



**DEPARTMENT OF BUILDING**  
**FACULTY OF ARCHITECTURE, PLANNING AND**  
**SURVEYING**  
**UNIVERSITI TENOLOGI MARA**  
**(PERAK)**

**PROCESS OF ROAD MAINTENANCE WORKS**

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FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING  
UNIVERSITI TEKNOLOGI MARA  
(PERAK)**

**DECEMBER 2018**

It is recommended that the report of this practical training provided

By

**MUHAMMAD ALIF BIN MOKHTAR**

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**Entitled**

**PROCESS OF ROAD MAINTENANCE WORKS**

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

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**FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING**

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**(PERAK)**

**DECEMBER 2018**

**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 Jabatan Kerja Raya Temerloh (JKR) for duration of 14 weeks starting from 3 September 2018 and ended on 7 December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfilment of the requirements for obtaining the Diploma in Building.

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Date : 21 MARCH 2019

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Finally, to my beloved parents who have supported me and I could not thank you for their sacrifices all the time.

Thank you.



## **ABSTRACT**

Road are important in this modern day use by people to travel especially by wheeled vehicles. This report will explain the process of road maintenance works that was done based on road maintenance works at Kampung Gantuk, Mentakab Pahang. In order to complete this report, an interview and observation with Assistant Engineer, Mr Sabri had been carried out on site. Valuable information such as process and method of road construction was discovered by doing this report and can be used as reference in the future. In conclusion, this report will illustrates how process of road maintenance works commonly done in this modern day.

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## **CHAPTER 1.0**

### **INTRODUCTION**

#### **1.1 Background and Scope of Study**

Roads and highways, travelled way on which people, animals, or wheeled vehicles move. In modern usage the term road describes a rural, lesser travelled way, while the word street denotes an urban roadway. Highway refers to a major rural travelled way; more recently it has been used for a road, in either a rural or urban area, where points of entrance and exit for traffic are limited and controlled. (Fred J, 2016)

Roads, and means of transport, make a crucial contribution to economic development and growth and bring important social benefits. Poorly maintained roads constrain mobility, significantly raise vehicle operating costs, increase accident rates and their associated human and property costs, and aggravate isolation, poverty, poor health, and illiteracy in rural communities. The economic and social importance of regular road maintenance and recommends ways to achieve sustainable road maintenance with scarce public resources. (Sally B, 2005)

Concrete pavements have been used for highways, airports, streets, local roads, parking lots, industrial facilities, and other types of infrastructure. When properly designed and built out of durable materials, concrete pavements can provide many decades of service with little or no maintenance. (Norbert J. 2014)

Roads make a crucial contribution to economic development and growth and bring important social benefits. They are of vital importance in order to make a nation grow and develop. In addition, providing access to employment, social, health and education services makes a road network crucial in fighting against poverty. Roads open up more areas and stimulate economic and social development. For those reasons, road infrastructure is the most important of all public assets. (Malkoc, 2015)



A pavement, in engineering terms, is a horizontal structure supported by in situ natural material. Its purpose is to distribute the applied traffic and other loading to such levels that they can safely and reliably be carried in a sustainable manner by the supporting soil. The bearing capacity of the supporting soil is critically dependant on particle size distribution, shape and its moisture content. (Pearson, 2012)

## **1.1 Background and Scope of Study**

This study was conducted to understanding the process of road maintenance works. In this case study, scope of work on road construction and maintenance construct at Kerja-Kerja Senggaraan Jalan Negeri Kg. Gantuk, Mentakab Daerah Temerloh Pahang Darul Makmur. The scope of the study explains in detail on the purpose, importance, process and methods of road maintenance carried out within the project mentioned.

## **1.2 Objectives**

### **1.2.1 Aim**

The aim of this study is to conduct the process road maintenance works at state road of Kampung Gantuk, Mentakab.

### **1.2.2 Objectives**

- i. To study the purpose and importance of road maintenance works.
- ii. To determine the method and process of road construction for state road.

### **1.3 Method of Study**

In order to satisfying the objective set up the method of study had been undertaken are:

- 1) Site Observation
- 2) Face to face interviews during site visit.
- 3) Literature reviews though text book, articles, journals and related reading materials available in JKR office.

#### **1) Observation**

The observation during practical training directly to site visit with JKR's staff. Was guided by supervisor on how a road resurfacing work done which consist of early stage to the final stage. The information collected based on what happen on site. Technology as cell phone used to record any information such as progressing, equipment and machineries used during construction.

#### **2) Interviewing methods**

A lot of accurate data gain by interviewing the JKR's staff and the supervisors as they have knowledge and experience of work through the years. Through this method, its gain me to complete this case study and gained a new knowledge.

#### **3) Research Material**

A research material from various sources such as books, magazine, articles and journals from the internet on road construction.

## CHAPTER 2

### COMPANY BACKGROUND

#### 2.1 Introduction of Company

JKR Temerloh is headed by Mr Rosli Bin Osman, SMP. JKR Temerloh Office is located at KM 4 Jalan Temerloh – Maran. JKR Temerloh office area is 1329 square meters, JKR Temerloh is the implementing department and development center for Temerloh District. Apart from planning, designing, implementing, supervising and monitoring development projects and federal and state maintenance works, JKR Temerloh also provides technical advice to government departments and agencies in the Temerloh District.

JKR Temerloh can be divided into several departments as follows:-

- 1) Road Department
  - a) Establish Road Infrastructure as well as bridges around the country to meet the country's development needs.
  - b) Coordinate construction and repair of roads and bridges in the Rural to connect to developing areas.
  - c) Determine that the existing roads and bridges are maintained, repaired and upgraded perfectly for a safe and comfortable trip.

2) Building Department

- a) Plan, coordinate and oversee the implementation of federal and state projects that are channel to the State JKR.
- b) Implement structural design work for new projects.
- c) Coordinate the progress of physical implementation and financial progress of building projects.
- d) Coordinate Maintenance of State buildings and several Federal buildings.
- e) To provide technical advisory services to the departments and Government Agencies in need.

3) Contract & Quantity Surveying Department

- a) The main role played by the Contracts & Quantity Survey Division is to provide the people with the services to other parts of the JKR. Consultants in project implementation particularly emphasize on efficient management of tender and contract administration so that projects can be completed within agreed time and cost.
- b) Contracts & Quantities Contracts are also responsible for ensuring the tender rules of the contract being executed meet the public accountability characteristics and consistent with the current government policy.

## **2.2 Company Profile**

### **2.2.1 Owner**

Kementerian Kerja Raya Malaysia (KKR)

### **2.2.2 Company Vision**

We will be a world-class service provider and a centre of excellence in asset management, project management and engineering services for the nation's infrastructure development through creative and innovative human capital and the latest technology.

