DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SCHOOL'S BUILDING MAINTENANCE

Prepared by:

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

FEBRUARY 2022

It is recommended that the report of this practical training provided

By

Nur Syamimi Binti Mustaffa Kamal

2019292534

entitled

School's Building Maintenance

be accepted in partial fulfillment 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 Batu Pahat District Education Office (PPD BP) for duration of 20 weeks starting from 23rd August 2021 and ended on 10th January 2022. It 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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Last but not least, my heartfelt gratitude goes out to my beloved parents for their countless sacrifices throughout the years.

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ABSTRACT

Building maintenance is a very important procedure to do for all kinds of buildings in order to maintain the strength and the safety of the existing building. This report was about and conducted for the school's building maintenance work at Temenggong Ibrahim Girls School (TIGS), that located in Batu Pahat, district. The objective of this report is to identify the procedure of building maintenance work and how far it carried out. This report will focus on the method of building maintenance work. It also investigates the cost throughout the maintenance work begin, and also to determine the problems occurring and the solution to the problem of the school building. This report will also look at how the school building maintenance is the same as other types of building maintenance and all the maintenance works are probably to keep the building safe to be used for people. So, the procedure of this school's building maintenance is the same with other building maintenance work.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

Maintenance work is a method of repairing and preventing the damage of the building. Damage will occur in a structure when a component of the structure is unable to operate properly. Things at the building that are always involved with damage such as floor, roof, wall, drainage, water supply and electric system. This issue might be resolved by doing maintenance with repairing or restoring equipment that is not working properly. The problems detected might be affecting people in the building, so with maintenance work it will help to ensure the safety of the building (UKESSAYS, 2015).

Building maintenance is used in all countries, and it is very important to have maintenance management in any development. The work completed by someone with experience to keep the building maintained and to ensure that every aspect of the building is properly improved, is referred to as building maintenance. It also intends to retain the building's worth and update its services and surroundings in order to sustain it. Building maintenance is also vital in this country since it maintains the facility's value, keeps residents safe, and allows the building to be utilized for longer periods of time (UKESSAYS, 2015).

The type of maintenance works is planned maintenance, unplanned maintenance, preventive maintenance, corrective maintenance, emergency maintenance, condition-based maintenance and scheduled maintenance. Maintenance that is organized and carried out with foresight, control, and the use of records according to a predetermined plan is referred to as planned maintenance, and unplanned maintenance is defined as maintenance performed without regard to a predetermined schedule. Furthermore, preventive maintenance is defined as maintenance performed at

predetermined intervals or in accordance with predefined criteria in order to lessen the likelihood of an item failing or degrading in performance, and corrective maintenance is performed after a failure has occurred with the goal of restoring an item to a state where it can fulfil its intended purpose. Therefore, emergency maintenance is maintenance that must be completed right away in order to prevent significant effects. This is also known as day-to-day maintenance, and it occurs as a result of events such as gas leaks and gale damage. Next, condition-based maintenance is a type of maintenance that is performed depending preventive maintenance, which is undertaken when the condition of an item is known as a consequence of routine or continuous monitoring, while scheduled maintenance is known as preventive maintenance that carried out at a predefined interval of time, number of procedures, and mileage (Ivor, 1987).

Furthermore, there are many advantages from the building maintenance work at the school. One of them is equipment that receives frequent maintenance not only lasts longer but also functions more efficiently. Maintenance work will improve the overall performance of a piece of equipment such as an HVAC unit. Besides that, maintaining accurate records and doing building maintenance can help to provide the facility's health and safety. Safety and health are usually considered in the context of building maintenance work as primarily a concern in facilities with dangerous equipment, although safety and health are significant in all facilities, including office buildings and schools. The maintenance work will allow to supervise and track of all devices in facility (Laubach, 2020).

There are many kinds of maintenance work, however, the aim of this report is to discover the school’s building maintenance.

1.2 Objectives

The objectives of this school's building maintenance are:

i) to describe method of building inspection for building maintenance work.

ii) to explain the process of preparing Bill of Quantity (BQ) for the building maintenance work.

iii) to identify common problems in building maintenance work and their rectification works.

