UNIVERSITI TEKNOLOGI MARA

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SEPTEMBER 2015

It is recommended that the report of this practical training provided

By

Rifky Farhan bin Ruazlizam

2013633466

Entitled

Road Construction

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

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

JUNE 2015

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 Mansalin Corporation Sdn. Bhd. For duration of 5 months starting from 1 June and ended 16 October 2015. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a partial fulfilment of the requirement for obtaining the Diploma in Building.

Name : Rifky Farhan Bin Ruazlizam

UiTM ID No : 2013633466

Date : 13th October 2015.

ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah, the Most Merciful, the Most Graceful.

I would like to extend my heartfelt gratitude for the guidance, advice and help rendered throughout the period of training by the following group of amazing individuals. First and foremost, I would like to thank Captain Ab Manan Mansor for the opportunity given, to conduct my training in his esteem company. His team of professionals comprising of Mdm Salina binti Ahmad, En. Hafiz Syafiq Ab Manan, En, Ahmed Naim Che Kub, Muhammad Aidil bin Zakaria enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structures, building and civil works. They are also responsible toward streamlining and assessing my training. Also to the site personnel in Jenderam Hilir, Sepang who have extended their cooperation and help to further enhance my ability in understanding the procedures in construction and site administration, tests procedures, site safety and best practices in the industry. It is an honour for me to be given the opportunity to 'work' with all of you.

I would also like to thank ALL the UiTM lectures that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To Puan Noor Sahidah binti Samsudin, supervising lecturer, Dr Hafizah binti Mohd Latif, Puan Noor Rizallinda binti Ishak, Practical Training Coordinator and Dr. Mohd Rofdzi bin Abdullah, Faculty Coordinator, I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that have been shared over the last few semesters.

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

Thank you so much.

ABSTRACT

Road construction is a making of route for user propose. It is a process of made a harsh and empty street into a flexibility access that can be used for all people. Thus, it required a few of steps from beginner until the end to make it. Therefore, the objective of this report are, the process related in making of the road and studied the materials, equipment and vehicle conduct in road construction and the major problems that can be occur throughout the process. By using observation, question and answer session, drawing, and many resources can be obtained to know how to make a road in practically. All of the process will be shown by learning throughout workers activity. All of the information is collected and gathered in order to make a report titled 'Road Construction'.

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CHAPTER 1.0

INTRODUCTION

1.1 Introduction

Road is one of the most crucial construction when it comes to a development of an area. Road become the passage for vehicle such as lorry, crane, backhoe, excavator and other transport to function effectively. Cement, sand, palette of brick, mosaic, tins of paint is carried by these transportation pass through the site during project process. Path is part where these transportation goes along in the site. If there is no proper path provided, then there will be hard to deliver upcoming order.

This report is about a complete installation of road lay in propose ground which consist of sand, crusher run, premixes including kerbs and drainage.

Road construction is about the installation of the road by following its process at a certain phases. For this project, road construction is induct for internal road which is in the site. It can be called as a private road mainly to access people use every day for which traffic is rarely seen. It is none that related to highway, street or alternate road. This road is owned by the private group and is maintained individually.

There are few stages to construct road which is preliminaries, adding crusher run, kerbs and premix installation. All of the process will be explain in details through case study afterwards.

1.2 Objective

The objective of this report are:

i. To identify the works related to road construction.

ii. To investigate problems which may occur during road construction and way to solve the problems.

1.3 Scope of Study

The scope of study only focused on construction, equipment and available technique on producing road, kerb and gutter during construction around the site located at lot PT 2141, Jenderam Hilir, Selangor Darul Ehsan

1.4 Method of Study

There are two methods of study that were used to obtain information regarding the road construction. The method is based on primary and secondary sources. Primary sources is an original material that usually show undetails and a little of information but it is a decent and reliable fact. Primary sources for this construction is observation and interviews session method.

i. Observation method

Observation method is measure by looking the workers doing work at the site. The work than be taken a picture so that it can be analyse and get something valuable information and knowledge gain. As for example, a picture of worker doing levelling and the equipment used.

ii. Interview method

Another way to obtain information that more simple and a reliable method. This interview method is done by asking or giving out a question of a work to the suitable person. The person must be someone who was more experienced, knowledgeable and involve with this project such as project manager, consultant or contractor.