### **2.2.3 Company Mission**

- i. To assist customers in delivering policy and service outcomes through strategic partner co-operation
- ii. Standardization of processes and systems for the sake of delivering consistent results
- iii. Providing effective and innovative asset and project management
- iv. Empowering existing engineering competencies
- v. Developing human capital and new competencies
- vi. Adhering to integrity in delivering services
- vii. Build harmonious relationships with the community
- viii. Preserving the environment in service delivery

### **2.2.4 JKR Logo**



Figure 2.1: JKR Logo



### 2.3 Organization Chart

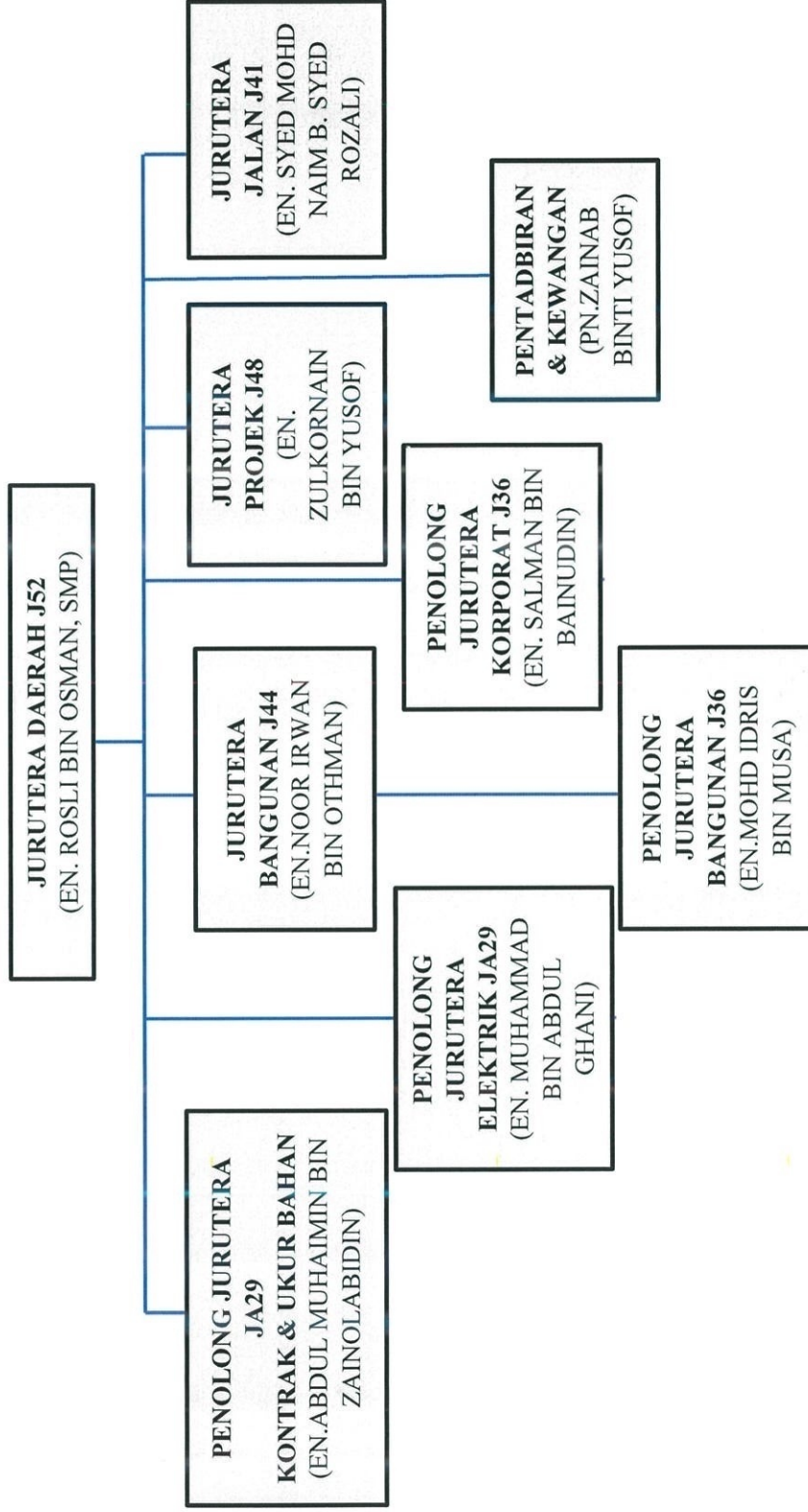


Figure 1.2: JKR TEMERLOH ORGANIZATION CHART



## 2.4 List of Project

### 2.4.1 Completed projects

Table 2.1: Completed Project.

No	Project Title	Contract value (RM)
1	MEMBINA DAN MENYIAPKAN KERJA-KERJA TERBENGKALAI PROJEK MASJID BARU KAMPUNG KETAM TEMERLOH PAHANG DARUL MAKMUR	2,595,717.40
2	MEMBINA DAN MENYIAPKAN MASJID KHARIAH SRI SEMANTAN TEMERLOH, PAHANG DARUL MAKMUR.	3,472,456.00
3	PEMBINAAN SEBUAH PADANG HOKI TURF SEKOLAH MENENGAH KEBANGSAAN SEBERANG TEMERLOH, TEMERLOH PAHANG DARUL MAKMUR.	3,045,831.20
4	MEMBINA DAN MENYIAPKAN MASJID BARU KAMPUNG GUNUNG SENYUM TEMERLOH PAHANG.	1,330,350.00
5	KERJA-KERJA PEMBAIKAN CERUN SERTA KERJA-KERJA BERKAITAN DI BELAKANG KUARTERS KLINIK KESIHATAN TANJUNG LALANG TEMERLOH, PAHANH DARUL MAKMUR	665,807.00
6	MEMBINA DAN MENYIAPKAN MASJID BARU KAMPUNG RANTAU PANJANG, MUKIM SEMANTAN, TEMERLOH PAHANG DARUL MAKMUR.	1,494,346.02
7	MENAIK ARAS JALAN-JALAN PAYA LUAS, TEMERLOH, PAHANG DARUL MAKMUR.	837,007.00

## 2.4.2 Project in progress

Table 2.2: Project in progress.

