



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

**CONSTRUCTION OF ROAD AT DESA BANGAU PARIT,
28000 TEMERLOH, PAHANG DARUL MAKMUR.**

**Prepared by:
NUR HIDAYAH BINTI RAHIM
2016458588**

**DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
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DECEMBER 2018

It is recommended that the report of this practical training provided

By

NUR HIDAYAH BINTI RAHIM

2016458588

Entitled

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28000 TEMERLOH, PAHANG DARUL MAKMUR**

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

Report Supervisor :
Puan Nurhasyimah Binti Ahmad Zamri

Practical Training Coordinator :
En. Muhammad Naim bin Mahyuddin

Programme Coordinator :
Ts. Dr. Dzulkarnaen bin Ismail

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STUDENT DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Jia Eu Development Sdn Bhd for duration of 14 weeks starting from 3rd of September 2018 and ended on 7th of December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfillment of the requirements for obtaining The Diploma in Building.

Name : Nur Hidayah Binti Rahim

UiTM ID No : 2016458588

Date : 18th December 2018

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Last but not least, my special appreciation to my beloved parents for their sacrifices over years in order to give me better education to achieve my dreams.

Thank you so much.

ABSTRACT

A road is very important to the living to undergo their daily life as they will be using the road to transport from one place to another place. Therefore, this report will discuss about how the construction of road was conducted at construction site. This case study was conducted in Desa Bangau Parit, Temerloh Pahang Darul Makmur. The purpose of this report is to study the method construction of the road. Besides, this report contains the factors to be considered in constructing the road, along with the problems and solutions to the road works. Every construction must be accompanied by a few problems, so it is very important to have knowledge as it will help to solve any problems that are coming on the spot.

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CHAPTER 1.0: INTRODUCTION

1.1) Background and Scope of study

Road is known as route or way on the land that has been paved or improved to allow travel either by foot or any other vehicles. It is one of the most important part in construction especially in the rural and new developed area as it can easier all the road users in their daily life in future. It need to be handled carefully as if there is any mistakes during the early stages of the construction, it might affect the road in the future.

In this case study, the scope of work is concentrated on the construction of the road in a new developed housing area which is Desa Bangau Parit, Temerloh Pahang. The scope of study explains in detail the construction activities starting from setting out until the finishing process.

The observation had been done at Temerloh. Besides, all the problems occurred during the construction were investigated and the solutions to each of the problems were identified. The scope of study explains in detail the construction activities starting from setting out until the finishing process.

The project of the road construction in Desa Bangau Parit is located near Jabatan Kerja Raya Temerloh. The project started at 29 October 2018 and estimate to end by 31 December 2018. This project has been handed to Singhco Traders Sdn. Bhd. to handle and construct the road.