The secondary sources for this report is an information gained from a written materials. Books, magazine, newspaper, journals or even a website can be a secondary sources that added through reading. In this project, secondary source is obtain from internet regarding about road construction, books as the reference, project drawing, document and all related sources.

iii. Books

Books as the source of getting information regarding to this project is obtained from bookstores or in library. Also, the books can be acquire from the internet such as google.

iv. Drawing

This is the crucial part in every construction industry method. Drawing is the foremost of sources that all the staff and workers need to be concern. It is the drawing which give valuable information when conducting a project.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction to Company

Mansalin Corporation Sdn. Bhd is a registered construction company under Suruhanjaya Syarikat Malaysia (SSM) which was founded on 20th November 1987. The owner, Ab Manan Mansor who first establishing the Aviation Management College (AMC), a private college for aviation education opened a new branch of company. Mansalin Corp. was a division of self-company after Mansalin Education Sdn. Bhd related especially for construction purpose. 'Mansalin' is a name taken from him and his beloved wife, Salina Ahmad. This company also registered with Pusat Khidmat Kontraktor kelas D, CIDB (G3), Ministry of Finance. MCSB is a registered vendor for Gas Malaysia, Felda Holding, TNB and Petronas Berhad. It is 100% Bumiputera MCSB shareholders.

Mansalin Education is located at Bandar Baru Bangi, Selangor. The office address was No.22 Jalan 4/12B Seksyen 4 Tambahan, 43650 Bandar Baru Bangi, Selangor Darul Ehsan. For recent, Mansalin is on their way to establish a new location for education purpose at Mukim Dengkil, Daerah Sepang, Selangor. This propose build project is under Mansalin Corporation.

2.2 Company Profile Particulars

Company Registered Name	:	**Mansalin Corporation Sdn. Bhd**
Business Registration No.	:	166305-D
Registered Address	:	No. 705B, 2nd Floor, Complex Diamond, Bangi Business Park, Jalan Medan Bangi,Off Persiaran Bandar, 43650 Bandar Baru Bangi,Selangor
Business Address	:	No. 22, Jalan 4/12B, Seksyen 4 Tambahan, 43650 Bandar Baru Bangi Selangor Darul Ehsan
Telephone No.	:	
Fax No.	:	
E-mail	:	mansalin@streamyx.com info@aviationtraining.com.my
Date of in Corporation	:	16th September 1987
Registration with PKK	:	1006 B 2001 0868

Class D	I	1
	II	1, 2a, 8b
	IV	1, 3b, 3c, 3d

Registered with MOF No. : 357-02018560

Services

220802	Building
220401	Cleaning Building
220502	Lecturer
220402	Cleaning Territories
200300	Cables, Accessories and Conductors

180100	Machine Workshop Accessories
100200	Laboratory Facilities
090300	Disposable Medical Equipment
090100	Medical Equipment
100102	Chemical Industry

Registered with PETRONAS	:	L-166305-D **Suppliers, Services and Offered Services** SA102010000, SC311020000, PC10701000, PC10704000
Registered with Gas Malaysia	:	0865 A01, C10 **Supply / Contractor** (Main Contractor, Office Maintenance, Property)
Company Status	:	Bumiputra
Bank No. 2, Jalan 6C/16, Seksyen 16, Bandar Baru Bangi, 43650 Selangor Darul Ehsan	:	**Malayan Banking Berhad**

