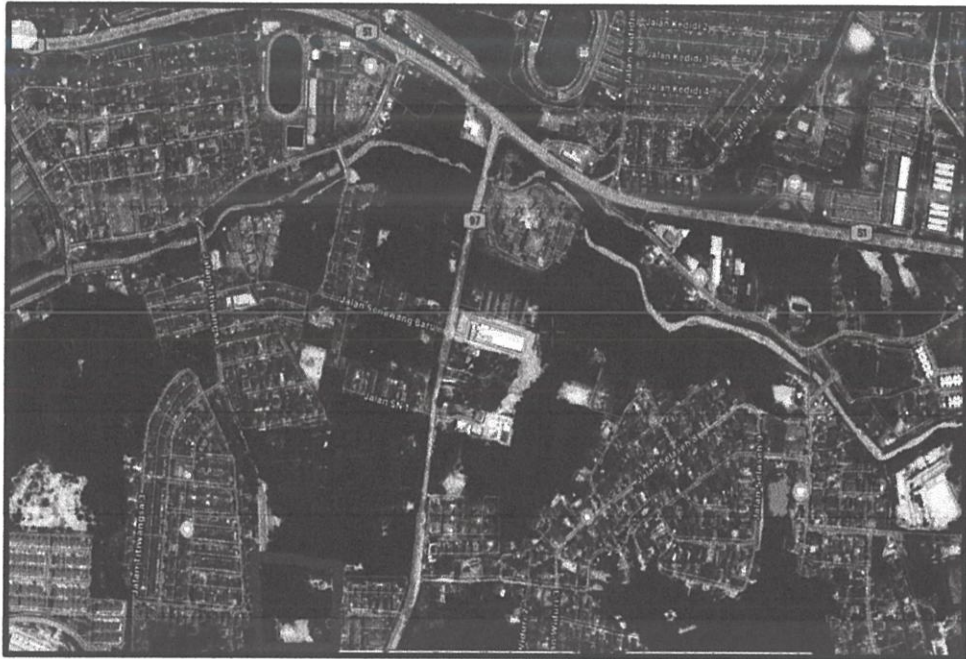


Figure 3.2 The actual location of the project

Source: satellites.pro

This site project is surrounded by a number of housing area. The contractor should be more careful and tolerance when conducting this project so that doesn't disturb the residents that live at the housing area around the site project.

The cost for this project is RM 9,435,183.00 in the contract sum. The duration of this project is 24 months or 2 years started from August 2019 and expected to be complete by August 2021. The project consists of two phases. The first phase consists the construction of retaining wall, drainage system, 6 units of semi-d houses and TNB power substation. While for the second phases including the construction of 12 units semi-d houses and a single unit of bungalow house.

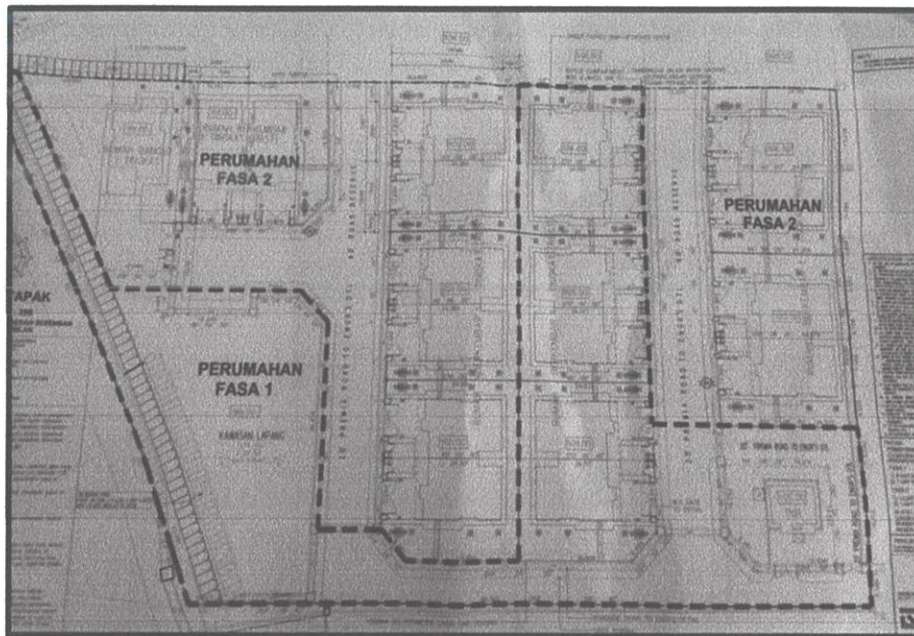


Figure 3.3 The phases for the construction of this project

List of parties involved in this project:

No.	List of Consultant	Name of Company Involved
1.	Client	Dermaga Sari Holdings Sdn Bhd
2.	Developer	MA Polaris Sdn Bhd
3.	Architect	Norman Selamat Sdn Bhd
4.	Civil and Structure Engineer	Perunding Shahidee
5.	Mechanical and Electric Engineer	KR Associate Sdn Bhd
6.	Quantity Surveyor	HMR Associates Sdn Bhd
7.	Contractor	Rimbun Dermaga Sdn Bhd

Table 3.1 List of Consultant

The Project Manager that is in charge for this project is Encik Mohd. Asnawi bin Amin and assisted by Encik Rahmat as Head Supervisor and Encik Guna as Site Clerk that will monitor all the workers on the site. The amount of workers work here is around 20 to 30 people which consist of bar bender, carpenter, electrician, plasterer and general worker. The activities that is recently being carried out are focus to the substructure work and preliminaries of building work.



Figure 3.4 General workers

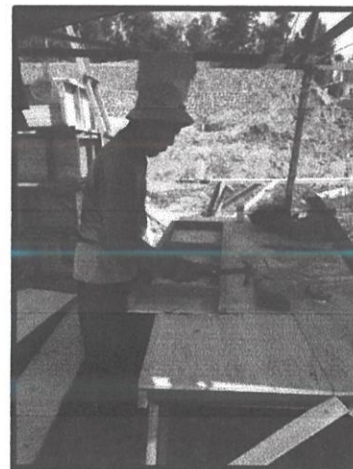


Figure 3.5 Carpenter

The construction of foundations and stumps for first 2 units of semi-d house had been done. This project is using 3 different size of foundation. The workers are currently doing the formwork for ground beam.

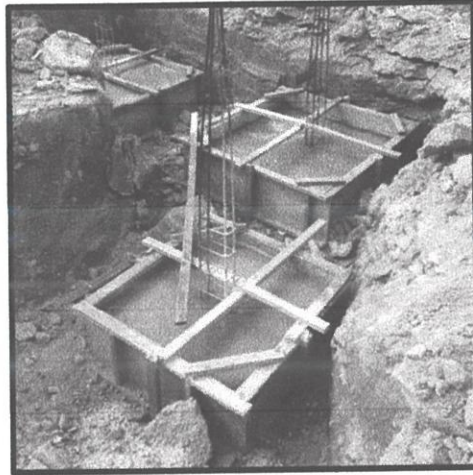


Figure 3.6 Foundation with 3 different size

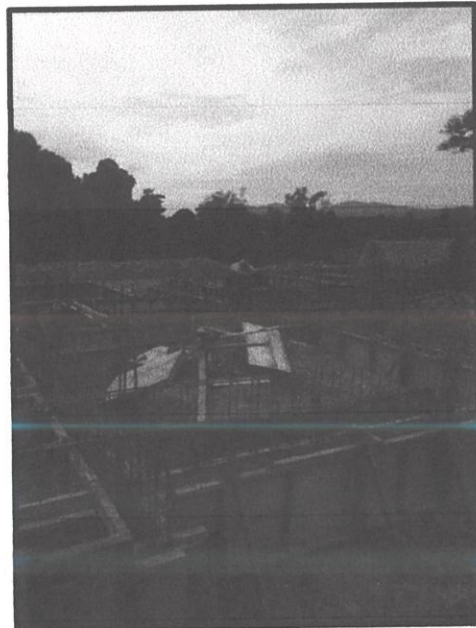


Figure 3.7 Formwork for ground beam

The preliminaries of building works consist of the construction of retaining wall and drainage. The construction of retaining wall is still in progress. This project is using two types of retaining wall which is anchored wall (reinforced concrete wall) and gravity wall (rubble wall).

The other preliminaries of building work is the construction of drainage. This report is focusing on the methods of construction of the drainage. The type of drainage system that is being used in this project is surface drainage system. The materials used is V shape block drain. The size of the drain block is 0.45m width x 0.45m height.