No	Project Title	Contract value (RM)
1	MEMBAIKPULIH SERTA MENAIKTARAF MASJID KAMPUNG BONGSU MUKIM SEMANTAN, LANCHANG DAERAH TEMERLOH, PAHANG.	150,000.00
2	MEMBINA MASJID BARU TAMAN SAGA, MENTAKAB DAERAH TEMERLOH, PAHANG DARUL MAKMUR.	200,000.00
3	MEMBINA MASJID BARU TAMAN BUKIT BENDERA, MENTAKAB DAERAH TEMERLOH PAHANG.	900,000.00
4	MEMBINA MASJID BARU KAMPUNG, CHEMPAKA MUKIM SEMANTAN, LANCHANG, TEMERLOH PAHANG.	750,000.00
5	PEMBINAAN BARU DEWAN SERBA GUNA LANCHANG, PARLIMEN TEMERLOH PAHANG.	2,000,000.00
6	MEMBINA BARU MASJID KAMPUNG GAJAH MATI, SUNGAI BULOH, MUKIM MENTAKAB 1 DAERAH TEMERLOH, PAHANG.	1,800,000.00

## CHAPTER 3

### PROCESS OF ROAD MAINTENANCE WORKS

#### 3.1 Introduction of Case Study

This project conducted during practical training was “KERJA-KERJA SENGGARAAN JALAN NEGERI KAMPUNG GANTOK MENTAKAB DAERAH TEMERLOH PAHANG” by Perniagaan Sinar Harapan as the main contractor for the maintenance works as per appendix A. The contract value for this project is RM 174,291.00. The Duration period awarded and given to be complete for this projects is from 9 October 2018 until 20 November 2018.

Descriptions:

- i. Heavy patching works
  - Cleaning of area and bushes
  - Digging, transporting and removing exists of existing premix
  - Gradually squeezing surfaces to provide surfaces to provide the foundation surface of the road
  
- ii. Culvert works
  - Cleaning of area and bushes
  - Build and installation of culverts between the drains follow the design plan as per Appendix D.

iii. Drain works

- Cleaning of area and bushes
- Build and set up "V Shape" drain concrete in-situ on the left and right sides of the road where the design plan as per Appendix C.



Figure 2.1: Perspective views of Kg. Gantuk road.

Source: Google Maps (2013)

### **3.2 The purpose of road maintenance works.**

Road maintenance is part of JKR works to ensure people can use the road safely that follow specification standard. Road maintenances provide an on-site representative from JKR to monitor the quality of work at site. JKR's representative role is to communicate with contractor to ensure the process of road maintenance and problems always follow the works standard.

Specification and drawing plan always check by JKR department that specialist in road engineering and geotechnical engineering. Therefore, all the road maintenance works must follow the drawing plan that has been approved by JKR. By performing the process of maintenance works, it can reduce costs. JKR additional specification will be issued to contractor in the contract that will explain clearly to contractor. (Refer Appendix F and Appendix G)

#### **3.2.1 The importance process of road maintenance works.**

Below are the importance process of road maintenance works based on my opinion and discussion with JKR Temerloh Road's Engineers:-

1. Ensuring that the surface and surrounding environment always safe and secure drive by any road failure and danger.
2. Ensure that the road structure has sufficient strength to accommodate traffic load.
3. Restore routes quickly when unexpected events occur such as landslides and so on.
4. To avoid accident such as car crash that cause by road settlement and uneven surface of road.
5. To ensure that road maintenance works smoothly as maintenance delays lead to increase in cost.



### 3.3 The process of road construction (heavy patching work, culverts and drain)

#### 3.3.1 Heavy patching works

The construction of this project used for heavy patching work using dig-outs method due to the sedimentation and cracking of the road as photo 3.1 shown below. These road cannot use resurfacing method because as they are not effective as it costly if they are damage again. If the road is cracked, the method of cracking sealing can be used to prevent seepage in the pavement substrate. This water will result in initial failure on the surface of the road in various ways. Starting by excavating the existing premix to subsoil layer with depth 550mm and overall 200m<sup>2</sup> for heavy patching work.

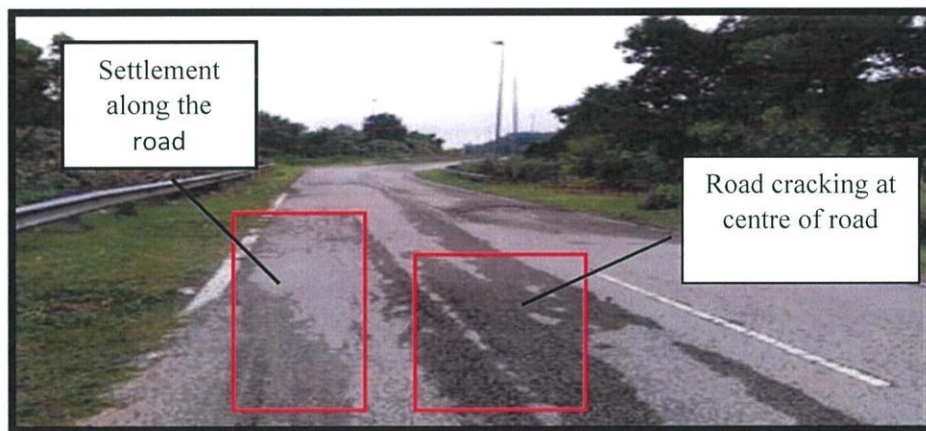


Photo 3.1: The perspective view state road of Kampung Gantuk.

Crusher run and binder works area for heavy patching which has been calculated and determined by contractor.

Table 3.1: Total area of heavy patching

No	Length		Breadth	M <sup>2</sup>
1	7	x	6	42
2	30	x	2.7	81
3	30	x	2.7	81
TOTAL				204

i. Site Preparation

Equipment and machines are used for cleaning the road area before making heavy patching. This road is closed by placed standard temporary signs as per Appendix E that has been provided by the contractor to facilitate the work performed and avoid any accidents on site. Once the site setup has been completed, excavate existing premix works are done. The premix that has been excavated will be delivered to the place provided by the contractor. According to the JKR specification, the state road needs to excavate 550mm depth set as photo 3.2 below shown.

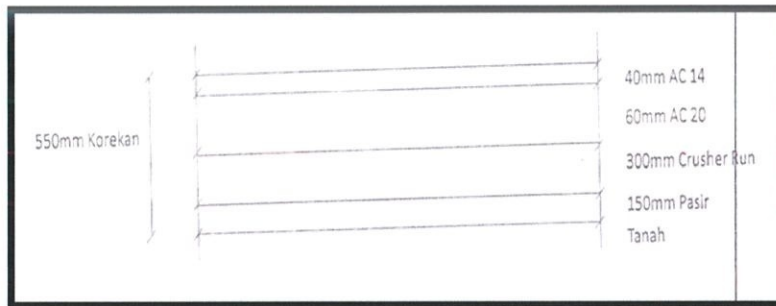


Photo 3.2: Road section in drawing

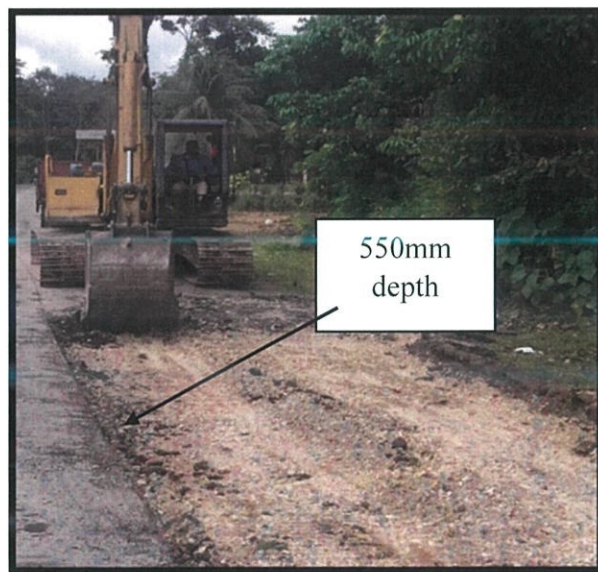


Photo 3.3: Excavated road



ii. Sand

Laying a sand into the excavated area with thickness 150mm and compacted in two layers according to JKR specifications and drawing (Refer Appendix B). Laying a sand two times, first layer will be compact with roller machine until second layer as Photo 3.4 below shown.



