



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

ROAD MAINTENANCE

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(PERAK)**

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It is recommended that the report of this practical training provided

By

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entitled

ROAD MAINTENANCE

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

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Laman Timur for duration of 20 weeks starting from 23 August 2021 and ended on 7 January 2022. 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.

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ABSTRACT

In general, there are two types of roads, which are non-drivable and drivable road. Road is one of the greatest contributions to economic development and growth for a country. Besides, it also brings significant benefits to the community. Therefore, the road that is focused on Route 21, Jalan Kubu Gajah – Sumpitan, Section 26.00, Perak is drivable road. In addition, road is a combination of aggregates, binder, and filler. The purpose of this report is to study the way of maintaining the road. Road maintenance is work of maintaining the road in a great condition. The criteria of the good road are strong, secure, and safe to be used by the road user. Furthermore, this report contains the method used for the road construction, the process of the road construction, and the safety measures at the construction site. Moreover, there are various of method are used to reach the satisfaction of making this report, which are by observation, interviews, and document review. Hence, it is very important to ensure that every road in the country in a good condition. A good condition of roads could reduce the possibly of the incident related with road to occur among the road users.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

The road is a long, wide horizontal line with a flat and smoothed surface that is placed on the ground where is leading from one place to another place (Dictionary, 2021). Next, the road is very important to the society and the community. It is because, roads providing access to employment, social development, health, and discover new areas for the economic development.

After that, there are two types of roads, which are non-drivable road and drivable road (Wazeopedia, 2018). The non-drivable road is also known as a pedestrian zone, where the used of the vehicles is prohibited (Lah, 2019). Therefore, it could guarantee the safeness of the people in the area. Besides, a lot of social activities could be conducted. Furthermore, the drivable road is essentially used for vehicles, such as car, motorcycle, bicycle, and public transportation.



Figure 1.1: Drivable Road

Next, road plays a very important role in transportation of goods and passenger (Malkoc, 2015). For instance, roads can improve the journey times. Therefore, road user can reach the selected destination within the time. Furthermore, roads provide comfort to the road user. It is because of the smoothed and flat surface of the road that gives the best experience for the driver and the passenger when driving on the road. Besides, with a good quality of roads, it could prevent from any accident to happen among the road users. Thus, the aim of the report is to discover the way of maintaining the road.

1.2 Objectives

There are three main objectives for this report, which is:

- i. to investigate the methods of construction of the road
- ii. to study the process of the road
- iii. to identify the safety measures at the project site

1.3 Scope of Study

The study is carried out at Daerah Larut, Matang & Selama, Perak, which is located on Route 21, Jalan Kubu Gajah – Sumpitan, Section 26.00, Perak. The types of roads that is studies in this report is drivable road. Next, the purpose of the study is to maintain the road on Route 21, Jalan Kubu Gajah – Sumpitan. Besides, this report comprises information about the equipment and machineries used and the materials used for the maintenance work. Furthermore, it is also consisted of the method construction and the safety measures at the project site.

1.4 Method of Study

There are a range of methods are used in the technique of finishing the report. The methods are by making an observation, handling an interview, and referring to document review. Thus, it is very beneficial in a way to enhance the satisfactory and quality of the work.

1. Observation

Observation is the act of observing something for the purpose of acquiring data from something viewed or experienced (Merriam-Webster, 2021). Therefore, the type of observation used in this report is visual observation. For visual observation, the data is collected directly through a visual, where the process of work at the construction site is watched and recorded (Root, 2021). Moreover, the data

collection is gathered through photography and written notes, where the tool use of this method is by using a smartphone.

2. Interviews

There are two types of interviews, which are unstructured and semi-structured interviews (Solutions, 2021). Next, the target interviewee is the contractor of the project, and also known as the boss. After that, for the unstructured interview, some spontaneous questions have been asked on the project site. The answer given was very enlightening at the time and it helps to understand the process precisely. Besides, for the semi-structured interview, a couple of prepared questions have been asked for the boss in the office. Therefore, the answer received related to the study is very helpful and comprehensible. Thus, the answers given will be recorded in the mobile phone. Also, it will be written down in the notebook.