1.3 Scope of Study

The scope of study for this building maintenance has been held in all schools in Batu Pahat district, which is handled Batu Pahat District Education Office (PPD BP). The total number of schools in Batu Pahat district is 176 schools. It has been acknowledged that schools in Batu Pahat district are the largest total of schools in Johor and other states. The major task while working in PPD, which under Sector of Financial, Infrastructure and Procurement (SKIP), is maintaining the school building by investigating the problems that occurred there. The method of working in this department is to investigate the complaints that given by the school in order to observe the issues there. Then, make an assumption of the cost and time of maintenance work that will be carried out at the school. If there is an allocation, the Johor Stated Education Department (JPNJ) will inform the Planning Unit at PPD to prepare the Bill of Quantity (BQ). Therefore, the problems of the maintenance work should be identified while site inspection begins and comes with solutions for each problem detected. Despite that, building construction project is not being studied in this department as that work only will be handled by Jabatan Kerja Raya (JKR).

1.4 Methods of Study

1. Observation

Observation is one of the methods of collecting data while doing inspection work at the construction area. From the inspections at construction sites, things that can be observed is the method of maintenance work process. The work will begin with inspecting and observing the defects of the school building. The pictures of school building defects will be taken as evidence of building damage. Then, prepare the required tools and equipment for measuring work, also prepare the measurement sheet and pen in order to record the data of measurement and maintenance work. Overall, the work while site inspection at school will take about 1 to 2 hours to be completed. Next, all of the data will be used for making the Bill of Quantity and cost calculation work, and this work will take about 1 to 2 days to be done.

2. Interviews

Interviews are one of the methods of gathering all the maintenance work data by conducting a structured or unstructured interview with people who are more experienced in this field of work. Interview sessions can be conducted wherever the place is as it is also for the purpose of direct learning. The unstructured interviews were conducted while doing site inspection at the construction site and also while working at the office, which was conducted by interviewing the supervisor and contractors that are in-charge in this maintenance work project. Furthermore, this interview will take about 15 to 20 minutes and all the information will be recorded at the same time.

3. Document Reviews

Document reviews are also the method in order to collect data while working in this maintenance work job scope. The documents that have been used to be the references and gathering data were the measurement notes from site inspections, original format Bill of Quantity and notes that were given by supervisor, drawing plan and photos that were taken by supervisor. The data that have been recorded from site inspections, the format of Bill of Quantity and photos that were taken by supervisor while inspection work will be used as references while making Bill of Quantity. The notes that were given by the supervisor will be used to acknowledge the process of tendering. Drawing plan will be used to acknowledge the floor plan of school blocks.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Batu Pahat District Education Office (PPD BP) is a department that is responsible to handle all the schools in Batu Pahat district. This department is responsible to provide suitable and high-quality facilities, with a special emphasis on rural schools, in order to improve the quality of school, particularly in terms of infrastructure, and ensuring that the school becomes more comfortable. The Batu Pahat District Education Office is the department that is responsible for handling 176 schools, which is the largest number of schools in Johor and other states. The schools under PPD's department which are 26 schools of 'Sekolah Menengah Harian', 104 schools of 'Sekolah Rendah Harian', 36 schools of 'Sekolah Jenis Kebangsaan Cina (SJKC)', 3 schools of 'Sekolah Jenis Kebangsaan Tamil (SJKT), 2 schools of 'Kolej Vokasional', 4 schools of 'SMA' and 1 school of 'SRAB'.

2.2 Company Profile

Batu Pahat District Education Office (PPD BP) is a management educational institution that was established in 1913 and began operations in Jalan Mohd Khalid, then relocated to No 1 Jalan Pejabat in 1960, and then to a 0.5-hectare site in Jalan Zaharah on December 1, 1999. This approach is, of course, intended to stifle the rapid advancement of education, which needs a strategic position and suitable facilities. The office is located at Jalan Zaharah, Kampung Bahagia, 83000 Batu Pahat, Johor, which stated in the center of Batu Pahat, nearby the famous recreational area in Batu Pahat, which is Taman Rekreasi Tasik Y, and also near with Batu Pahat Stadium.