Photo 3.4: Sand compacted with roller machine

iii. Crusher Run

After laying a sand, the crusher run struck and compacted with 25 tons rollers. The first layer was 150mm compacted by rolling 25 tones rollers and a second layer of 150mm thick, watered evenly and compaction up to 95% density. If the surface of the crusher run is loose, other method can be used by place the dust on the crusher run and compacted until it is in good shape. For this crusher run, the total of the thickness is 300mm. The crusher run work follow JKR specification JKR/SPJ/1998 bill 4.1.4 (Refer Appendix F).



Photo 3.5: Compaction of crusher run

iv. Field density test (Sand Replacement Method)

Apparatus required:

1. Sand pouring cylinder
2. Density Plate, with a central circular holes of diameter equal to the diameter of sand pouring cylinder.
3. Digging tools
4. Brush
5. Ladle
6. Balance to weight into an accuracy of 1g.

First, place the density plate on levelled clean test ground. Field density test done every 200m<sup>2</sup> area. Dig out crusher run 6'' deep with the same diameter of the density plate hole using digging tools. After digging the crush run, the loose crusher run or sand out of the density plate with brush and ladle. Then, the depth of the excavated crusher run has been measured as photo 3.6 below shown.



Photo 3.6: Worker check excavated depth



Photo 3.7: Excavated crusher run for field density test

Then, all the excavated soil and weigh collected and weigh using balance. The worker invert the sand cone apparatus over the density plate and open the valve to tilt the hole with sand. When the sand stops flowing, the worker close the valve and remove the apparatus from the test hole. The sand cone apparatus with remaining sand weigh by the worker and collect as much of the sand from the hole as possible using ladle. Last, the sample of excavated crusher run collected into the plastic for lab test.



Photo 3.8: Sand is filled into the cone



v. Tack coat (Bitumen Prime Coat SS 1K)

The pavement works are carried out on dry surfaces and sprayed with a tack coat at the specified spray rate. The entire surface area that will be paved cleaned to remove dirt, dust and other unnecessary materials. The tack coat is sprayed on a clean and dry surface. It is sprayed before pavement work but with enough time to allow the tack coat set to get satisfactory adhesiveness before the pavement work is carried out. The tack coat rate used is 1.0 liter / m<sup>2</sup> and temperatures ranging from 25C to 45C during spraying. It is sprayed on the surface firmly as photo 3.9 shown below. Before the tack coat spray done, the road is closed to traffic all the time before the pavement work is carried out.



Photo 3.9: Tack Coat is sprayed

vi. Pavement work ( Premix Asphalt Concrete Binder Course AC20 & AC14)

Laying work starts at the lower part before climbing to the higher side. The speed of the pavement machine is between 3 and 20 meters per minute as photo 3.10 shown below. The type of pavement machine used is a floating screed paver. This machine is equipped with a fixed or hydraulically adjustable screed at a wide range of spreadsheets ranging from 2.5 to 3.75 meters. Screed will provide partial compaction and surface levelling.



Figure 3: Paver screed control



Photo 3.10: Road pavement in progress.

Premix temperature is checked from time to time by contractor. These premix temperatures on truck during delivery is 158C. Premix temperature in the hopper is 154C and not less than 130C.

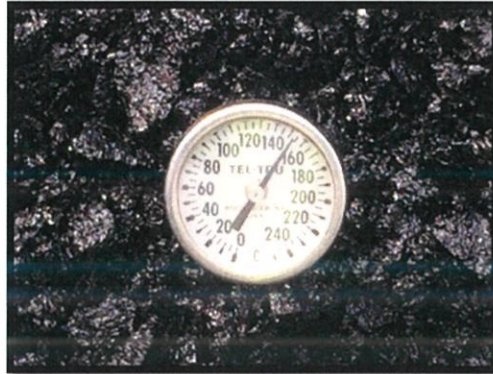


Photo 3.11: Premix temperature is taken

After that, the quantity of premix in front of the screed consistent to prevent the surface of the pavement to become bumpy. Premix are poured into a hopper 2/3 its space. Premix lorry are ready to approach the hopper so that the pavement runs smoothly without a long stop as photo 3.12 shown below. This prevents premix from cooling rapidly, which causes a bad surface and aggregate easily removed from the pavement surface.

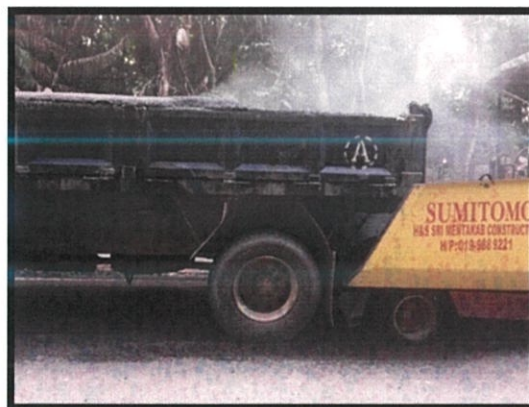


Photo 3.12: Premix poured into hopper.



Hand casting is used to improve defects and uneven surface of premix but this hand casting should be minimize. Excessive aggregate is removed by rake as it will crack under the rollers and will not form solid bonds with asphalt stranded with pavement machines as photo 3.13 shown below.



Photo 3.13: Hand casting works

While paving, the premix of the premix spreadsheet is checked from time to time. The premix thickness changes are always checked to ensure that the spreadsheet is uniform. Workers use dipping to check the thickness of the overlay as photo 3.14 shown below.



Photo 3.14: Dipping to check premix thickness



Photo 3.15: Premix thickness measured

After compaction by pavement machine, followed by rolling machine with several processes. For early rolling, steel rollers is used followed by pneumatic tire rollers (rubber tires). Compaction with steel rollers to eliminate any irregularities on the surface and impact of tires left by pneumatic rollers. 2-2-10-2 rolling pattern is used 2 times the path go and back and with steel static roller, followed by 2 path with vibrating steel roller, then 10 times pneumatic tire roller path and 2 rolling steel roller. The water is sprayed on the surface of the steel rollers and pneumatic rollers to prevent the premix attached to the tires during the rolling operation as photo 3.16 shown below. One steel roller and one pneumatic tire roller unit are used for this road works.