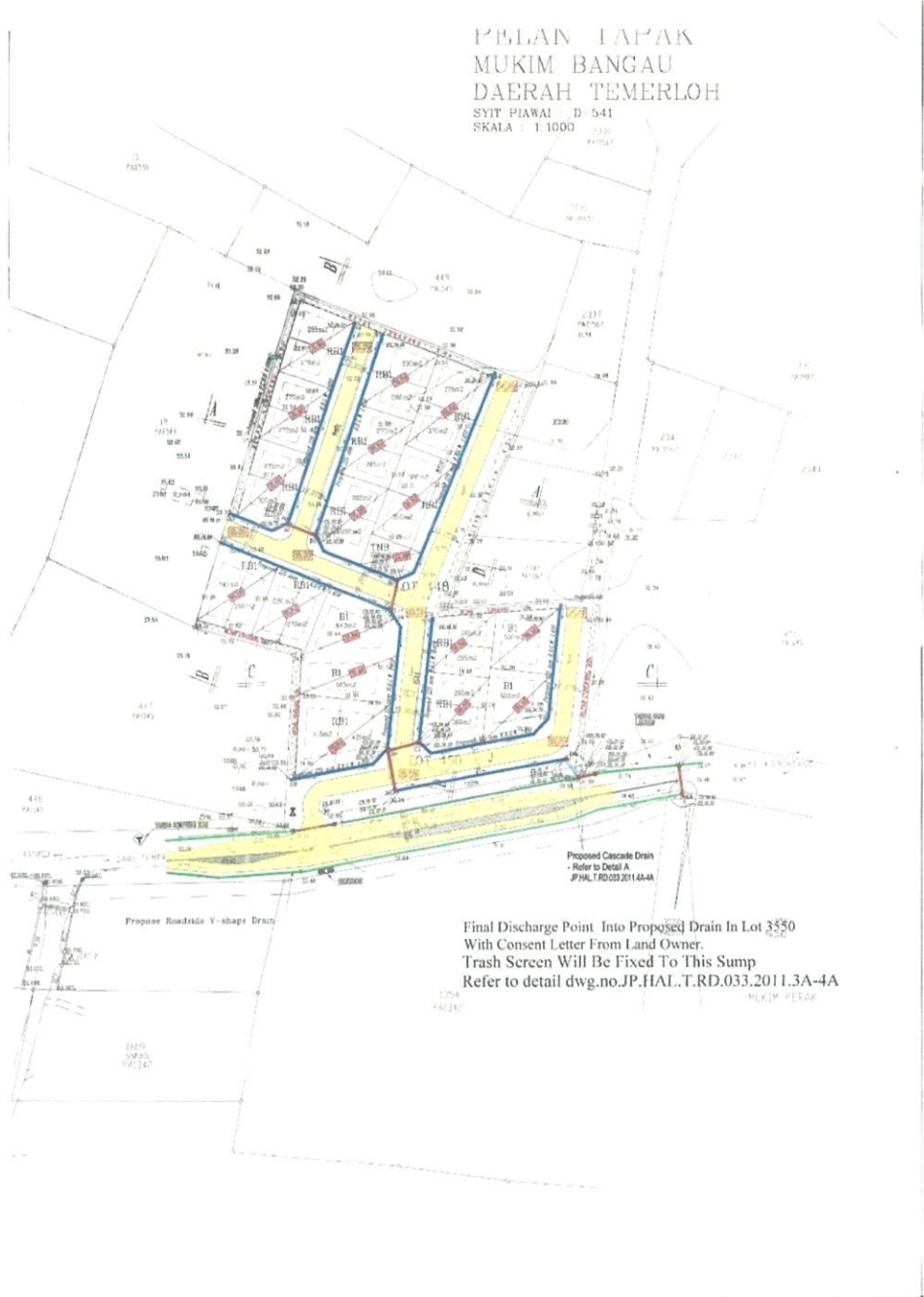


Figure 1.1: The site plan for the road works

1.2) Objectives of study

The objectives of this study are:

- i. To study the method of construction of the road
- ii. To identify the factor to be considered for road construction
- iii. To identify the problems and solutions during the road construction

1.3) Methods of Study

To conduct this study, there are a few method of study that are used to complete this task. The first method is by discussing among the sub-contractors. Next, doing a site visit on the actual site, have a proper visual observation of the site before starting the works at the construction site. Last but not least, using books and internet as references to gain a further research on the related topic before finalising in the assignment.

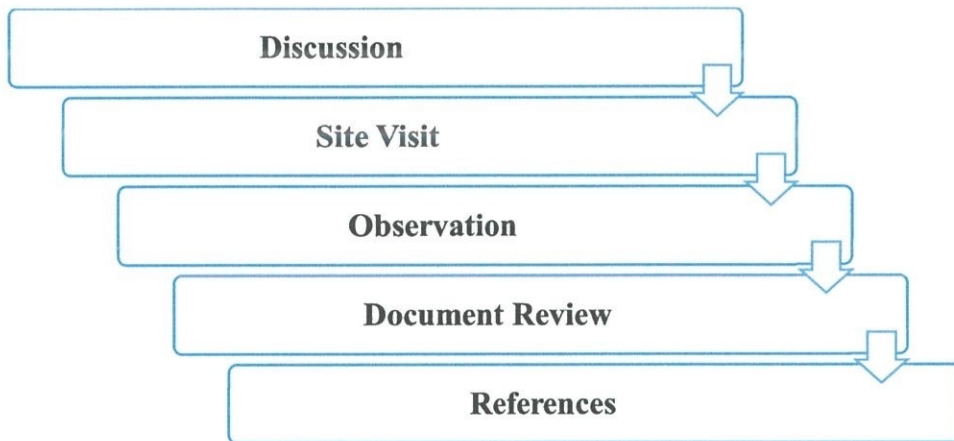


Chart 1.3: The flow process in method of study

1.3.1) Discussion

Before further into researches, the discussion are made thoroughly with Puan Nurhasyimah Binti Ahmad Zamri on the topic selection. After the topic was selected, the progresses of the report were done according to the deadline give. Further consultations with the lecturer were made from time to time.