3. Document Review

Document review used in this report is through company profiles, every project that has been conducted by Laman Timur will be recorded and saved in the company profile, where the process of work will be captured before, during and after the project is completed. Therefore, the work that has been captured could be useful to understand the procedure of the work.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

For this semester, each student is required to find a workplace for the industrial training. The purpose of the industrial training is to assure the adaptation of the working environment for the students. Next, it is an opportunity to apply their academic knowledge and also learn to overcome the challenges in the workplace. Besides, the exposure of the industrial training, could help the students to prepare the physical and mental for their working life after finishing the study (Sreedhar, 2017).

Therefore, the company chosen for performing the industrial training is Laman Timur, which is based on Kamunting, Perak. This company is focusing on general construction. For instance, maintenance works of road, monsoon drain, riverbank, sewerage, wiring and renovation work for house or office. Furthermore, about 15 numbers of project has been completed for 2021.

Next, Laman Timur will make a SWOT analysis to enhance the successfulness of the company every year. SWOT analysis is a combination words of Strength, Weakness, Opportunities, and Threats (Tools, 2018). From the data obtained from the SWOT analysis. A lot of strategies will be figure it out for the improvement of the company.

2.2 Company Profile



Figure 2.1: Logo of Laman Timur

Laman Timur was established on May 21, 2013. It is a Bumiputra – owned company and registered under the Construction Industry Development Board (CIDB) as a grade 1 contractor, and Bumiputra Status Certificate (STB). Furthermore, it is based on Kamunting, Perak, which is located at No.36, Tingkat Bawah, Jalan Medan Saujana 8, Medan Saujana.

Next, the company is owned and managed by Mr. Ahmad Shafiq Bin Mohamed. Moreover, he holds a bachelor's degree in Materials Engineering at Universiti Malaysia Perlis (UniMAP) and has 12 years of experience in this field. Plus, the company business structure is sole proprietorship.

After that, Laman Timur constantly takes the opportunity of joining the government tender as a grade 1 contractor. For example, of the government institution are, Jabatan Kerja Raya (JKR), Majlis Perbandaran Taiping (MPT), Jabatan Pengairan Saliran (JPS) and Pejabat Daerah Taiping. However, Laman Timur also received a job from private client.

2.3 Company Organisation Chart

Below is the organization Chart of Laman Timur.