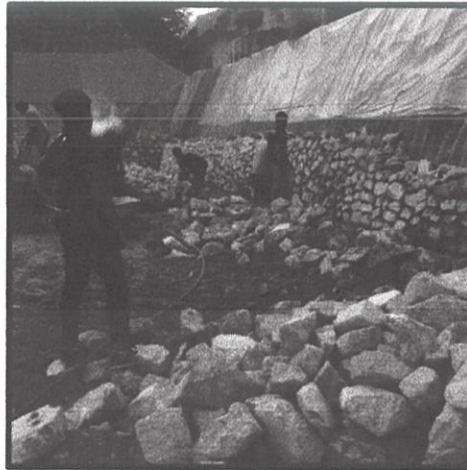


Figure 3.8 Construction of 3m height rubble wall

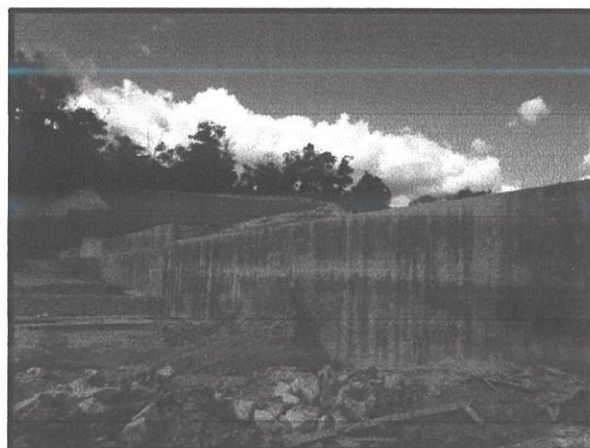


Figure 3.9 4m height reinforced concrete wall

3.2 Process Involved in Construction of Drainage

Below is the flow chart of the process to construct the drainage in construction. This process is the most common process doing by all the contractors. This process including from the first step to the final step on drainage construction.

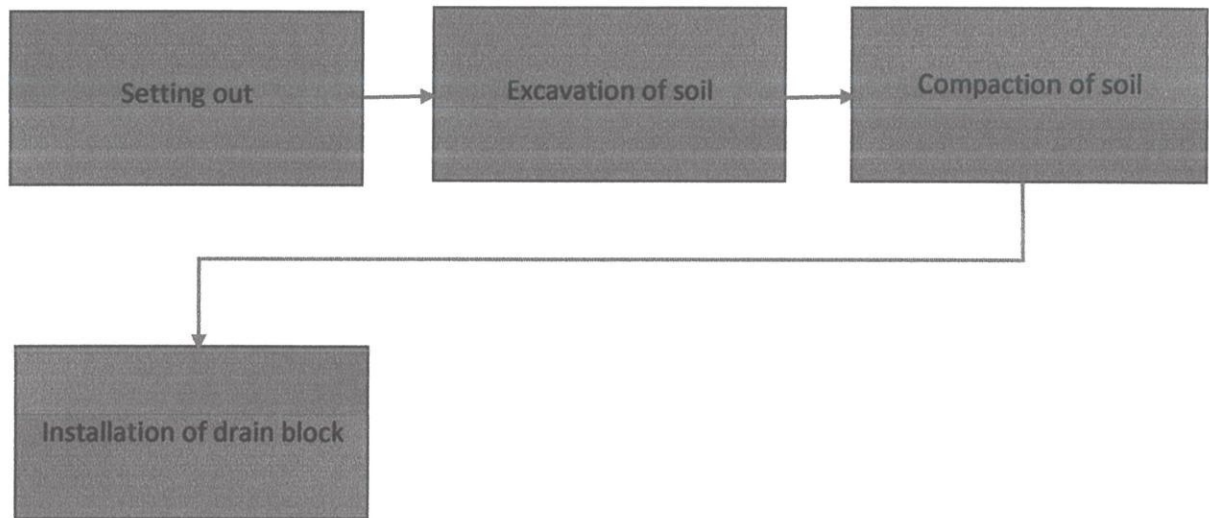


Diagram 1.0 Flow chart to construct drainage

a) Setting Out

Setting out for the construction of drainage is a process where the surveyor will come to the site to measure the distance and height of the drainage that need to be construct. The main instruments used by the surveyor are theodolite, surveyor tape and wooden pegs. Theodolite used to measure the angles in the horizontal and vertical planes before construct the drainage. The theodolite will give the accurate location to construct the drainage. Surveyor tape is used to measure the perfect distance that need to be excavated.