1.3.2) Site Visit

Desa Bangau Parit is chosen because there is an on-going construction of housing area which fits the task that was chosen. The construction started at the end of October and estimated done by the early of 2019. The site visit has been carried out frequently to keep up with the progress at the site.

1.3.3) Observation

The observation has been done by observing the condition of the site and determining the type of pavement that will be constructed. In addition, from the observation obtained, it can be seen clearly the method of construction, machineries used and problems occur during the construction stage.

1.3.4) Document review

The construction drawing has been referred and need to follow up the progress at the site so that if there are any mistakes detected, it can be minimized or avoided. This was to ensure the work progress were done smoothly and can be completed on time to avoid as any delays need to be issued later.

1.3.4) References

A few information has been obtained through the internet sources. The searching of information on the internet had to be done carefully to avoid invalid and wrong information gained.

CHAPTER 2.0: COMPANY BACKGROUND

2.1) Introduction of Company

Jia Eu Development Sdn. Bhd. is a developer company which generally focuses in housing development in Temerloh, Pahang. The company has been established since 8th January 1999 under the guidance of Mr Cheah Kee Fah as the Managing Director and Dr. Chai Ah Ko as the Director.

The Managing Director of this company which is Mr Cheah Kee Fah started his career as a worker in Jabatan Kerja Raya. After retire, he creates his own empire by establishing his own company. He also has a wide knowledge in the construction field such as construction of buildings, road works, bridges and others. He is also very intelligent as he managed to guide and handle the company from the early construction stages until the sale and purchases process.

After almost 20 years established, this company is becoming more stable and gaining a lot of capital to keep the construction going. This company also obtained a lot of profit as most of the land owners (95%) will Join Venture (J.V). Jia Eu Development Sdn. Bhd. is one of the most successful developer in Temerloh. Although this company only handling the housing development project, it is more competitive than any other developers in this town.

This company only dealing with three (3) contractors that will take part in handling every project which is:

- a) Low Kuang Faat Entreprise
- b) Perniagaan Siew Ping Sang
- c) CK Build and Resources

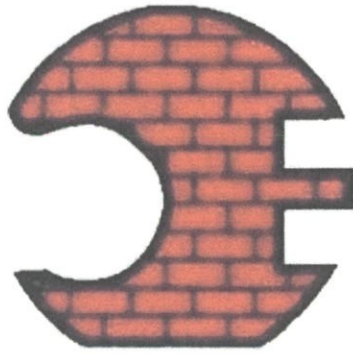
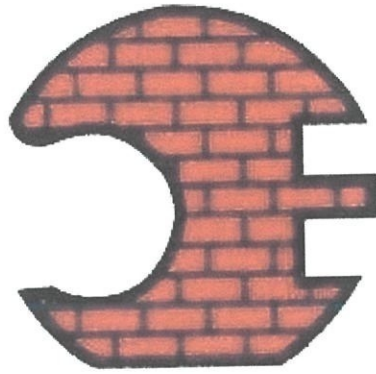


Figure 2.1: Logo of Jia Eu Development Sdn. Bhd.



Figure 2.2: Headquarters of Jia Eu Development Sdn. Bhd.

2.2) Company Profile



Name of Company : JIA EU DEVELOPMENT SDN. BHD.
Managing Director : Mr Cheah Kee Fah
Address : NO.2, TINGKAT 1, PERSIARAN DAMAI 1,
DAMAI COURT,
28000 TEMERLOH, PAHANG DARUL MAKMUR.
Phone Number :
Fax Number :
Nature of business : Development and construction