Figure 2.1: Location of the company from the Google Maps

Source: https://maps.app.goo.gl/zPwXa5XqBNtF6Lbg6

Furthermore, there are various sectors in the PPD department that include their own roles. Firstly, 'Sektor Perancangan PPD' in accordance with the MOE's education development policy and plan, establish, monitor and assess the district's strategic plan for educational development, while 'Sektor Pembelajaran' for coordinate and implement academic development activities for relevant officers and support staff, identify field-based competencies and training needs. 'Sektor Pengurusan Sekolah' to supervise the management and administration of PPD controlled preschools, primary and secondary schools, also private educational institutions, while 'Sektor Pembangunan Murid' is to carry out the district's student excellence plan, which include academics, co-curricular activities, discipline and educational support. Then, 'Sektor Psikologi Dan Kaunseling' is to provide counselling advisory services at the district level, and 'Sektor Pentaksiran dan Peperiksaan' is to supervise the implementation of assessment or examination in all of the district's schools. Next, 'Sektor Pengurusan' is to supervise and manage asset management in PPD and schools under the PPD's control. Among the sectors above, 'Sektor Perancangan PPD' is the department that handles the school's infrastructure issues.

2.3 **Company** Organization Chart

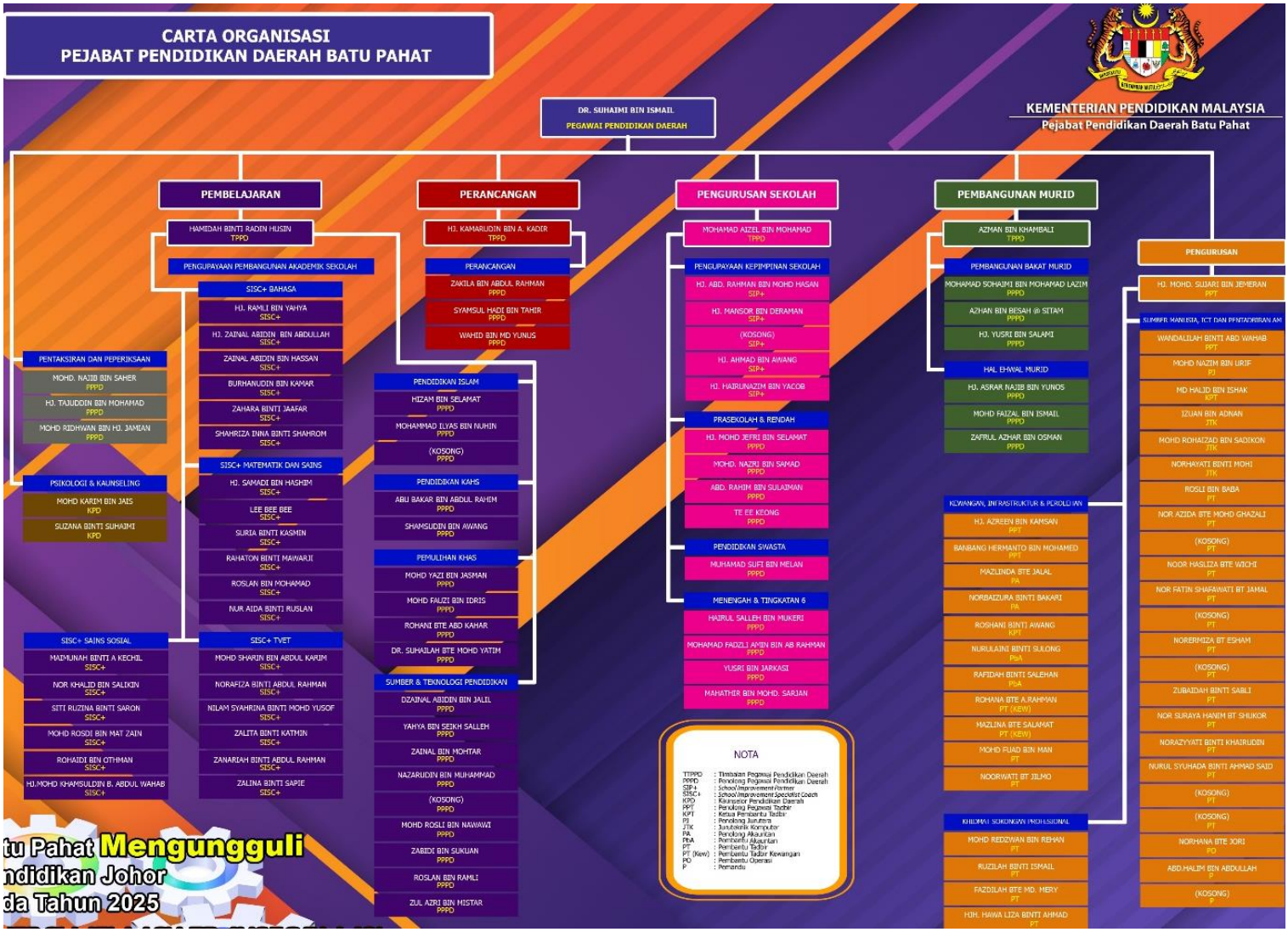


Figure 2.2: Organization Chart of Batu Pahat District Education Office (PPD)

Source: http://ppdbp.edu.my/v5/index.php/korporat/carta-organisasi

As shown above, there are seven sectors that are organized in Batu Pahat District Education Office (PPD). The Management Sector (‘Sektor Pengurusan’) has three units. Firstly, there is the Sector of Human Resources, ICT and General Administration. Next is the Sector of Finance, Infrastructure and Procurement. Lastly, there is the Sector of Professional Support Services. Among those sectors, the Sector of Finance, Infrastructure and Procurement are the sectors that are responsible for maintaining the damaged school buildings. Furthermore, the Planning Sector (‘Sektor Perancangan’) is also involved in maintaining the school building, which the schools will refer first to this sector to complain about the issues of school buildings.

2.4 List of Projects

2.4.1 Completed Projects

Table 2.1: Table of Completed Projects.