Directors Salina Ahmad (9 %)	:	Ab. Manan Mansor (91%)
Shareholder Salina Ahmad	:	Ab. Manan Mansor
Business	:	Trading
Auditor	:	**MH & Associate** No. 28B, Wisma Waja Jalan Kota Raja E 27/E, Hicom Town Centre, 40400 Shah Alam, Selangor Darul Ehsan
Company secretary	:	**Comprehensive Management Services** No. 705B, 2nd Floor, Complex Diamond, Bangi Business Park, Jalan Medan Bangi, Off Persiaran Bandar, 43650 Bandar Baru Bangi, Selangor
Tax Consultant	:	**Sahril & Accessories** No. 705B, 2nd Floor, Complex Diamond, Bangi Business Park, Jalan Medan Bangi, Off Persiaran Bandar, 43650 Bandar Baru Bangi, Selangor
Customer List	:	**1) Gas Malaysia Sdn Bhd** - Preventive Maintenance Work for Kuala Lumpur and Central Region for 1 year **2) Petronas Dagangan Berhad** - Supplying and Offered Services

3) ATMA

-Services and Building Maintenance Work

4) Felda Holding Berhad

- Supplying and Civil Engineering Work

2.3 Organization Chart

Managing Director

Ab. Manan Mansor

B. Av, MBA, CIMM, MMIM

Administration Director

Salina Ahmad

Certificate, Town Planning

Alternate Director

Faiz Aizat Ab. Manan

B.E.E Degree in Electrical and Electronic

Project & Business Development Director

Hafiz Syafiq Ab. Manan

B.S.E. Degree in Civil Engineering

Project Manager

Ahmad Kamal Kamaruzzaman

Senior Executive

Rohazlin Jamaluddin

Diploma in Business Management

Marketing Executive

Mohd Hanafi Mohd Yunus

Diploma in Business Management

Public Relation Executive

Wafi bin Abdulfatah Haron

Admin Assistant

Nor Shahida Mat Usop

MANSALIN CORPORATION SDN BHD
Board of Director

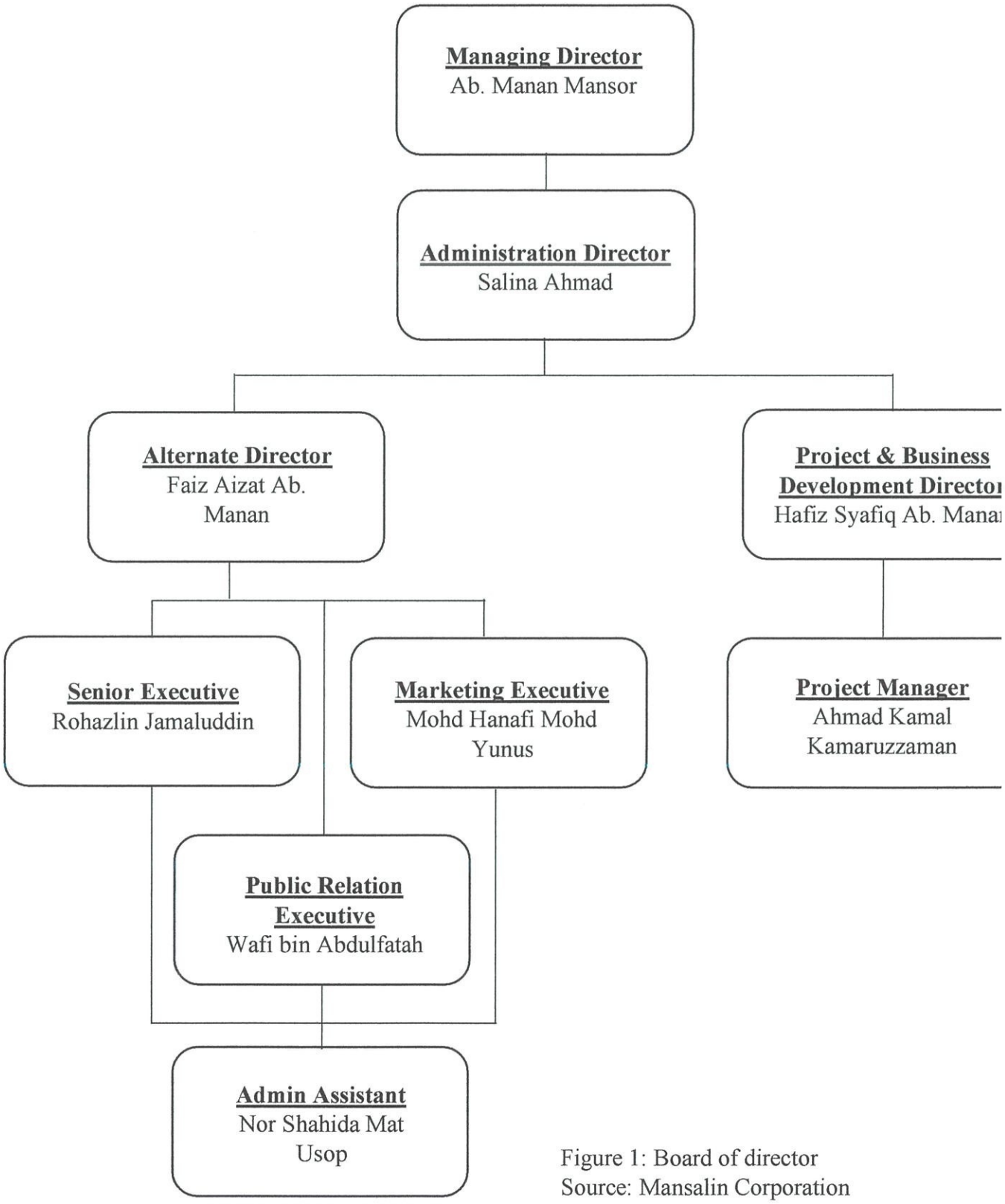

Figure 1: Board of director
Source: Mansalin Corporation

2.4 List of Project

2.4.1 Completed Project

Table 2.1: List for completed project company

No.	Title	Government/Private	Contract Value (RM)
1.	Office Repair & Renovation	Gas Malaysia Sdn. Bhd.	3600.00