2.3) Organization Chart

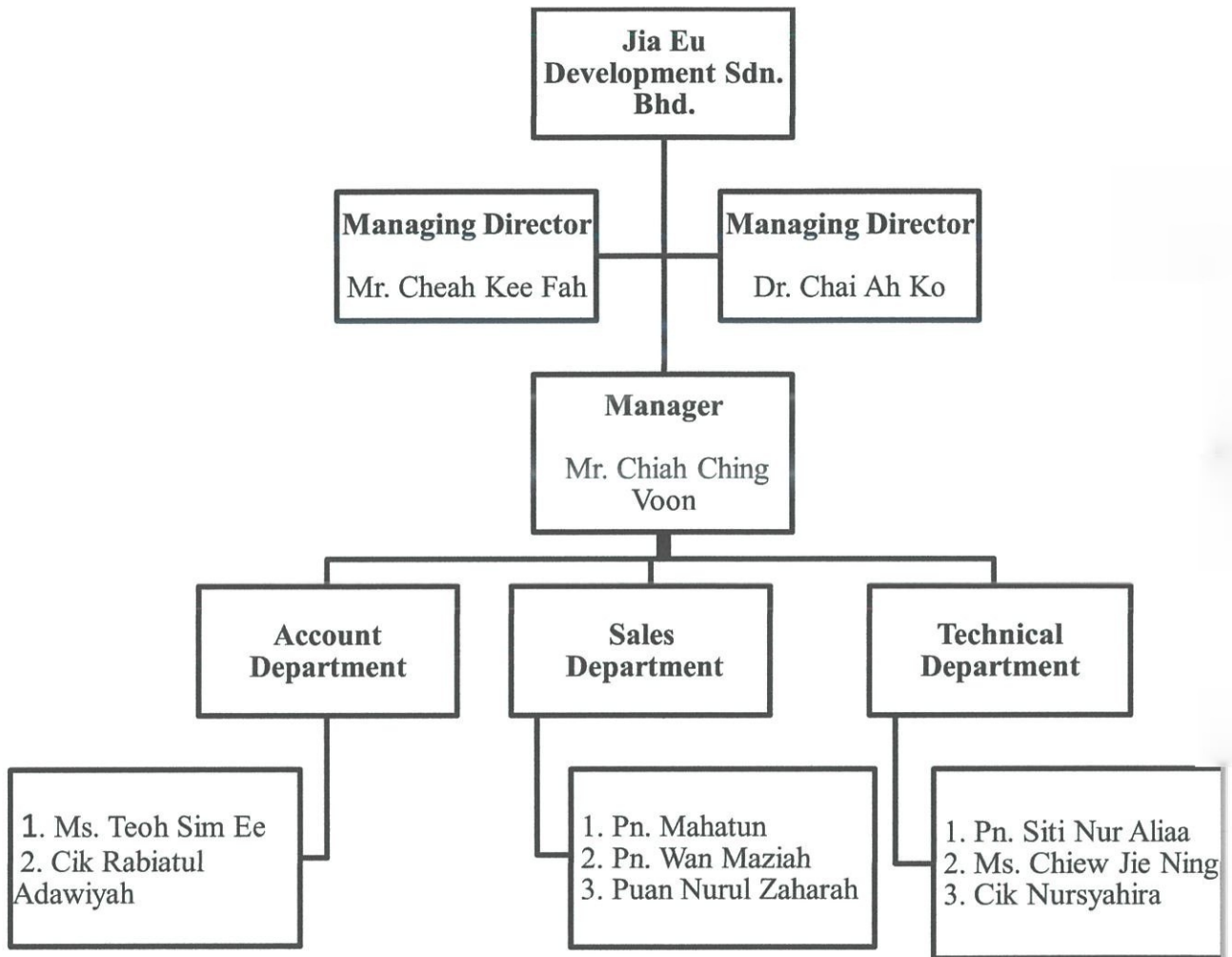


Chart 2.1: Organization chart of Jia Eu Development

2.4) List of Project

NO	PROJECT	STATUS
1	Belengu Residence(Phase 1)	
	112 units of Single Storey Terrace House	Incomplete
	32 units of Single Storey Semi-Detached House	
	8 units of Double Storey Bungalow House	
2	Desa Teluk Ira	
	12 units of Single Storey Semi-Detached House	Incomplete
	2 units of Single Storey Bungalow House	
	30 units of Single Storey Terrace House	
3	Desa Bangau Parit	
	26 units of Single Storey Semi Detached House	Incomplete
	4 units of Single Storey Bungalow House	
4	Taman Bedong Permai(Phase 2)	
	16 units of Single Storey Semi-Detached House	Incomplete
	2 units of Single Storey Bungalow House	
5	Taman Chenor Indah	
	32 units of Single Storey Semi-Detached House	Incomplete
	3 units of Double Storey Bungalow House	
	15 units of Single Storey Terrace House	
6	Taman Pulau Mutiara(Phase 2)	
	12 units of Double Storey Semi-Detached House	Incomplete
	4 units of Double Storey Bungalow House	