Photo 3.16: Water is sprayed on the pneumatic tire surface

## VII. Road marking work

After completion of road paving, road marking are carried out. Before road marking is start, long rope is used to specify the size roads to be painted as figure 3.2 shown below. This easily the painting works fast and uniform. The safety cone is placed on the road shoulder to ensure road users are always alert with marking work done to avoid accidents. The road marking machine is operated manually on the front and rear of the machine as it moves to ensure it runs smoothly and does not go outward from the line that has been specified by long rope.



Figure 3.2: Road marking in progress

The thermoplastic materials is used on clean and dry surfaces road. The material is heated first using a mechanical stirrer to obtain a uniform colour before the road paint work is made. These works are monitored and approved by JKR representative. All the marking protected from traffic until they have dried sufficiently so that no pick-up by vehicle tires occur.



Figure 3.1: Thermoplastic road marking machine



### VIII. Coring test

Within 24 hours after compaction, samples were taken, one quantity of sample per 500m<sup>2</sup>. This work was conducted by appointed laboratory company. Samples were taken and tested for thickness and densities of compacted layers after compaction. The average thickness of every 100m length produced is more than the required thickness and the minimum thickness tested is not less than the required thickness minus 5mm. The total point for coring test is ten points. As the coring test is carried out, road temporary signs are placed like a cone to facilitate road users and avoid accidents as photo 3.17 shown below.



Photo 3.17: Coring test performed by the workers



Photo 3.18: Pavement thickness depth check.



### 3.3.2 Culvert works

In this road maintenance, single R.C Pipe culvert is used. The culvert is located in a hilly area, so it is very important for the flow of water under the road to prevent water from seeping into the road or surrounding area. This culvert drains water from the road and flows down the drain. The size and length is follow the provided drawing plan as per Appendix D.

Before the installation of the culvert, the surrounding bushes is carried out to facilitate the installation work done. A backhoe used to excavated soil to make space for the fill on which culvert will sit. The excavated soil follow the existing slope ensure the water run to the lower slop. After that, the culvert place and being center same as the v-drain beside it and carefully to avoid the culvert crack.

The side and top of the culvert is fill with soil firmly to avoid failure due the weight of road traffic. Then, concrete work is perform at the top of the culvert as finishes to strengthen the upper culvert from cracking and failure.



Photo 3.19: Work outside the culvert is carried out.

### 3.3.3 Drain works

Concrete drains are constructed using pre-cast concrete or in-situ casting and have several sizes and shapes. The objective is to channel water from the surface of the road and surrounding areas to the constructed drain. The drain have a degree that can drain water without any obstacles.

For this project, 600mm x 600mm v shape drain concrete in-situ on the left and right along the roadside according to plan. This type of drainage is used because it is easy to construct and can be construct on a short time. Also, it is low cost and reduce maintenance work in the future.

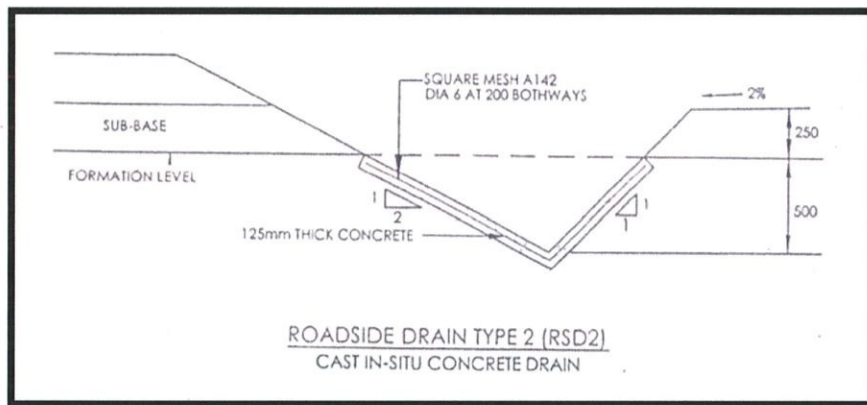


Photo 3.20: Detail of the roadside drain in the drawing.

First, the roadside was cleaned from the bushes and the soil on the road as Photo 3.22 shown below. This easier the excavated soil for drain work. Flagman is placed at each end of the road that involved with drain work to ease traffic users on the road.



Photo 3.21: Roadside cleaning work for roadside drain.

Second, the soil is excavated along the roadside according to the plan. The ground was excavated using a backhoe mounted v-ditching bucket. The v-ditching bucket is used as it is v-shaped and is ideal for moulding the drain before the in-situ concrete work is carried out. Excavated soil is poured into the lorry to be transported to the area provided as Photo 3.23 shown below. So, the surface of the road is free from soil that has been excavated and easier the next excavated work.



Photo 3.22: Roadside drain excavation.



Third, overlay BRC A6 square mesh left and right along the roadside before concrete work is carried out as Photo 3.24 shown below. The concrete for v drain is G20. After concrete work, concrete surface screed work to smooth and to enhance the durability of concrete.



Photo 3.23: Square mesh applied on both side.



Photo 3.24: Cement screed by workers.

## **CHAPTER 4**

### **CONCLUSION**

Road are one of the important structure that withstand load and distribute the load into the soil. In this project of “Kerja-kerja Senggara Jalan Negeri Kg. Gantuk, Mentakab Daerah Temerloh Pahang Darul Makmur” used method which are easy to construct and commonly used in road construction in Malaysia.

The method of road maintenance is explained in detail in this report. An organized process of road maintenance works also play a big role in making sure all the works are following the required standards and to increase productivity and efficiency at the site. This could avoid any unnecessary delay of work as time is a very critical factor in every road maintenance works. It is clear that process of road maintenance works is particularly important before and after. An individual who has a great awareness and precision in making a decision is needed to produce great results for any project. Knowledge and experience are also important in order to archive the work progress without any defects and issues that arise also can be resolved immediately without any delays.

Lastly, road maintenance works will never achieve what they're hoping for if there is no cooperation from all parties involved that can disturb the process. There is a still a lot of space for improvements in road maintenance works, but with great supervision and great people who know how to manage a works will surely produce great results in the end.