2.	Preventive Maintenance Activities of Gas Malaysia Gas Distribution in Central Regional Office for 1 Year	Gas Malaysia Sdn. Bhd.	64,957.43
3.	Preventive Maintenance Activities of Gas Malaysia Gas Distribution in Kuala Lumpur Branch Office for 1 Year	Gas Malaysia Sdn. Bhd.	26,021.35

Source: Mansalin Corporation

2.4.2 Project in Progress

Propose to build 3-Storey Private College containing Phase 1; a Canteen, Swimming Pool with Football Field and Phase 2; Student Hostel in Lot PT 2141, Mukim Dengkil, Daerah Sepang, Selangor Darul Ehsan

Duration of time	:	2 years
Starting from	:	1st January 2013
Ended at	:	31st December 2015
Company Attributing	:	Architect **KC TAN ARCHITECT** Unit 8-12, 8th floor, Wisma BU8, No.11, Lebuh Bandar Utama, Bandar Utama PJU6, 47800 Petaling Jaya, Selangor Darul Ehsan.
		C&S Engineer **JAYA KONSULT SDN. BHD.** No. 82-1, Tingkat Satu, Jalan Teknologi 3/9, Bistari De Kota, Kota Damansara PJU 5, 47810 Petaling Jaya, Selangor Darul Ehsan.
		M&E Engineer **PERUNDING JC YEO SDN. BHD.** No. 62B, Jalan Bendahara 8, Off Jalan Sungai Jati, Taman Sentosa Jaya, 41200 Klang, Selangor Darul Ehsan.

CHAPTER 3.0

CASE STUDY

3.1 Introduction

The case study about road construction in this project is about internal road paving. This can be difference from other or external road paving which comprises of highway, bridge, main road and other. It can be difference from the aspect of strength, thickness, process and sometimes can be the material and equipment use in road making. In this project, the road is commonly used for pedestrians that daily use to enter and go outside after finished purpose building.

Road construction for internal site is mainly divide into five main parts which is preliminaries, conducting crusher run, kerbs laying and road paving (premix). Drainage is the fifth or the last part of construction because it also affect the process. It is an additional value added in road making. In case study, all of the process will be explain details accordingly.