7	Taman Pulau Idaman	
	24 units of Single Storey Terrace House	Incomplete
	8 units of Single Storey Semi-Detached House	
8	Taman Paya Pulau	
	26 units of Single Storey Terrace House	Completed
9	Taman Jaya 8	
	1 units Double Storey Bungalow House	Completed
	4 units Double Storey Semi-Detached House	
	12 units Single Storey Terrace House	

Table 2.1: Completed project and project in progress

CHAPTER 3.0: CASE STUDY

3.1) Method Construction of Road

The main purpose of this report is to show the method construction of the road works. Method of operation that involved in road construction works at the site are:

a) Site Clearance

It is a process of clearing everything on the ground within the road reserve. The clearing should include removing surface vegetation such as trees, shrubs and bushes. The purpose of site clearance is to create a cleared site for construction purposes and preventing the occurrence of obstacles during construction works. A backhoe is used for excavation and a truck used for transportation purpose.

The site clearance had been done at Desa Bangau Parit. All the trees and bushes have been removed by an excavator and loaded in a truck to be disposed at the disposal area. The clearance took about two days to remove all the bushes and shrubs at the site.



Figure 3.1: Site clearance process

b) Preparation of Earthwork

The next stage is to carry out earthworks or commonly known as excavation for road works. The purpose of this excavation is to level the ground to the required level either to road finished level or at least 200 mm higher than the subgrade of the pavement.

At this stage, excavation had been done. The process includes the removal of undergrowth roots, excavating and removing unsuitable materials, cutting of slopes and trimming excessive ground above the formation level. In the excavation process, environmental protection must be considered to prevent land erosion, landslide and ground water pollution. A backhoe is used to excavate the existing soil. The depth of the excavation is 450mm. After that, the soil is compacted using a steel roller. The compacting processes take 4 to 6 passes of the roller, depending on the condition of the ground.



Figure 3.2: Excavation to remove undergrowth roots



Figure 3.3: Excavation for slope

c) Laying of Pavement Layer

A flexible road pavement consists of layers of selected materials that act as a load distributor from the vehicles to the subgrade of the road. The main function of the layered road structure is to limit the stresses within the capacity of the subgrade to sustain.

A sub base material, either sand, laterite or crushed aggregate is laid and compacted to the required thickness. At the construction site, they are using sand crusher run as the sub base materials. Firstly, they laid the sand bedding with the thickness of 150mm along the road way. After that, they put the crusher run with the thickness of 300mm. A steel roller is used to compact the sub base layer.



Figure 3.4: Sand bedding laying process



Figure 3.5: Compacting sand bedding process using steel roller

The next process following the completion of the subbase material is the laying of the roadbase course layer that may consist of dense bituminous macadam, cement stabilized or stabilized crushed aggregate. The process is similar to a subbase layer using an aggregate spreader and a compactor. A steel roller is used to compact the road base layer.



Figure 3.6: Compacting crusher run material using steel roller



Figure 3.7: Crusher run that have been compacted

The next process is spraying a thin layer of prime coat onto the cleaned roadbase course surface in order to enhance the bonding between the binder course (bituminous layer) and the roadbase course (non-bituminous layer). The type of equipment used in the spraying works are compressed air blower and self-propelled pressure distributor for bituminous materials. The way to apply the prime coat is spraying it onto the premix using the spray pavers. The material for the prime coat is Cutback Bitumen RC-70. Cutback asphalt used in mixing with aggregate will usually contain an adhesion agent to assist in the coating of the aggregate surface.



Figure 3.8: The Cutback Bitumen RC-70

During the asphalt laying process, several aspects of quality control need to be considered. A minimum temperature of normally not less than 125°C is needed at the paver to ensure that the asphalt could be compacted and aggregate can be worked out to the required density.

The premix asphalt, namely a binder course is transported to the construction site and laid to the base course layers by asphalt pavers. The thickness of the binder course is 80mm. The binder course then is compacted using a steel roller until the thickness reach 60mm.



Figure 3.9: Process of laying premix on the ground



Figure 3.10: Premix binder course is laid onto the ground by pavers

The premix asphalt, namely a wearing course then is transported by the truck and poured into the asphalt pavers before laid it onto the binder course. It is then compacted by a steel roller. The thickness of the wearing course is 40mm.