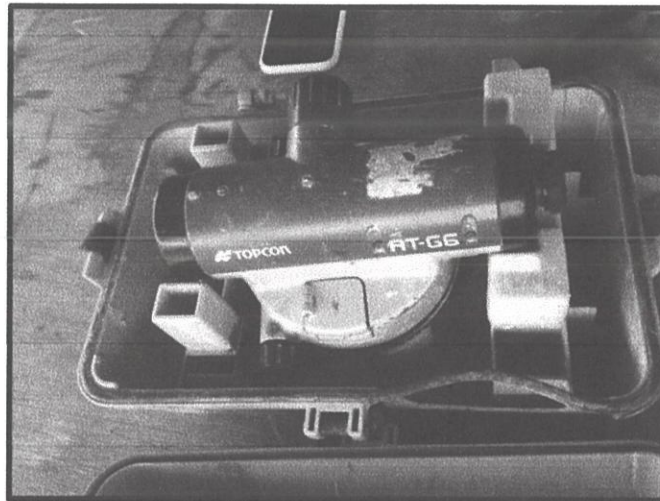


Figure 3.10 Theodolite used by the surveyor

b) Excavation of soil

After the setting out work is done, the worker excavate the soil using backhoe excavator. The soil was excavated with 1 meter deep and 1 meter width. The soil that have been excavated was gathered at some place and can be use when needed.



Figure 3.11 Worker using backhoe excavator to excavate the soil

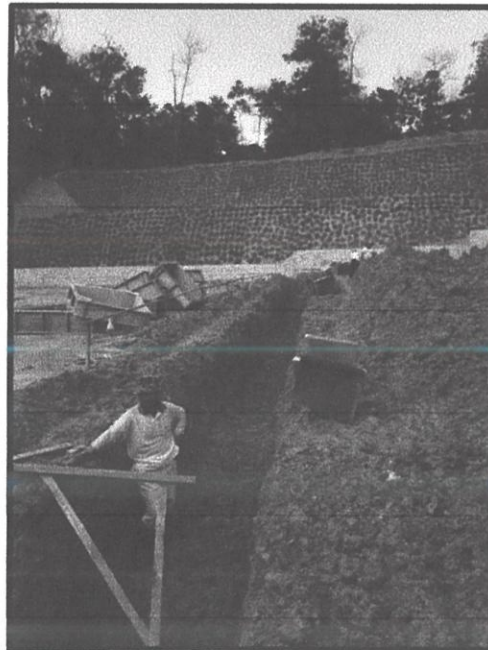


Figure 3.12 Soil that have been excavated

Then, the crusher run were put on the excavated area using backhoe excavator. Crusher run is a blended mix of coarse aggregate and fine aggregate. The combination of both crushed stone and stone dust creates a low void content or the amount of space between the pieces of rock in a mix.



Figure 3.13 Crusher run were put onto the excavated soil

c) Compaction of soil

Then, the worker will flattened the crusher run to make sure that the thickness of every area is same. Then the crusher run will be compacted by the worker using a compactor.



Figure 3.14 The worker is compacting the crusher run

Source: rcpblock.com



Figure 3.15 Crusher run that has been compacted and flattened

Next, the worker then put the mortar on the crusher run before installing the drain block. The thickness of mortar that has been pour on the crusher run is 100 mm. The function of mortar is to make the drain block more stable and durable.



Figure 3.16 The worker is pouring and flattened the mortar

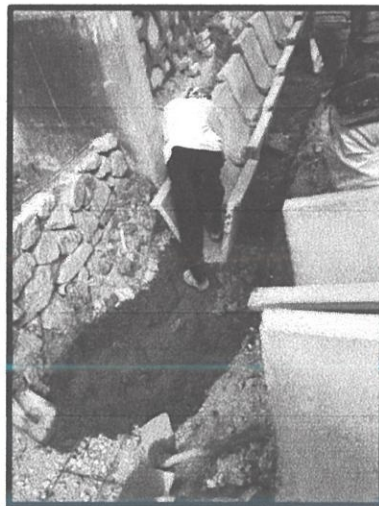


Figure 3.17 Mortar that has been poured

d) Installation of drain block

After the soil and crusher have been flattened and compacted, the worker installs the drain block carefully to make sure that the drain block was located on perfect position. The type of drain blocks used for this project is precast v drain block. The size of the drain block is 0.45m height x 0.45m width.