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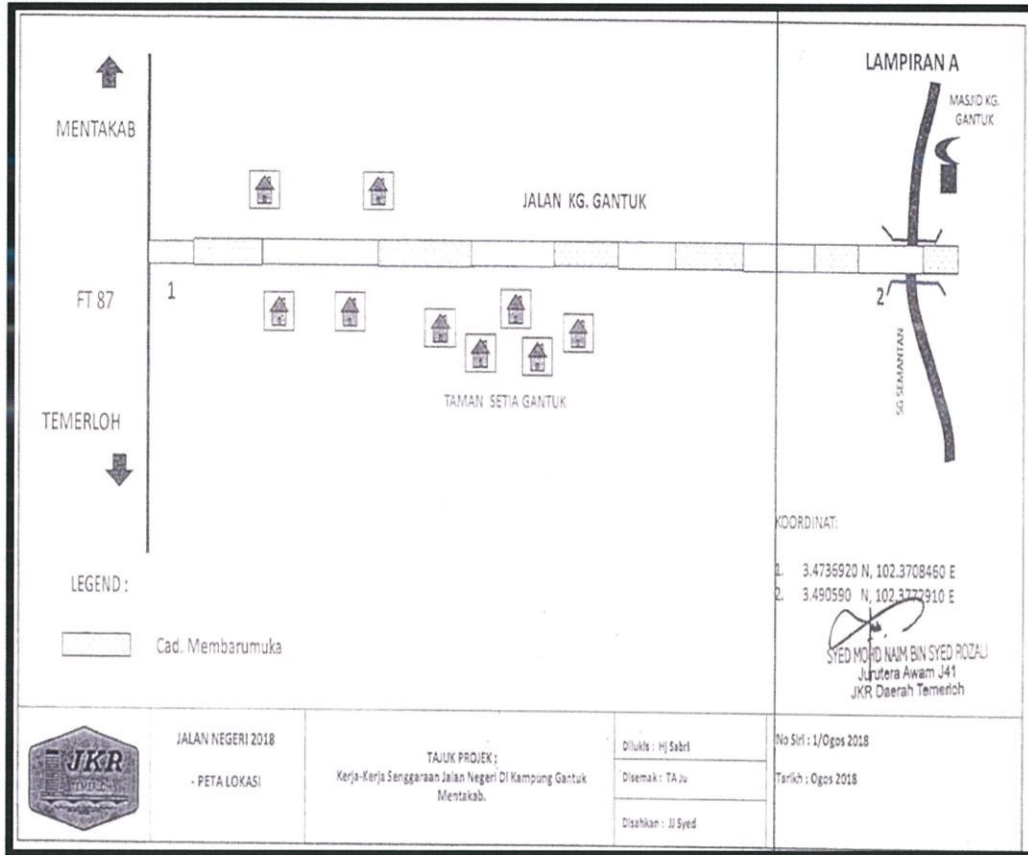
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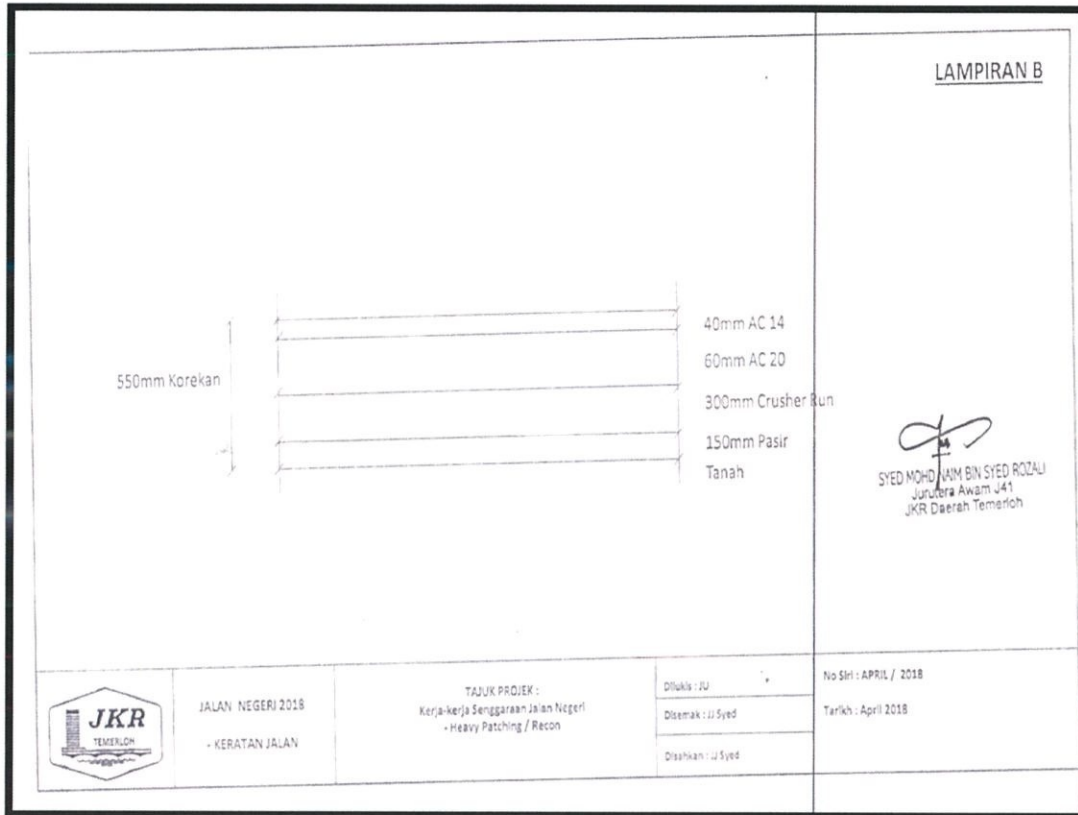
# APPENDIX

## Appendix A: The drawing plan of road construction and maintenance



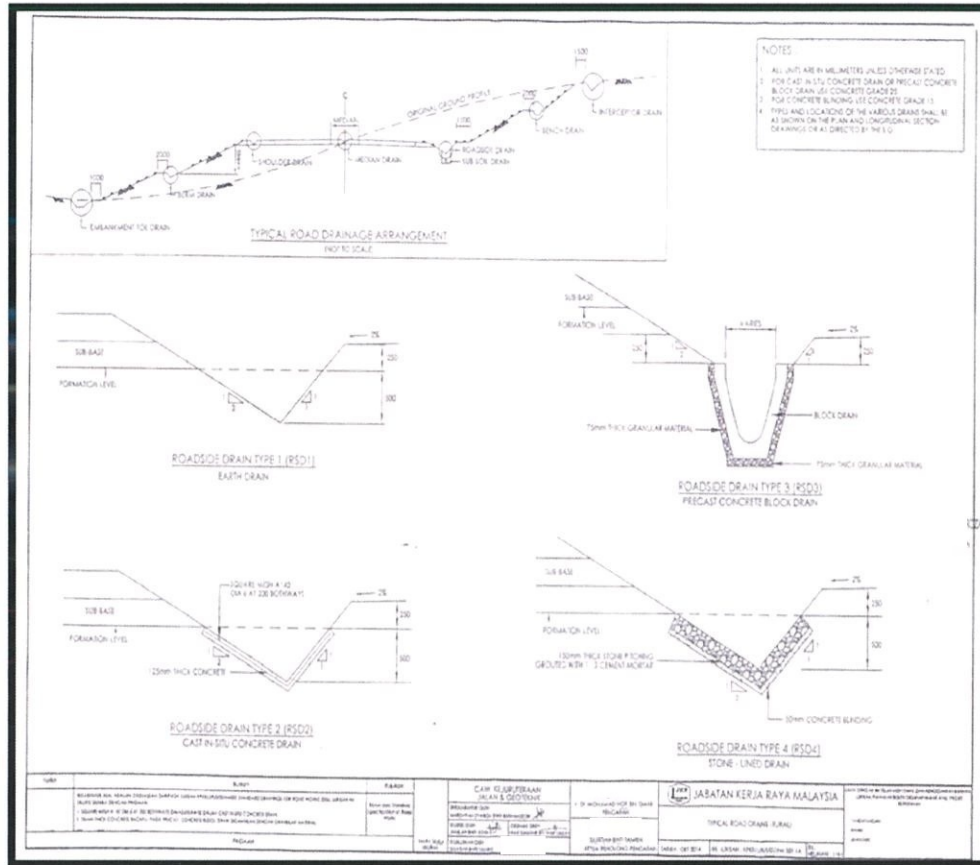
Source: JKR Temerloh (2018)