Furthermore, every construction may have its disadvantages during the process. It can because of weather, ground condition or worker involved. Problems that occur during road construction is defined and solved in order to achieve the main objective of this report.

3.1.2 Flow chart for road construction

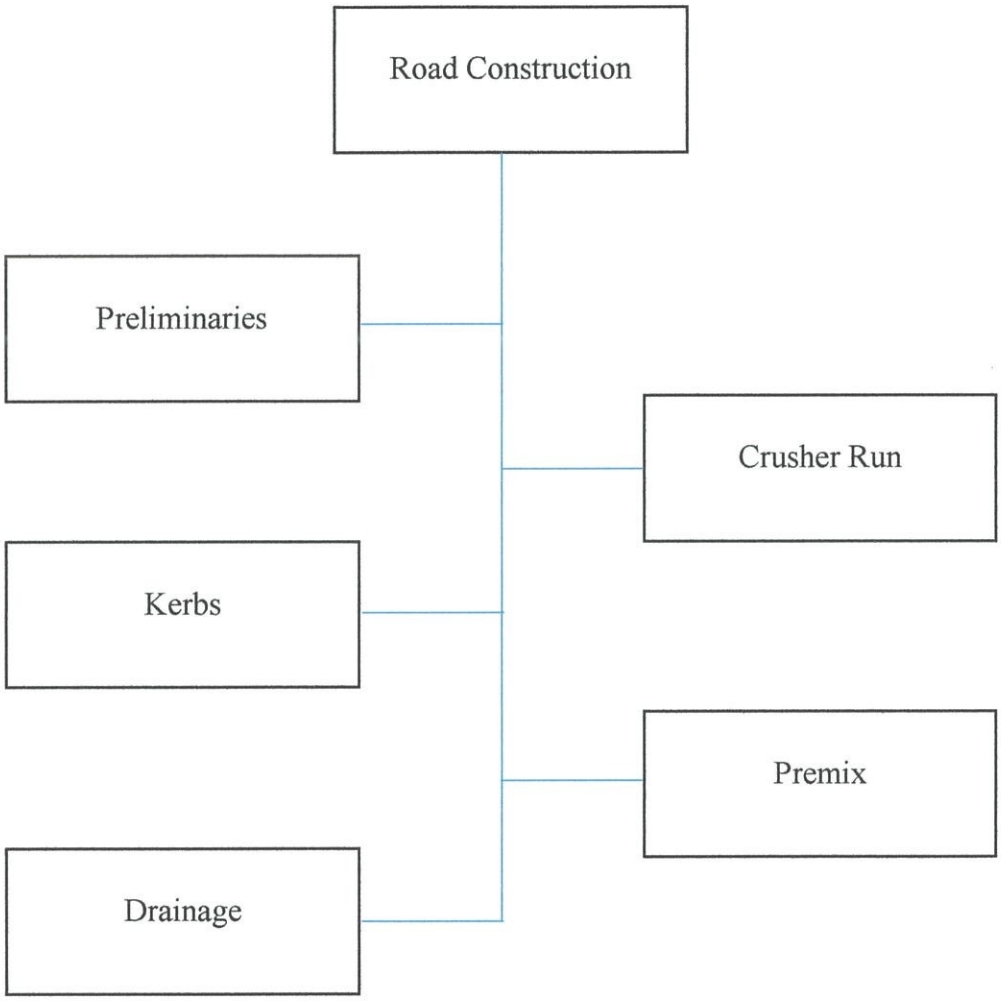

Figure 3.1: Flow chart of road construction

3.2 Case Study

3.2.1 Preliminaries

Generally entire process in construction must begin with early work which called as preliminaries. It includes surveying, setting out, clearance and other type of work involves. Preliminaries for road must to ensure that there is no running underground work before starting to lay road materials. If there is so, it will affect the quality and texture of the finished road.

Preliminaries for this site is started with flattening job which requires backhoe to level the ground. Backhoe must even the soil according to level given by the surveyor, 12.90 m for ground level.