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Soil Investigation Work (4 Mackintosh Probe and 1 Borehole, 3 Mackintosh Probe).	RM14,645.10	28/10/21	02/11/21	1 week	SMK Dato' Bentara Luar, SK Bukit Kuari, SK Seri Bertam
2.	Renovation work of meeting room	RM46,240.00	09/11/21	24/11/21	2 weeks	Pejabat Pendidikan Daerah Batu Pahat
3.	Maintenance work of ceilings, roofs, pipes, sewage tank fencings and gates, water storage tank.	RM96,093.90	10/09/21	30/11/21	2 months	SMK Datin Onn Jaafar
4.	Maintenance work of ceilings, slab, doors, fascia board.	RM29,452.81	24/10/21	07/11/21	2 weeks	SK Seri Pandan
5.	Maintenance work of pipes sewage system installation.	RM13,315.40	18/10/21	01/11/21	2 weeks	SMK Seri Gading

2.4.2 Project in Progress

Table 2.2: Table of Project in Progress.

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Maintenance work of repairing toilet appliances, pipes system.	RM19,999.00	-	-	In progress	SMK Dato' Syed Esa
2.	Maintenance work of table top installation, bricklaying wall.	RM98,000.00	-	-	In process of awarding	SK Seri Belahan
3.	Maintenance work of roofs, ceilings, water tank system, doors.	RM19,990.00	-	-	In process of awarding	SMK Munshi Sulaiman
4.	Maintenance work of repairing roofs, doors, ceilings.	RM19,990.00	-	-	In process of awarding	SK Parit Raja
5.	Maintenance work of repairing pump house and related work.	RM19,990.00	-	-	In process of awarding	SK Seri Binjai

CHAPTER 3.0

CASE STUDY OF SCHOOL'S BUILDING MAINTENANCE

3.1 Introduction of Case Study

The case study is about the building maintenance work at schools in Batu Pahat District, which was handled by Batu Pahat District Education Office (PPD BP). One of the schools in this Batu Pahat district has many kinds of maintenance works there as the school building has been used for a long time. Therefore, the case study will describe the method of building maintenance, the process of making the Bill of Quantity and the cost of project that has been spent, and problem and solution of this maintenance project. The school for this case study is Temenggonng Ibrahim Girls School, Batu Pahat, which is located at Jalan Tasek, Kampung Bahagia, Batu Pahat, and has been built since 1938. Overall, the project value of the building maintenance works approximately twelve thousand five hundred and ninety-six Ringgit Malaysia (RM12,596.00). The project was started on 21st September 2021 and completed on 1st November 2021.