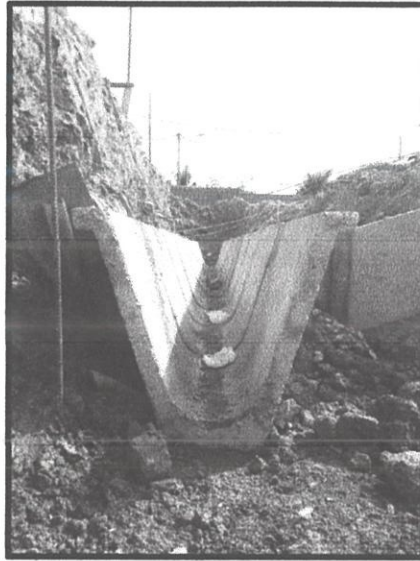


Figure 3.18 The actual size of the precast v drain block

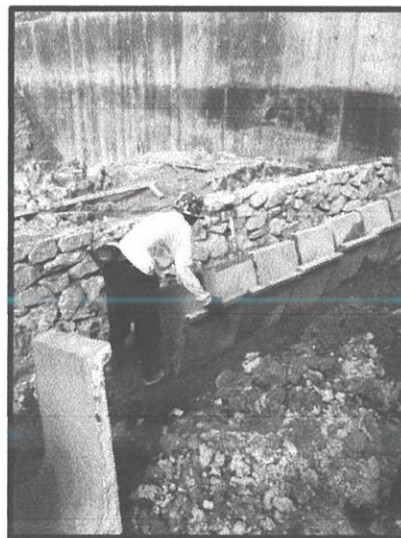


Figure 3.19 The process of installing the drain block

Next, the remaining area beside the drain will be filled with soil. The soil then will be compacted by the worker using suitable instruments. This process is to increase the stability of the drain block.

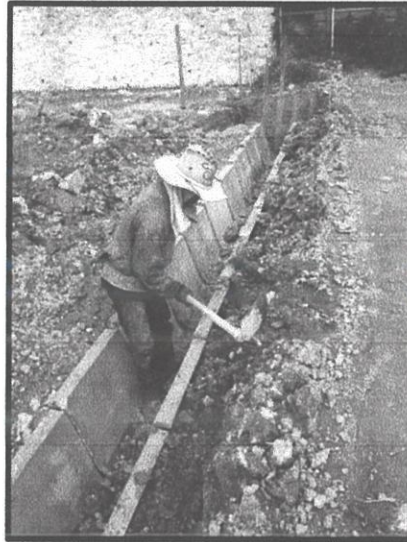


Figure 3.20 The process of filling the remaining area beside the drain block

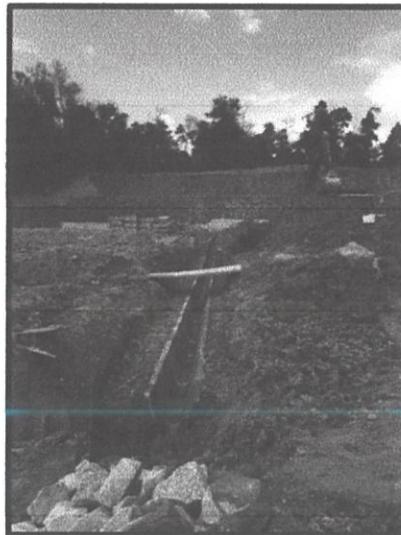


Figure 3.21 Soil that has been compacted

Then, the worker will fill the drain block joint with mortar. This is to avoid the drain form leakage.

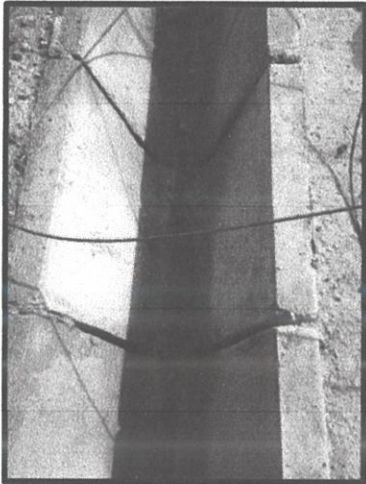


Figure 3.22 The drain block joint before filled with mortar



Figure 3.23 The process of filling the drain block joint with mortar

Source: rcpblock.com

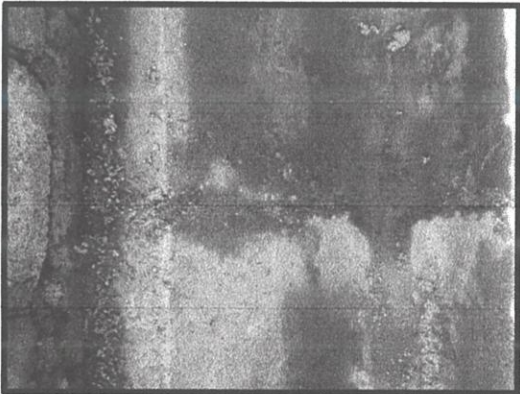


Figure 3.24 Drain block joint after filled with mortar

Next, a wall with 0.5 m is built using concrete brick and mortar. The built of the wall to ensure the position of the drain has the same level with ground level.