Photo 3.1: A worker doing clearance job

Another preliminaries beside from clearance is earthworks. This job include the removal of topsoil with grass, scraping and grading the specified area according to it level (Chudley and Greeno, 2010). Plant which suitable for this work is mostly backhoe.

3.2.2 Crusher run

According to Braen (2014), crusher run goes by varies name such come from quarry process (QP), dense grade aggregate (DGA) or road stone. The material differs from other crushed stone and gravel product in that it not only include crushed rock, but also come from stone duct. Crusher run is carefully blended and graded to create a low-void content stone when produced. Typically crusher run is acquirable in sizes from ¾" to a #200 sieve.

It needs 15 numbers of 3 tonne lorry to deliver crusher run to this site, adequate to cover almost half of road. Thus, there is need to come up a plan to place crusher run effectively for incoming lorry that come by every 30 minutes. Usually crusher run is put from the rear site to the front site.

Photo 3.2: crusher run is deliver by a huge amount

Photo 3.3: crusher run

The next process is to level crusher run according to its thickness specification. Crusher run is set up to be 300 mm thick on the ground. For this site, sand blanket

which 50 mm thick is consider lay as it is contain altogether with crusher run. This level work is done by vehicle known as Back pusher.

Back pusher is a tractor mainly functional for level the crusher run. One driver (one worker) only required to execute the work. Skills to drive back pusher are crucial for back pusher worker to lay the crusher in an even manner.

Photo 3.4: back pusher is laying the crusher run

Next, compaction taking over the job after laying crusher run had been induct on the ground. Compaction is a process of pressing something that is harder and fills less space. A crusher run that have being compact give less void between the stone and harden to the road. This work play important role in road construction because the road needs a strength to undo any load come from moving vehicle on it. If the crusher run are not compacted yet, it is advisable not to pass upon it because the crusher are loose and does not have any strength to overcome it and the road will form an inward curvature.

Photo 3.5: crusher run after compacted

3.2.3 Kerbs

Kerbs is the most attribute features in road. It gives advantages if it is in competent type and put in well-positioned. Kerbs perform itself where it keeping the water off the street, act as the pavement edge in straight condition, aid in systematic roadside building and give aesthetic value. (Uitm Press, 2012)

Kerbs usually located most in the city along the side of the road. It can be varies type of shape but often in rectangular shape. It is made from plain concrete. It physical figure normally is plain and painted in black and white stripes or black and yellow stripes colour. Kerbs can also provide safety among the pedestrian who uses sidewalks since it gives minimum barriers to separate between the road and sidewalks. Curbs is made from sand, cement and tar.

Type of kerbs use for this project is precast concrete kerbs. It is the most popular used for kerbing because of it is strong, durable and cheap.

Photo 3.6: Kerbs

Construction of kerbs

Commonly there a four type of common kerbs use in Britain which is half-battered, bull nosed, splayed and square kerbs. This project use half battered kerbs for road construction. Half-battered kerbs is one of common kerbs use in precast concrete kerbs mainly because of its sloping design that can avoid scratching or damage at kerbs face

cause by road rollers while operates. Another function for half-battered kerbs is used to warn motorist that they are close to the edge for parking place.

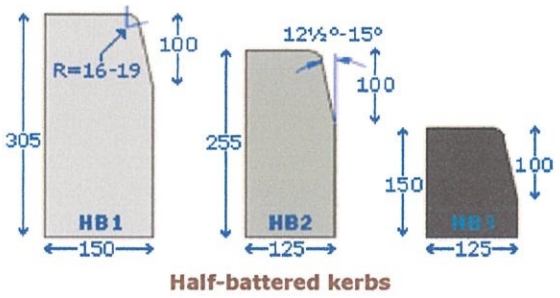

Figure 3.2: Half-battered kerbs

Source: http://www.pavingexpert.com/edging5.htm

Kerbs can be construct in many ways as long as it comply with kerbs material and enough for one day make. For this project, kerbs construction mainly can be divided in two ways which is machine-made kerbs or hand-made kerbs.

i. Machine made kerbs.