Figure 3.11: Premix wearing course is laid onto the ground by asphalt paver



Figure 3.12: Compacting the premix wearing course using steel roller.

A thin layer of tack coat is then sprayed onto the thoroughly cleaned binder course surface, followed by laying of the wearing course. Tack coat (also known as bond coat) is a light application of asphalt emulsion between hot mix asphalt layers designed to create a strong adhesive bond without slippage. Without tack coat, the asphalt layers in a roadway may separate which reduces the structural integrity of the road and may also allow water to penetrate the structure. The way to apply the tack coat is same as applying the prime coat which is spraying it onto the ground by spray pavers. The material for this tack coat is Bitumen Emulsion Tack Coat K1-40. Cationic Bitumen Emulsion Tack coat K1-40 is an emulsified asphalt containing minimum 40% bitumen and 60% water . With the use of a cationic type bituminuos emulsion, better adhesion of aggregate is achieved, the surface opens quicker to the traffic and is less susceptible to rain after construction.



Figure 3.13: Bitumen Emulsion Tack Coat K1-40.

3.2) Introduction to Pavement

The site is located at Desa Bangau Parit, Temerloh, Pahang Darul Makmur. There are seven types of houses that have been constructed at this area such as Single Storey Bungalow Type A, Single Storey Bungalow Type B, Double Storey Semi-D Type A, Double Storey Semi-D Type B, Double Storey Semi-D Type C, Double Storey Semi-D Type D, Double Storey Semi-D Type E and Double Storey Semi-D Type F. After the structure of the building finished constructed, a wheel path is needed to ease the residents to move at their housing area. Hence, it is necessary to have a layer of stronger materials to support and distribute the wheel load to the natural soil to the level of stress it could sustain.

A road pavement is a layer above the natural soil that supports the vehicles that travel on it. Pavement is used for roadways, airport runways and parking lots.



Figure 3.14: A roadway



Figure 3.15: Airport runway

The main tasks of a pavement are to be able to support wheel loads, withstand the stresses imposed and distribute the loads to the subgrade (natural soil). The performance of a pavement should be considered from the aspect of its structure and function. Good structural and functional performances fulfil the basic requirement of a pavement to provide a safe and comfortable ride. A pavement is structurally strong if the pavement can support all the imposed on it without deteriorating the subgrade. Its functional performance should meet users' ride ability quality needs, such as comfort and safety.

3.2.1) What is flexible pavement?

Flexible pavement is a structure made up of several layers called sub base course, road base course, binder course and wearing course. The term flexible reflects the characteristic of the allowable deformation of the subgrade and of subsequent layers to the surface. Its design is based on the load distributing characteristic of the component layers. Different traffic volume, traffic composition, climate condition and bearing capacity or strength of the subgrade might require different design thickness and quality of material used. (Sian, 2012)



Figure 3.16: The pavement layer

Source: <https://nptel.ac.in/courses/105101087/19-Ltexhtml/p6/p.html>

3.2.2) Function and material used for pavement layer

Typically, a flexible pavement comprises of four main layers. The top two surfacing layer is made up of the surface course or wearing course and binder course. Both are bound layers constructed of aggregates, fillers and bitumen. The uppermost layers, wearing course which will be directly in contact with the wheel and consequently, exposed to direct concentrated load from the vehicles. It should be good quality to protect the layers beneath from deformation and other types of deterioration such as cracks.

The second layer below the wearing course is known as the binder course. This layer is also constructed of bound materials. Compared to the wearing course, materials used here slightly lower quality. This layer usually more pervious since it is covered by the wearing course from the surface water. It also supports and disperses traffic stresses from the wearing course to the road base course underlying it. These two courses are bond together using tack coat, which is a thin layer of bituminous emulsion sprayed onto the binder course. Prime coat is sprayed on the road base surface, prior to the laying of the binder course, for bondage between non-bituminous layer and bituminous layer. This binder course and wearing course materials consists of asphalt.



Figure 3.17: The wearing course and binder course layer



Figure 3.18: The wearing course and binder course layer

The road base or base course is the thickest layer laid on the sub base. It supports and disperses most of the traffic loads. This layer may be considered as the load bearing layer of the pavement. The materials for the road base are from granular materials. Granular materials is a mixture of soil particles ranging in size from coarse to fine such as crushed stones, gravel and sand to dense bituminous macadam and else depending on the expected level of performance of the pavement.