**Appendix B: The cross section drawing plan of road**



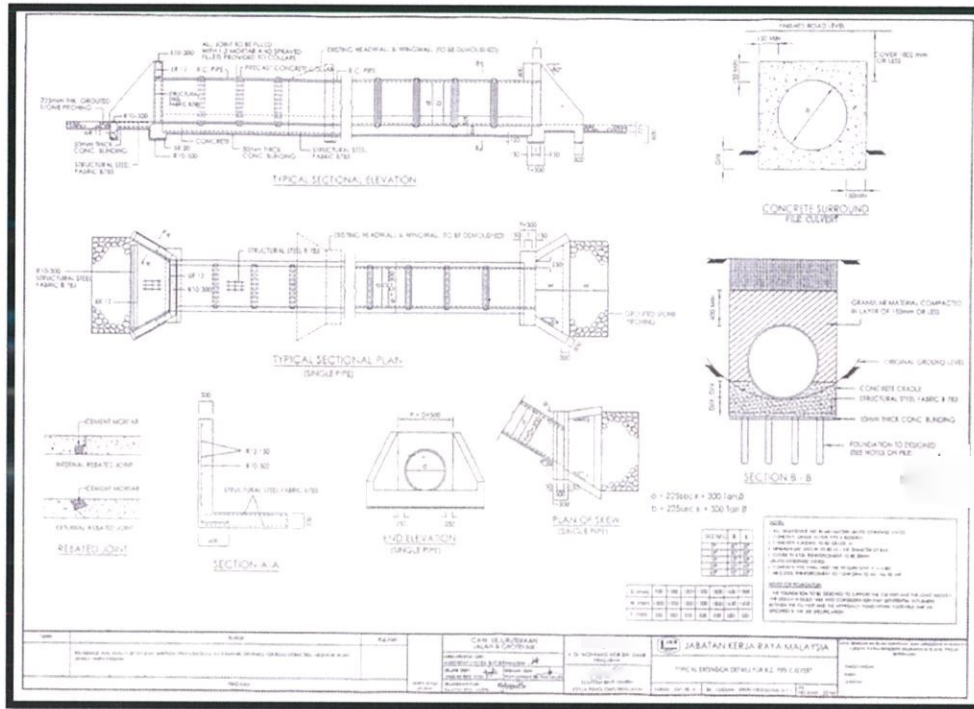
Source: JKR Temerloh (2018)

## Appendix C: The cross section drawing plan of drain



Source: JKR Temerloh (2018)

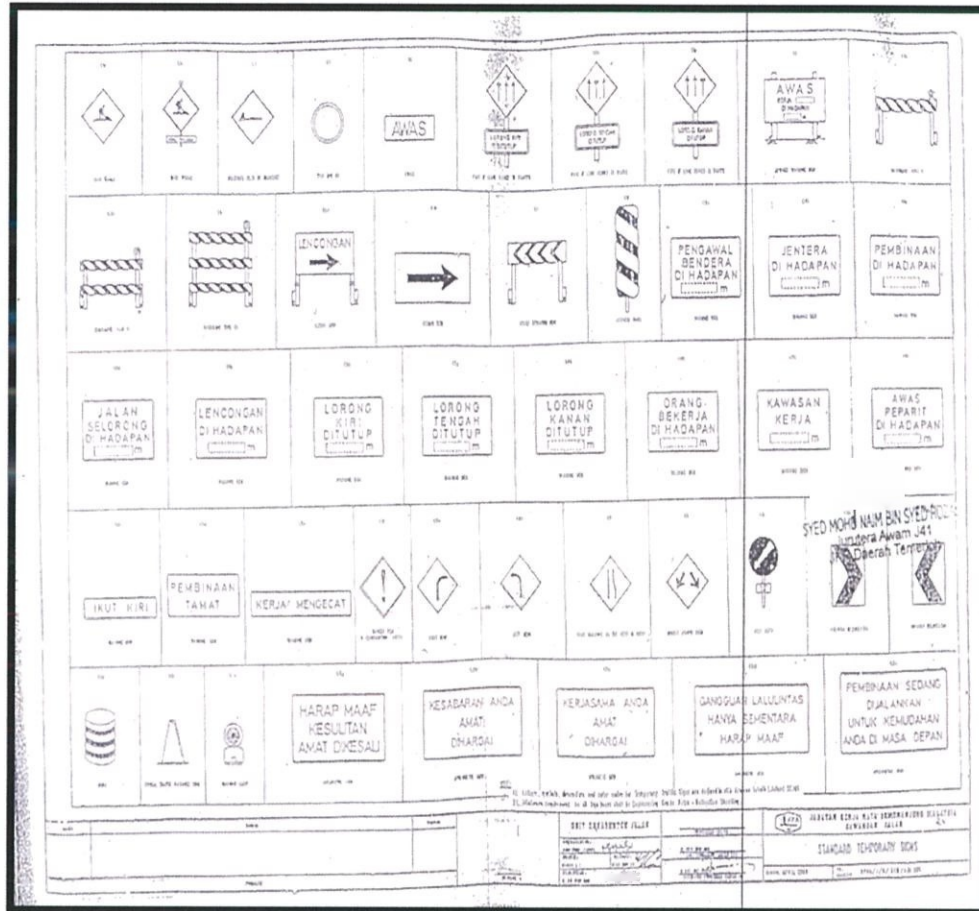
## Appendix D: The cross section drawing plan of culvert



Source: JKR Temerloh (2018)



## Appendix E: Standard temporary signs



Source: JKR Temerloh (2018)