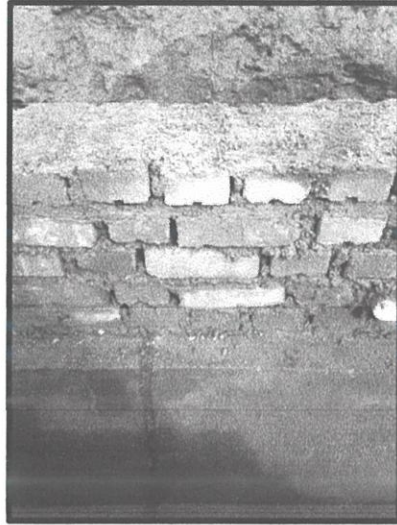


Figure 3.25 0.5m height wall that is still in progress

For the final step, the 0.5m concrete wall will be plastered by the worker. This is to make the wall look good.

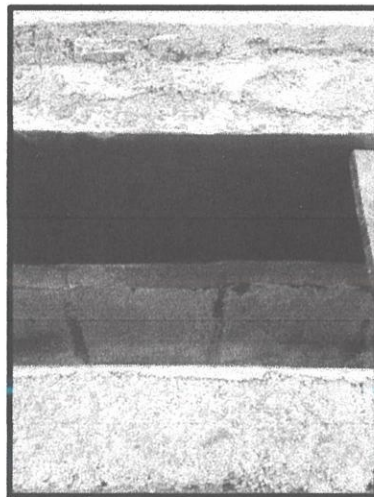


Figure 3.26 Wall that has been plastered

3.3 The Problems Occurred When Constructing The Drain and Solution Taken To Solve

A number of problems occurred when constructing the drain. But every problem has its' own solution. One of the main problems occurred when constructing the drain is the condition of site. The site will wet and not suitable for the construction if it is raining heavily. The excavated area will flooded with water. It is difficult for the worker to do their work. The concrete cannot be hardened on time because of wet condition on the site. The progress on constructing the drain will be interrupted and take a long time to finish it.

A quick solution has to be done by the worker. The example of solution for this problem is the worker should complete the concreting work at fine weather. This is to make sure that the concrete can be hardened on time. The worker should use pump to remove the flooded water from the excavated area so that the worker can do their work on constructing the drain.

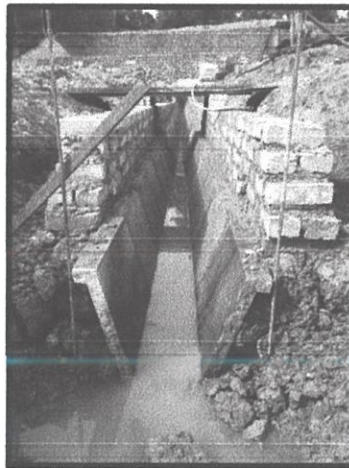


Figure 3.27 Flooded water on site project

The other problem that occurred when constructing the drain is the different thickness of mortar. This problem may affect every drain block height level. This problem is caused by lack of skilled worker. The unskilled worker that do the work may affect the flow of drain construction.

The solution for this problem is the contractor should hire more skilled worker work in this project. Other than that, unskilled worker should learn from the skilled worker on how to do the work perfectly without any problem occur.



Figure 3.28 Pouring mortar

CHAPTER 4.0

CONCLUSION

As a conclusion, drainage system is one of the important part of a building. Without proper drainage system, there might be a serious problem such as flooding. As we all know, flood can cause many disease to human. For a proper drainage system, contractor should conduct a good progress when constructing drain. Contractor should hire more skilled worker to do this job to make sure that every work on the site could be complete perfectly without any defect and on time.

The construction of drainage is also an important task. The method for constructing the drain from the first step to final step such as setting out, excavating soil, compaction of soil, compaction of crusher run, installing drain block and filling the soil at the remaining area need to be done carefully by the worker.

The worker that involved in this project need to take serious on their safety. Safety supervisor have to make sure that the worker are wearing a suitable safety kits. This is to avoid injury occur when constructing the project. It is also to make sure that the project can be completed on time without wasting time and costs.

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