Figure 3.19: The road base layer

The sub base course is the intermediate layer overlying the foundation, normally referred to as the subgrade. It disperses further the stress transmitted from the road base before distributing it to the subgrade. The granular sub base material used may allow water to flow, as such, this layer can act as the subsoil drainage layer. It may also serve as a temporary driveway during the construction and at the same time protects the subgrade from weather changes. The sub base is normally composed of lower grade granular material as compared to the road base. The materials used are unbound granular materials such as crushed stone, crushed slag, concrete or slate.

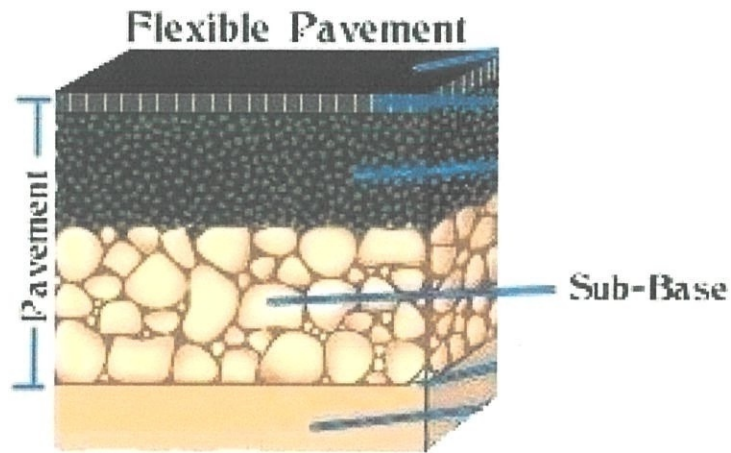


Figure 3.20: The subbase layer

The subgrade is not part of a pavement structure but acts as the foundation supporting the traffic load transmitted from the overlying layers. The strength of the subgrade is important as the thickness of the upper layers and materials used would depend on it. The sub-grade material should be clean and free from organic matter and should be able to be compacted by roller, to form stable sub-base.

3.2.3) What is rigid pavement?

A rigid pavement is a pavement designed to achieve a certain degree of beam strength that allows spanning over some minor irregularities in the underlying sub base or subgrade. It has a higher flexural strength compared to an asphalt pavement. It is a structure which distributes loads to the subgrade, having as one course a Portland-cement concrete slab of relatively high bending resistance. A concrete pavement, constructed of Portland cement and aggregate, is the most commonly used. Therefore, a rigid pavement is generally referred to as a concrete pavement. (Sian, 2012)

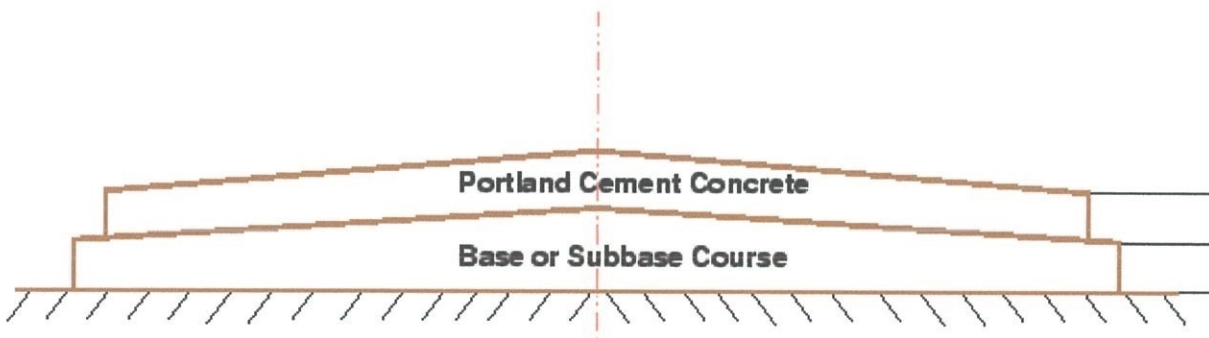


Figure 3.21 : The rigid pavement layer

The design of rigid pavement is based on providing a structural cement concrete slab of sufficient strength to resist the loads from traffic. The rigid pavement has rigidity and high modulus of elasticity to distribute the load over a relatively wide area of soil. Minor variations in subgrade strength have little influence on the structural capacity of a rigid pavement. In the design of a rigid pavement, the flexural strength of concrete is the major factor and not the strength of subgrade. Due to this property of pavement, when the subgrade deflects beneath the rigid pavement, the concrete slab is able to bridge over the localized failures and areas of inadequate support from subgrade because of slab action.