It is a manufactured machine especially for processing specified material for kerbs. This type of machine easier to use as it mixed the compound of cement and tar. The machine form the shape of the kerbs while moving across the side of road following the linear. One hour uses can make 100 metres length. It is much easier provide for the worker.

Photo 3.7: Machine made kerb

ii. Hand-made kerbs.

Another types of kerbs construction. Handmade use the energy of each individual worker skills to produce kerb with bare hand and some of equipment aided use to make curbs. The work become faster, conscientious and cheaper. It is different when it comes to quality compared to machine made kerbs but in order to save time for project progress, it is the perfect one.

Photo 3.8: Handmade kerb

After the kerb had been laid across the side of the ground, a hole for every 5 metres is made in order to give water flow or to extinguish finer material on road. The pipe will be installed for every hole that made to ensure the flowing is directly through drain. As can be seen, there is a line that made between the holes. It is a line that made in order to give the kerb expand or shrink when the weather is hot or cold. This is to ensure the kerb will able to cope with lateral forces and increase its durability on the road.

Photo 3.9: Hole and line made at every 5 metre kerbs

Kerb is produce from the mix of tar, sand, cement and water. It is the tar who usually make contact with cement such give adhesive value between the compounds. The mix is made from a huge amount of those material planned to be use for one day work so that there is no wastage and lower the quality of material.

3.2.4 Premix

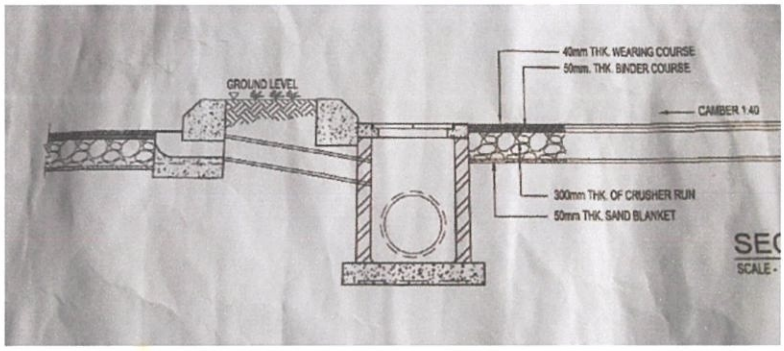

Photo 3.10: Drawing for premix in road construction

Premix is the last layer for the road construction. It can be called as finishes surface for road. Premix is a material that is mixed or blended from two or more ingredients before used.

From the photo above, premix is seen as a combination between wearing and binder. Wearing course is a good for non-skid properties whereas binder coat is made to form the cross falls and/or slope. (Chudley and Greeno, 2010)

There are few type for premix which is (civil engineering, 2014):

Sheet asphalt, mixed of bitumen and sand with 30 % add of course aggregate, its thickness varying from 3/4" to 1/2".

Asphaltic concrete, mixed of bitumen and sand and not less than 30% by weight of mineral size aggregate that size is larger than sand. The premix is then be laid at high temperature around 35 degree Fahrenheit and required heavy binder between 50-60, 60-70, 70-80, and 85-100.

Prime coat, the primary binder to highway surface before laying wearing coat. Prime coat purpose is to assist in maintaining the adhesion for road base and bituminous surface and also helps to bind finer particles of aggregate at the surface of road base.

Tack coat, the primary application of binder for existing surface and ensure the bond between the new construction and existing surface.

The road bed, having thoroughly drained must be properly shaped and sloped each way from the centre so as to discharge what water may penetrate to it (Gillespie, 1871). Road surface have degree of slope which able the waters to be flow to drain in order to avoid water accumulated at road which may harm the motorist.

3.2.5 Drainage

Drainage for road is important as in road construction. It provides the movement for water flow in case the water coming from the road. Drainage also can be use as medium to extinguished unused material on the road. Such type of drainage to transport is by using pipe. To carry water or distinguish material came from the road, there must be a certain degree of slope of pipe across the drainage. For road construction, drainage is more focused on water flowing through pipe.