Figure 3.1: Location of the site (school) from the Google Maps

Source: https://maps.app.goo.gl/U7Y4xRP2uQTjqsQq8

The maintenance work project is located at 35, Jalan Tasek, Kampung Bahagia, 83000 Batu Pahat, Johor. The school, which is Temenggong Ibrahim Girls School, is located in a residential area and food stalls. Apart from that, it is also near the secondary school, namely Sekolah Menengah Kebangsaan Dato' Syed Esa. The surrounding area is a strategic area and many vehicles pass by as it is located in the center of Batu Pahat.

The activities that were carried out at the construction site is maintenance work of pipe systems repairing and installation work. All of the work was placed at the school buildings involved. The work will begin with providing the tools and machineries, safety tools and items required by following the Bill of Quantity provided. The tools required were measuring tape, trowels and other tools and machineries related.

Furthermore, the cost that has been spent throughout this maintenance work should be estimated properly. The completion of the Bill of Quantity should be in accordance with the given time period, so the contractor will follow all the details in the Bill of Quantity provided. Moreover, the problems of this maintenance work should be identified throughout the project. The solutions also will be explained in order to fix the problems from the entire work.

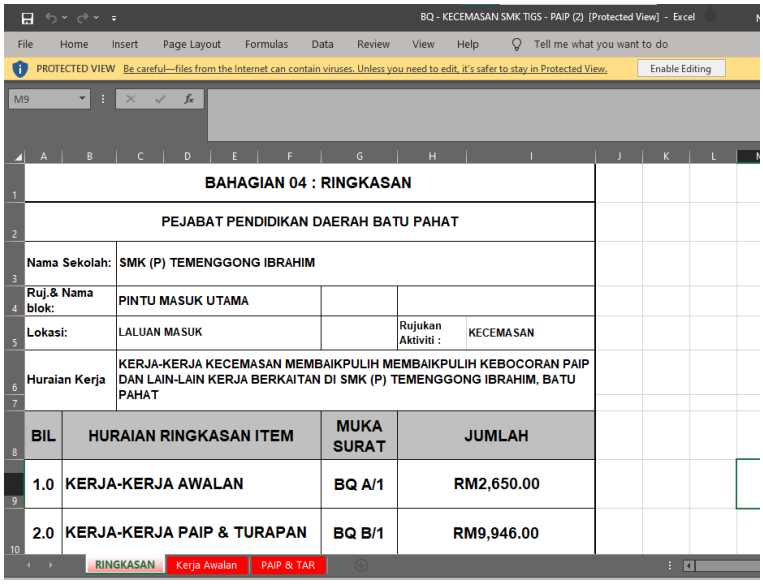
3.2 Describe Method of Building Inspection for Building Maintenance Work

Site inspection to the location of the construction site by bringing along the measurement tools such as measuring tape, wheel distance measure, and also measurement sheet for recording the information from the site inspection. Inspect the defect at the school, which was blockage pipes around the school compound. Determine the type of the blockage pipes, which was polyethylene and measure the length of the pipes using measuring tape and wheel distance. Recorded the length of the blockage pipes and items that required for this maintenance work with examine the diameter of the pipes, which was 50mm diameter, to replace it with the new pipes. Take the pictures of the blockage pipes for report purposes.

Figure 3.2: Site inspection of blockage pipe area.

Figure 3.3: Water comes out slowly as there was a blockage in pipe.

Next, making the Bill of Quantity of the pipes system maintenance work at Temenggong Ibrahim Girls School by using the information that has been recorded in the measurement sheet throughout the site inspection session. The Bill of Quantity is then given to the contractor who has been appointed by the PPD's officer. The contractor and workers provide tools and materials for adequate pipe maintenance work, as already listed in the Bill of Quantity provided.