In Malaysia, concrete pavements are not widely used. A few examples of concrete pavements are portions of North-South Expressway which is the expressway from Ayer Keroh to Pagoh in the south and Alor Star to Gurun in the north.

3.2.4) Factor need to be considered for road construction

a) Comparison between Flexible Pavement and Rigid Pavement

Flexible and rigid pavements are characterized by the different mechanism of distributing loads to the subgrade. Generally, an asphalt pavement deforms more than concrete pavement due to the flexibility of asphalt. Hence, higher stresses are distributed to the subgrade compared to a concrete pavement. These differences cause both pavements to perform differently and require different design procedure.

Flexible pavement is most likely chosen because of it needs a lower initial construction costs compared to rigid pavement which needs the higher initial construction costs. The material for flexible pavement is also cheap and easy to get materials. Compared to rigid pavement, it need the usage of reinforcement and cement which the materials shortage always occurs. Half-skilled labour is sufficient and no need expensive machinery required for constructing the flexible pavement while constructing the rigid pavement need a high capital in machinery investment and the skilled labour needed.

As for flexible pavement, the stage construction and upgrading work is possible because it is easy to upgrade the pavement. For the maintenance work, rutting and potholes also may occur. It also need scheduled maintenance. It need a higher maintenance cost. For rigid pavement, stage construction and upgrading works is not suitable. For the maintenance work, it is free from rutting potholes and corrugations. It also required less maintenance work. Lastly, for flexible pavement, it can be opened to traffic after a minimum of one hour after then final compaction ceases. While the rigid pavement only can be opened to traffic after the concrete reaches the required 28-day strength.

3.3) Problems and Solutions

The road construction must have their own problems. At this construction site, the road works have been delayed for a few days because of a few problems that occur during the construction.

a) Weather

This is the most common problems that occur during the construction works. Because of the unpredictable weather such as raining, the construction works cannot be continued. This is due to the condition of the ground filled with water puddles. The machine is also stuck because of the muddy soil condition. This situation can effect the road in the future if the construction keep on going.

The solution to this problem is to wait for the water puddles to dry. It is because the soil is a material that are not stable, so anything could happen in the future if construct a road on the muddy ground condition such as cracks, sediment and potholes.



Figure 3.22: The water puddles on the ground



Figure 3.23: The site condition after raining

b) Pipe leakage during excavation

During the excavation of the top soil, there was a leaked pipe. If left untreated, it will result the water will coming out from the pipeline and caused water stagnant. It also will affect the road that already finish constructed. At the same time, it will also cause a lot of wastage of water.

As the solution, the contractor needs to change to a new Polyvinyl Chloride(PVC) pipe. At the same time, it will need more cost. It also will delay the road construction works as the contractor need to excavate and install the new pipe first before continue the road works.

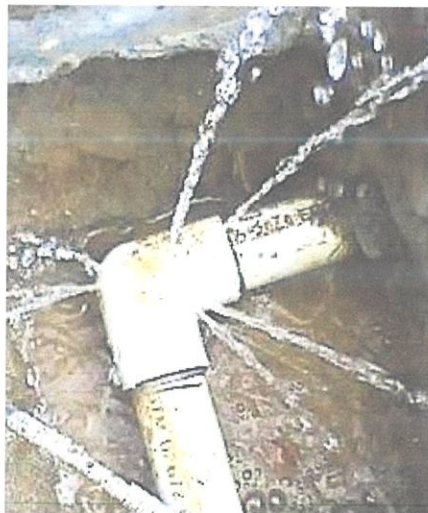


Figure 3.24: Example of leaked pipe

CHAPTER 4.0: CASE STUDY

4.1) Conclusion

To conclude, a road is very important to the living to undergo their daily life as they will be using the road to transport from one place to another. It is important to connect the rural area to the town. Flexible pavement is very common in Malaysia because it is most economical for the country in every aspect. The role of each individual on site is also very important to ensure every works done smoothly. The construction process also does not undergo many huge problems that can affect the environment and the resident as all the problems occurred can easily settled by the responsible party. The method that has been used during the road construction have met the standards that set by the Jabatan Kerja Raya(JKR) and all the procedures has been conducted in order.

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