This project involves pipes for drainage system in road construction making. The pipe is installed in every 5 metres at the edge of the kerb where the hole is located. Soil then be put on the pipe to enclose it as the soil is for landscape purpose.

Photo 3.11: Measure the length to install the pipe between kerb and drain

Photo 3.12: Pipe is directly installed after kerb had laid

3.2.6 Problems and solutions

There are a few parts that need to be serious taken before, while and after the work which can be the major problem regarding to road construction.

i. Ground/ soil/ earth condition

Photo 3.13: Slope ground

For this site, there has been an amount of soil curvature lying in the ground. It is due to its original form. Curvature can give difficulties for the thickness of sand, crusher run and premix to be install. Load from various vehicle enter the site adding the problems to produce route.

One way to overcome soil condition for curvature earth is by levelling. Surveyor is the main person to detect and give a right level suitable to the road for future user. Furthermore, it is way much easier for road worker to put crusher run, sand and premix for a level road. Otherwise, road defect may be occur.

ii. Wrong form of work

Photo 3.14: Polyvinyl chloride (PVC) pipe type for drain is installed first before kerb

Making a road must follow its steps to prevent from upcoming problem. Installing pipe before curb can bring a situational problems where worker must keep an eye to prevent the pipe from damage.

It is the duty for project manager to run the job accordingly follow the work schedule. Working schedule is make so that all the job will run smoothly and can be done based on the time period for the project. Managing also required courage to stop the worker doing an error for specified job.

iii. Unskilled/semi-skilled worker

Photo 3.15: Worker had make an error by changing the actual place of kerb that need to be install

A work done by worker sometimes is not as perfect as in the drawing. Sometimes worker lack of attention to secure the road making precisely. It may due to hot weather, exhausted and acknowledgeable for the work. For this site, a problem occur when the worker had changed the original measure of kerb from drain to another distance. Actual measure is 1200 metres distance from kerb to drain, but it becomes 900 metres after they had thrown the original peg in order to make the kerb.

Every work in the site is been notified by site supervisor. Any of the wrong way for specified time and work must be detected so that the development will not harm the user in the future. Worker may doing slack in the job, but is the duty of site supervisor to correct it accordingly to plan.

iv. Improper site work procedure

Photo 3.16: Kerbs undergo damages because of digging work.

There is a major problem occur when work are not been followed according to work schedule. Electrician worker need to install cable for street lighting purpose while kerb has been install at that area. Thus, worker had to remove the kerbs so that cable can be put underground. Kerbs was heavily damages because of the removal. This improper job have led to kerb wastage and also kerb quality.

Work had to be done by steps accordingly. Installing the cable is the main before any other ground works. The work schedule must be checked every day and the work is done completely without have any lack.

v. Blocked drain

Photo 3.17: crusher run had penetrate drain and cause blockage

Blockage problem is occur because of the crusher run accumulated in the drain. This case may happen due to crusher run that have enter the drain through near grating with hinges sump from the process of laying the crusher run by back pusher. When a heavy drain or pumping water process, crusher run inside was being pushed along with the flow of water and stack in the main drain.

Pull out the accumulated crusher run is the best solution for this problem. Worker use rope and tied it until it become a hump, this hump can be used to pull out remaining crusher run to goes out. This process is keep going until the drain is completely clean. Checking the drain once in every week is considerable as to avoid repeating problems occur again.

CHAPTER 4.0

CONCLUSION

4.1 Conclusion

Road construction provide us one of the most beauty in construction. It have given many knowledge for me started from beginning until the end of construction. During the process, making a road is not as easier as collecting the data. There are many challenges, obstacle that have been solved nor faced that will eventually give us experience and also enhancing the road to a better development.

Moreover, throughout the learning process we can also know many relating features that come by while making road construction such as underground work where electric cable or piping installation that must be concerned and also on ground work that must be complete first before making the road. Road is one of the last process in construction that show that the development is ready to be used.

Overall, this project had given me a lot of knowledge and experience that cannot be bought. Thanks for the opportunity given to me as a practical student whom are fresh and have decent information about construction.

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