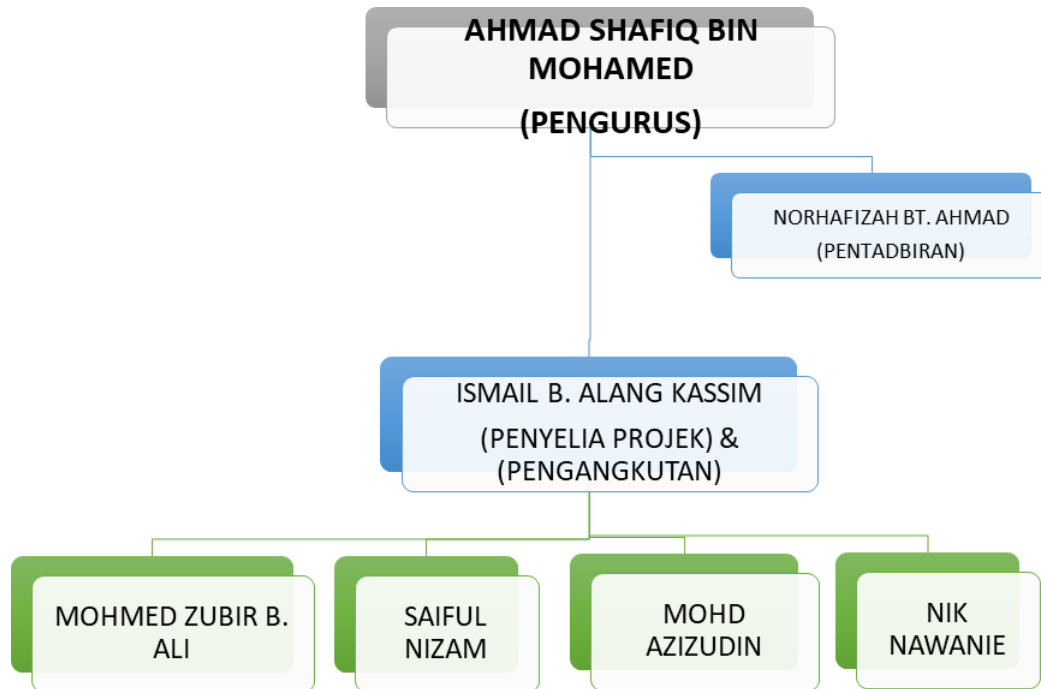


Figure 2.2: Organisation Chart of Laman Timur

2.4 List of Projects

Table below is list of completed project and project in progress of Laman Timur.

2.4.1 Completed Projects

Table 2.1: List of Completed Projects

No.	Project title	Project value (RM)	Start date	Completion date	Project duration	Client
1.	Penyelenggaraan Jalan di Kampung Ayer Puteh, Mukim Taiping	20,000.00	16.07.2021	12.08.2021	4 weeks	Pejabat Daerah, Taiping, Perak
2.	Penyelenggaraan Jalan di Kampung Batu Teguh, Mukim Taiping, Perak	20,000.00	27.07.2021	23.08.2021	4 weeks	Pejabat Daerah, Taiping, Perak
3.	Penyelenggaraan Jalan di Kampung 20, Matang Jambu, Mukim Taiping,	20,000.00	27.07.2021	23.08.2021	4 weeks	Pejabat Daerah, Taiping, Perak
4.	Membaiki Longkang di Taman Sri Hijau, Taman Temenggung, Taman Simpan Makmur, Jalan Setia Kasih dan Taman Lebah Tupai, Perak	19,923.40	26.07.2021	20.9.2021	8 weeks	Majlis Perbandaran Taiping, Perak
5.	Kerja Penstabilan Tebing Parit Kg. Changkat Ibol, Skim Bukit Bintang, Perak	19,465.00	03.08.2021	01.09.2021	4 weeks	Jabatan Pengairan dan Saliran, Daerah LMS, Perak
6.	Kerja Pembersihan Parit Kg. Parit Menteri dan Kerja Berkaitan di Rancangan Saliran Pertanian Pangkalan Aur, Perak	27,195.00	05.08.2021	02.09.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak

7.	Kerja-Kerja Menyenggara Papan Tanda Kilometer dan Kerja Berkaitan di Laluan A21, Jalan Kubu Gajah, Sumpitan, Perak.	50,000.00	10.08.2021	05.10.2021	4 weeks	Jabatan Kerja Raya, Larut Matang Dan Selama, Perak
8.	Kerja Selenggaraan Kuarters Kakitangan JPS di Teluk Kertang, Mukim Matang, Perak	20,00.000	07.09.2021	05.10.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak
9.	Kerja Selenggaraan Terusan Menteri di Kg. Air Kuning di Rancangan Saliran Pertanian Pengkalan Aur, Perak.	19,850.00	24.09.2021	22.10.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak
10.	Kerja-Kerja Pembaikan Cerun dan Kerja Berkaitan di Laluan A21 Jalan Kubu Gajah – Sumpitan Seksyen 26.00, Perak.	109,985.00	29.09.2021	26.10.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak
11.	Kerja Penyelenggaraan Kolam Takungan Banjir (KTB) Serta Lain-Lain Kerja Berkaitan di Taman Larah Ria dan Larah Aman, Perak.	18,175.00	04.10.2021	25.10.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak
12.	Kerja Penyelenggaraan Kolam Takungan Banjir Serta Lain-Lain Kerja Berkaitan di Kampung Aman, Perak.	7,747.11	04.10.2021	25.10.2021	4weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak

13.	Kerja Penyelenggaraan Struktur Kawasan Pam Akibat Kesan Banjir di Kg Masjid Menteri, Mukim Jebong, Perak.	5,037.35	13.10.2021	21.10.2021	1 week	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak
14.	Kerja-Kerja Pengukuhan Tebing Sungai Pulau Kampung Repoh Mukim Batu Kurau, Daerah LMS, Perak.	11,254.99	02.11.2021	07.12.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak
15.	Kerja-Kerja Pengukuhan Tebing Sungai Pulau di Kampung Jabi Mukim Batu Kurau, Daerah LMS, Perak.	16,654.43	02.11.2021	07.12.2021	4 weeks	Jabatan Pengairan Dan Saliran, Daerah LMS, Perak

2.4.2 Project in Progress

Table 2.2 : List of Project in Progress

No.	Project Title	Project value (RM)	Start date	Completion date	Project duration	Client
1.	Kerja Penyelenggaraan Pembersihan Longkang Monsoon Untuk 2 Pusingan Setahun di Kawasan Zon D (2021/2022)	104,862.00	1/10/2021	1/10/2022	1 year	Majlis Perbandaran Taiping, Perak
2.	Kerja Membaik Pulih Dan Mengubah Suai Rumah di Sg. Mati, 34750, Matang, Perak	137,600.00	8/11/2021	27/1/2022	8 weeks	Ustaz Abdullah B Abd Wahab
3.	Kerja Membaik Pulih Dan Mengubah Suai Rumah di Alamat No 584 Lorong 20, Taman Berkat, 34700, Simpang Perak	30,000.00	04/01/2022	15/02/2022	6 weeks	Iza Talib Construction
4.	Kerja Membaik Pulih Dan Mengubah Suai Rumah di Lorong 17, Taman Mewah	N/A	N/A	N/A	N/A	Iza Talib Construction
5.	Kerja Membaik Pulih dan Mengubah Suai Rumah di Lorong 35, Taman Mewah	N/A	N/A	N/A	N/A	Iza Talib Construction

CHAPTER 3.0

ROAD MAINTENANCE

3.1 Introduction to Case Study

Road maintenance is work of maintaining the road in a good condition (BituChem, 2021). In the other words, it is to ensure the road remains strong, secure, and efficient to be used for the road user.

After that, the road is in the moderate condition, where some cracks were spotted on the surface of the road. Therefore, damaged road could bring harm to the people who used the road. So, by inspecting and servicing the road, it could prevent and decrease such thing to occur.

After that, the road is located on Route 21, Jalan Kubu Gajah-Sumpitan, Section 26.00, Perak. Furthermore, the client of the project is Jabatan Kerja Raya, Daerah Larut, Matang Dan Selama, Perak (JKR). The value of the project is included on another project task at the location. Thus, by referring to the bill quantities of the road, the cost of the project is RM 9,785.67. However, the plan of the project is to reconstruct the road from the subbase.



Figure 3.1: The Area of The Project Site

Moreover, the surrounding area of the road is in a hilly zone and located next to a high slop area. However, the road is essentially used as an alternative route to the East Coast State, such as Kelantan and Terengganu. Hence, this road rarely experiences severe road congestion.

3.2 Method Used for Road Construction

The method used for the road construction located on Route 21, Jalan Kubu Gajah-Sumpitan, Section 26.00, Perak is asphalt road construction. Asphalt is a mixture of aggregates, binder, and filler. Furthermore, it is produced in an asphalt plant, which is a fixed plant. The supplier of the asphalt is based on Kamunting, which is the company's name is Kamunting Premix Plant SDN.BHD. Besides, there are various of plant that could produce the asphalt up to 250 tons per hour. This company is the main supplier for the road maintenance project. Therefore, the number of asphalts that have been bought is 20 tons of asphalt.