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PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing

M9

BAHAGIAN 04 : RINGKASAN

PEJABAT PENDIDIKAN DAERAH BATU PAHAT

Nama Sekolah:	SMK (P) TEMENGGONG IBRAHIM			
Ruj.& Nama blok:	PINTU MASUK UTAMA			
Lokasi:	LALUAN MASUK		Rujukan Aktiviti :	KECEMASAN
Huraian Kerja	KERJA-KERJA KECEMASAN MEMBAIKPULIH MEMBAIKPULIH KEBOCORAN PAIP DAN LAIN-LAIN KERJA BERKAITAN DI SMK (P) TEMENGGONG IBRAHIM, BATU PAHAT			

BIL	HURAIAN RINGKASAN ITEM	MUKA SURAT	JUMLAH
1.0	KERJA-KERJA AWALAN	BQ A/1	RM2,650.00
2.0	KERJA-KERJA PAIP & TURAPAN	BQ B/1	RM9,946.00

RINGKASAN Kerja Awalan PAIP & TAR

Figure 3.4: The Bill of Quantity of pipes maintenance work at Temenggong Ibrahim Girls School (TIGS)

The first thing when on a construction site is to do a site clearance at the selected place, which has blockage pipes to prevent any dirt or debris which is likely to affect the defects on the maintenance work performed, and at the same time can affect safety of the school building. Before then, bring along and prepare all types of safety tools, equipment, plant and machinery required. The tools and machinery are measuring tape, trowel, excavator and pneumatic jackhammer, road roller, and safety tools such as safety helmet, safety jacket and safety boot.

Before that, take the picture of the blockage pipes detected while site inspection for the purpose of comparing before the maintenance work is done and after the maintenance work is completed. This is also to be used when making company reports. Always reminded to take pictures during maintenance work is in the progress for company reporting purposes. After that, examine the place of blockage pipes, then measure the length of the pipes, using measuring tape, in order to replace it with the new pipes.

Next, dismantle the existing landscape structure with about 300mm thickness, which consists of concrete and soil. Dismantle the concrete structure using a pneumatic jackhammer, then excavate the soil 300mm thickness using an excavator. Removed all the remains of landscape structures from the site. After that, search for the main

blockage pipes underground from the main supply meter pipe to the service pipe until the blockage channel is found and commence maintenance work and related works.

Figure 3.5: Excavate and dismantle existed landscape, which consist of concrete and soil.

Thus, excavate the top soil 300mm thickness along 10m length using an excavator. Then, examine the blockage pipes and pull it out. Replace the blockage pipe with installing and connecting of polyethylene pipes class ‘C’ (PN9) 50mm diameter. Connect the pipes using clamps and rubber rings from the main supply meter pipe to the existing service pipe to reuse it. After that, supply and spreading 150mm thick sand as subgrade and compacted the soil.

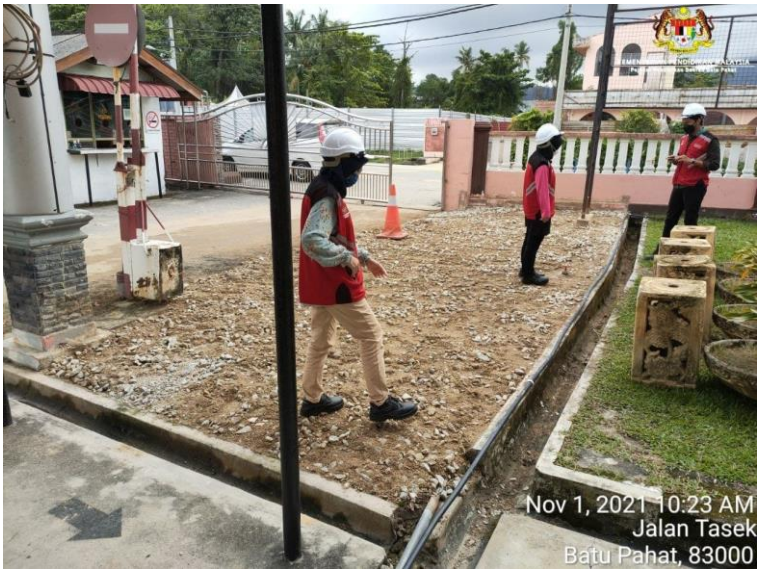

Figure 3.6: Construction area after dismantle the existed landscape and compacted the subgrade.