## Appendix F: The additional specification of works

LAMPIRAN 'C'	
<b>NOMBOR SEBUTHARGA :</b> / / 2018	
<b>SEBUTHARGA :-</b>	
<b>KERJA-KERJA SENGARAAN JALAN NEGERI KAMPUNG GANTOK MENTAKAB ( LOCALISED ) DAERAH TEMERLOH, PAHANG DARUL MAKMUR</b>	
<b><u>SPESIFIKASI TAMBAHAN</u></b>	
1	Semua peralatan seperti mesin dan jentera perlu cukup di tapak semasa kerja dijalankan termasuk menyediakan papan tanda amaran, papan tanda lalulintas dan pengawal lalulintas.
2	Sebelum pihak kontraktor melaksanakan kerja - kerja " Patching ", lokasi untuk kerja - kerja " Patching " ditentukan terlebih dahulu oleh Pegawai Penguasa atau Wakilnya di tapak.
3	Pihak kontraktor terlebih dahulu perlu mengorek dan membuang premix sediaada keluar dari tapak. Kontraktor juga perlu membersihkan kawasan dan semak samun untuk menyediakan permukaan asas jalan
4	Selepas kerja pengorekan, Crusher Run tersebut perlu dirata dan dipadatkan dengan jentera pengelek 25 tons ke atas dan barulah pihak kontraktor boleh meletak, merata Crusher Run yang baru setebal 230mm.
5	Pihak kontraktor perlu menghampar Crusher Run dalam dua lapisan, lapisan pertama adalah 115mm dipadatkan dengan menggunakan jentera pengelek 25 ton ke atas dan lapisan kedua setebal 115mm, perlu disiram dengan air, menggaruk, merata dan memadat sehingga mencapai 95% kepadatan. Sekiranya permukaan Crusher Run tersebut longgar, kontraktor perlu menabur dengan habuk ( dust ) dan dipadatkan sehingga kemas. Kerja - kerja Crusher Run perlu mengikut spesifikasi JKR/SPJ/1998 bil 4.1.4 serta mengikut arahan Pegawai Penguasa atau wakilnya.
6	Sebelum menyiram Prime Coat SS 1K keatas permukaan Crusher Run, Crusher Run tersebut perlu dibersihkan dengan menggunakan power broom sehingga debu - debu hilang sepenuhnya dan barulah pihak kontraktor dibenarkan menyiram Prime Coat dan dibiarkan setting selama 12 jam atau satu hari dalam keadaan cuaca panas.
7	Semua primex yang dihantar ke tapak mesti mengikut spesifikasi JKR/ SPJ/ 2008 yang berkaitan.
8	Suhu premix yang dihantar dan sampai ketapak adalah di antara 120 C hingga 140 C
9	Untuk setiap lapisan, pemadatan dengan mesin pengelek hendaklah dimulakan sebaik sahaja bahan dihampar boleh menampung beban pengelek tanpa sebarang anjakan. Sebagai panduan, suhu semasa gelean biasanya antara 125 C hingga 135 C dan mestilah tidak kurang dari 120 C seperti yang dinyatakan dalam klausa 4.3.3.5 (i) JKR/SPJ ( tingkatkan suhu ke 10 C bagi bitumen gred 60 - 70 ). Gelekan hendaklah dihentikan sebaik sahaja suhu premix mencecah 80 C
10	Gelekan awal hendaklah dijalankan dengan menggunakan pengelek roda keluli dan diikuti gelean menggunakan pengelek tayar pneumatik ( tayar getah ). Akhir sekali proses pemadatan disudahkan dengan menggunakan pengelek roda keluli. Mesin pengelek bergetar TIDAK sepatutnya digunakan sekiranya ketebalan lapisan kurang dari 37.5 mm
11	Semua mesin pengelek perlu beroperasi dalam arah memanjang dengan roda pemacu menghala ke arah mesin penurap. Gelekan perlu dimulakan di bahagian yang lebih rendah dan dijalankan beransur-ansur hingga ke bahagian tepi selebihnya kecuali sekiranya ada sambungan yang sepatutnya perlu digelek dahulu.
12	Semua ujian - ujian adalah diwajibkan dan sekiranya keputusan ujian didapati gagal dan tidak mengikut kehendak spesifikasi maka ujian semula atau tambahan perlu dibuat semula dan kos ditanggung oleh pihak kontraktor

Source: JKR Temerloh (2018)

## Appendix G: The additional specification of works

<u>SPESIFIKASI TAMBAHAN (SAMBUNGAN...)</u>	
13	Bahan - bahan yang dibekalkan adalah berkualiti dan mengikut spesifikasi JKR/ SPJ/2008 yang berkaitan, Pegawai Penguasa atau wakil tapak JKR boleh menolak bahan - bahan tersebut jika tidak menepati Spesifikasi JKR dan segala kos yang ditanggung oleh kontraktor. Semua bil - bil akan direkod dan disemak oleh Pegawai Penguasa atau wakilnya ditapak untuk mengetahui kuantiti yang sebenarnya ditapak, dan sekiranya kuantiti itu kurang daripada yang sepatutnya ia digunakan, maka Pegawai Penguasa atau wakilnya akan memotong bayaran ke atas sebutarga tersebut.
14	Ujian kepadatan (Sand Replacement Method) akan dibuat ditapak untuk menentukan kepadatan sebenar ditapak.
15	Kontraktor dikehendaki menyediakan papantanda lalulintas dan papantanda amaran mengikut saiz Arahan Teknik Jalan termasuk pengawal lalulintas semasa kerja sedang dilaksanakan
16	Semua tanah korekan semasa menjalankan kerja "patching" hendaklah dibuang keluar seperti yang diarahkan oleh Pegawai Penguasa atau wakilnya.
17	Kontraktor bertanggungjawab sepenuhnya sekiranya kerja-kerja tersebut melibatkan utiliti seperti PAIP, TNB, TM dan sebagainya.
18	<b><u>Kerja-Kerja Pembinaan Longkang &amp; Pemetung</u></b>  Bahan yang digunakan mestilah mengikut gred dan spesifikasi yang dipersetujui oleh Pegawai Penguasa / wakilnya.  Ujian "slump 'dan Ujian Kiub perlu dibuat dan keputusan yang dicapai perlulah sepertimana yang ditetapkan kepada gred konkrit  Kerja-kerja korekan longkang perlulah mengikut Standard Of Procedure ( SOP ) yang betul dengan meletakkan Traffic Management Plan ( TMP ) yang betul mengikut spesifikasi yang telah ditetapkan Bahan korekan perlu dibuang keluar dari tapak atau tempat yang diluluskan oleh Pegawai Penguasa ( PP ) atau wakilnya.  Kaki jentera pengorek ( Con : backhoe perlu dilapik jika sekiranya diletakkan di atas pavement.
19	<b><u>Siap Kerja</u></b>  Pihak kontraktor dikehendaki membersihkan tapak kerja dengan sempurna. Segala bahan berlebihan dan lain - lain bahan / kekotoran yang dihasilkan semasa kerja-kerja pembinaan hendaklah dibersihkan dan dibawa keluar dari tapak yang diluluskan oleh Pegawai Penguasa atau wakilnya.

Source: JKR Temerloh (2018)