Figure 3.2: The Supplier of The Material

Moreover, there are several layers of the flexible pavement, which start with natural subgrade, compacted subgrade, subbase course, base course, binder course, and surface course (Gopinath, 2021). However, for this project, the reconstruction process by using asphalt road construction was started at subbase level.

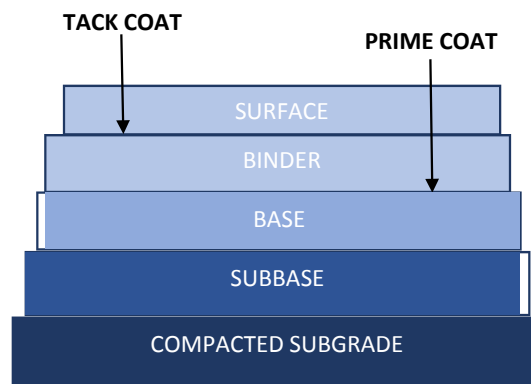


Figure 3.3: The Cross Section of The Road

3.3 The Process of The Road Construction

Below is the process of the road construction located on Route 21, Jalan Kubu Gajah-Sumpitan, Section 26.00, Perak.

1. Early Work

The cleaning work was carried out by removing dirt or debris on the road. After that, the marking work has been done by using the distance measuring wheel roller to measure the length of the existing road that needs to be maintained. However, the equipment used to mark the road is red spray paint. Thus, the length of the existing road that need to be excavated is 30 meters and the width is 3.5m of the road and the depth is 560mm.



Figure3.4: The Marking Work

2. Excavation Work to Subbase

The machinery used for the excavation work to subbase is excavator. The marked road was excavated to a depth of 560mm and was placed on the side of the road. After the depth has been reached, the surface was inspected to ensure the existing crushed premix and dirt were fully removed. It is because, to assure the surface of the subbase is smooth and level.



Figure 3.5: The Excavation Work

3. Compacting Sand Work from Subbase

The material used for the subbase work is sand. Therefore, the thickness of the sand that is needed for the subbase is 150mm. After that, by using the dump truck, the sand was dumped on the excavated road to the subbase level. Next, the sand has been spread all over the subbase by the workers with the spreader. It is to assure the sand was levelled with a thickness of 150mm. Thus, the sand has been compacted by the road roller machine.



Figure 3.6: The Compacting Sand Work

4. Flattening Crusher Run Work to Base

For base course, the material used is crusher run. After that, with the aid of the dump truck, the crusher run has been placed on the compacted sand. Next, by using the same hand tools equipment, which is spreader, the crusher run was spread all over the compacted sand surface with a thickness of 300mm. Then, the crusher run has been flattened by the 6 tons road roller machine. After the work was completed, the bitumen prime coat has been sprayed at the rate of 0.5 liter/m² all over the base surface and was left for 24 hours.



Figure 3.7: Flattening Crusher Run Work

5. Compacting Asphaltic Binder Concrete Course

The material used for binder is Asphaltic Binder Concrete Course (ACBC 28). Next, by referring to the BQ, the thickness of the material required is 60mm including the bitumen tack coat. After the dump truck was connected to the paver. The material was transferred to the paver by raising the bed of the dump truck. Next, the dump truck was pushed by the driver of the paver while the machine laid down the Asphaltic Binder Concrete Course. Then, the workers spread the material by using the spreader, to ensure the surface is smooth and level. Moreover, the 6 tons road roller machine was used for compacting the Asphaltic Binder Concrete Course. After the compacting has done, the bitumen tack coat was sprayed at the rate of 0.5 liter/m² at the top of the binder surface and was left for 12 hours.