Then, supply and spread 150mm thick crushed mortar and approved road base material, and compressed the road base as specified. A 60mm thick binder course including penetration grade bituminous base layer, which is prime coat, is sprayed at a rate of 4 liters/square meter. After that, the top layer is sprayed at a rate of 1.4 liters/square meter. Next, compressed it with a 6 tonnes road roller.

Figure 3.7: Spread the penetration grade bituminous base layer.

Lastly, supply and spreading 50mm thick binder course including a layer of liquid bitumen, which is tack coat, is sprayed at a rate of 4 liters/square meter, then compressed with a 6 tonnes road roller.

3.3 Explain the Process of Preparing Bill of Quantity (BQ) for the Building Maintenance Work

For the process of obtaining approval to make the Bill of Quantity (BQ), the PPD's Planning Unit ('Unit Perancangan') receives complaints from schools. After that, PPD's Planning Unit passes the information about the complaints from schools to the PPD's assistant engineer. The PPD's assistant engineer then goes to the school to investigate the complaint, as well as prepare an initial cost estimate upon completion of the inspection. Thus, submit the cost estimate to the PPD's Planning Unit then the application is sent to the Johor State Education Department (JPNJ) development unit.

If there is a provision, JPNJ then informs the PPD's Planning Unit to prepare the Bill of Quantity, which is prepared by the PPD's assistant engineer. Then, the BQ is received by the PPD's Planning Unit and handed over to JPNJ. Then, channel the provision to the PPD. If the provision provided is less than RM20,000 then it is a direct appointment job, and if it is over RM20,000 then it is a quote job. If there is no provision, the PPD's Planning Unit includes in the application the operating expenditure estimate (ABM) for the following year.

For this pipe maintenance work in the school's building, the cost of items and equipment required to carry out this project is being estimated in advance during the site inspection. Make sure to estimate the cost overall of the project properly, so the contractor can get an adequate cost too. The price cost for this pipe maintenance work is worth RM12,596, which is below RM20,000 as it is a direct appointment work, where the contractor is appointed with reference to previous work records and work indentures. This direct appointment work is under emergency work.

The following price of each item and other related work is referred to as the Price Rate Table (JKH). The JKH is basically the price rate, which is set by Jabatan Kerja

Raya (JKR). Besides that, the price in JKH is useful while making an estimation during the site inspection. Even so, the price of the item is also a lump sum for certain reasons such as work which is not listed in JKH.

3.4 Identify Common Problems in Building Maintenance Work and Their Rectification Works

The problem that occurs at this school building maintenance is the cause of the blockage pipes are hard to identify and detect as the pipes are underground. It is a normal thing for underground pipes difficult to find out and consider the real condition of the pipes.

So, in order to solve the problem, excavate the top soil of where the blockage pipes are located. Excavate the top soil until the underground pipes appear. Before the excavation work of top soil is conducted, an assumption of the length of the pipes with the accessories related can be made first.

Moreover, the other problem that occurs at the school building maintenance is the age of the pipe is old and causes the rust on the pipes. The rust on the pipes was blocking the pipes, which caused water to not flow properly.

The solution of the issue is to replace the existing pipes to the new one, which is polyethylene pipes (PE). This type of pipe is elastic and free from rust, which can avoid serious issues like blockage pipes.

CHAPTER 4.0

CONCLUSION

In conclusion, the school building maintenance is important to run it wisely in order to provide a safe and comfortable environment for students, teachers and staff of the school. The school building maintenance procedures are the same as other kinds of building maintenance which need to inspect the problems occurring at the building. The project started with clearing the construction site before the work started, prepare all tools and machineries, excavate the top soil to pull out the blockage pipes and then replace with the new pipes, then fill again the top soil to plant the pipes so that the pipes are not visible from the outside.

The maintenance work takes a month to be completed, from 21st September 2021 until 1st November 2021. The maintenance work is a common procedure and usually been used for any existing building, regardless of school building, house building, office building and other building, also the school building maintenance is carried out the same thing as other building maintenance, which is maintaining the issues occurring at the building. Whether the problems detected are hard to solve or not, it depends on what kind of problems, for example if the issue detected is in the ground and difficult to find out, the matter will be hard to solve.

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