Figure 3.8: Compacting Asphaltic Binder Concrete Course

6. Compacting Asphaltic Concrete Wearing Course

For the surfacing of the road, the material used is Asphaltic Concrete Wearing Course (ACWC 14). The machinery used to lay the material on the road is a paver. In addition, spreader was used by the labors to ensure the levelness of the material on the road surface. After the levelness was confirmed, the Asphaltic Concrete Wearing Course has been compacted by using the 6 tons road roller machine.



Figure 3.9: Compacting Asphaltic Concrete Wearing Course

3.4 Safety Measures at Project Site

Below are the safety measures on Route 21, Jalan Kubu Gajah-Sumpitan, Section 26.00, Perak

1. Site Meeting

Before the work began, a short meeting or in another word is toolbox talk will be conducted. It is to ensure the workers understand the aim of the job that will be done on the day. Besides, the site supervisor is required to ensure the workers have eaten before doing the task. because the food supplies energy and stamina for humans to stay productive and focus. However, a short activity such as exercise could also increases their concentration in handling the project task. Thus, it can reduce any bad injuries or accidents to occur.



Figure 3.10: Short Meeting at The Construction Site

Source: (hseblog.com, 2021)

2. Personal Safety Equipment

The workers have been required to wear the personal protective equipment at the project site. The personal protective equipment consists of safety helmet, shades, safety boots, proper attire, safety vest (high visibility) and a pair of gloves. For instance, by wearing a proper safety equipment, it can avoid the workers from the high temperature of asphalt that could bring harm to human skin. Therefore, it can cause the second-degree burn injury to the victim of the hot asphalt. Hence, as a supervisor site, it is important to make sure the workers are wearing an appropriate attire with a proper safety equipment before their entering the work areas.



Figure 3.11: Safety Equipment

Source: ((K.), 2020)

3. Separate Work Areas

To ensure the safety of the labors and the road user, the road was divided into two sections. Therefore, the equipment used to separate the road into two is cones and barrier. So, one part of the road still can be used by the road user. The type of cone used is the reflective cone. Furthermore, the reflective cone is a high visibility item. It could be a reminder for the road users of the work areas because of the vehicle light that is reflected on the reflective cones (Safety, 2021). In addition, the safety sign board for road construction was used and has been placed 500m from the work areas. Hence, the road users will see the safety sign board first before they pass by the work areas.



Figure 3.12: Barrier and Reflective Cones
(Bungartz, 2022)

CHAPTER 4.0

CONCLUSION

An inspection has been carried out of the road on Route 21, Jalan Kubu Gajah – Sumpitan, Section 26.00, Perak, which the surroundings is in the hilly area. Based on the inspection that has been conducted, the road is in a moderate condition, where it had some cracks on the surface and the road is not perfectly level. Thus, the outcome showed that the road is having a complication and needs to be maintained.

After that, the aim of the road is to reconstruct the existing road on Route 21, Jalan Kubu Gajah – Sumpitan, Section 26.00, Perak. Therefore, the method construction used for the road is asphalt road construction, where the supplier for the project is from Kamunting Premix Plant SDN.BHD. Additionally, about 20 tons of asphalt was bought from the company.

Furthermore, there are 6 steps of the road construction process. The first step is the early work, which is the cleaning and the marking work. Secondly, the excavation work to the subbase. Thirdly, compacting sand to the subbase. Fourthly, compacting rusher run to base. Fifthly, compacting the Asphaltic Binder Concrete Course. Lastly, compacting Asphaltic Concrete Wearing Course.

Moreover, when conducting the maintenance work, it is very important to apply the safety measures at the work site. For instance, by doing a safety meeting every workday, worn a personal protective equipment when entered the work site and by separated the work areas.

To sump, it is a good step to take early action of unsafe roads. Besides, it is not only could reduce the cost of the maintenance work, but it can also prevent from any bad incident to happen among the road users. However, the safety measures on the site are also important to prevent any injury happen to the workers while their handling the task.

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