



**KERAJAAN MALAYSIA
JABATAN KERJA RAYA MALAYSIA
STANDARD SPECIFICATION
FOR ROAD WORKS**

Section 1: General



KETUA PENGARAH KERJA RAYA
JABATAN KERJA RAYA MALAYSIA
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FOREWORD

As practices in road construction change over time, it is imperative for Jabatan Kerja Raya (JKR) to continuously update and improve their standard specifications. These new specifications are not only aimed at keeping abreast with current technologies but also to help improve the quality of construction works and its final product. Consequently, these new specifications will ultimately have a significant positive impact on the construction industry especially with the incorporation of new products and technologies.

The JKR Standard Specification for Road Works is an essential component in the road infrastructure construction industry. This Specification provides an improved guidance in the material selection and quality control of workmanship and products, based on current best practices. The purpose of the JKR Standard Specification is to establish uniformity in road construction to be used by road designers, road authorities, manufacturers and suppliers of road related products.

This particular document, the “**Standard Specification for Road Works – Section 1: General**”, is a part of a series of improved specifications in the JKR Standard Specification for Road Works. The compilation of this document was carried out through many discussions that had been held by the technical committee. The draft had also been presented and discussed at length in a specially held workshop to get feedback and comments from relevant parties involved, which were then carefully considered and incorporated into the Specification wherever appropriate or necessary.

The Specification has also gone through the different phases of vetting and approval before the production of its final draft and printed copy. It will be reviewed and updated from time to time to cater for any changes in policies and the inclusion of current requirements, if necessary. Any feedback or improvement to be considered for future revisions should be forwarded to Bahagian Pembangunan Inovasi & Standard, Cawangan Jalan, JKR Malaysia.

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This “**Standard Specification for Road Works - Section 1: General** “ has been prepared by a technical committee comprising of the following members ;

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SECTION 1 – GENERAL

1.1 GENERAL DESCRIPTION OF THE PROJECT

The general description of the project is as given in **Appendix 1A - (General Description of Project)**.

1.2 SCOPE OF WORKS

The Works covered in this Contract comprise the provision by the Contractor at his own risk and cost of all materials, tools, plants, labour, transport and everything else necessary for the construction and completion of the Works as given in **Appendix 1B - (Scope of Works)**, all to the approval of the S.O.

The Standard Form of Contract (PWD Form 203/203A) shall be read in conjunction with this Specification. A copy of the Standard Form of Contract is available for inspection in the Tender Table Document on any working day up to the time the tender closes. If the tenderer considers that any of the clauses of the Contract involves expenses, it shall be deemed to have been priced in his Tender.

1.3 NOTES, ABBREVIATIONS AND UNITS OF MEASUREMENT

1.3.1 Notes

Any clause in this Specification which relates to work or materials not included in the Works shall be deemed not applicable.

Unless stated to the contrary, any dimension of material described means the finished or fully compacted dimension.

The requirements for tolerance where necessary are incorporated in the specification notes shown on the Drawings and by references to the relevant Malaysian Standard, British Standard, Eurocode and/or other equivalent international standard approved by the S.O.

All Standards and Codes of Practice referred to in this Specification together with any addenda issued shall be deemed to be the current editions at the time of Tender. If the Malaysian Standard (MS) exists, which is equivalent to other standards specified, then the Malaysian Standard shall prevail.

In the event of any discrepancy between the provisions of this Specification and the provisions within the relevant Standards or Codes of Practice as mentioned in this Specification, then the provision of this Specification shall take precedence.

The terms 'Engineer', 'Superintending Officer' and 'Project Director' shall be synonymous.

Unless specifically defined otherwise, the definition of terms used in this Specification are those stated in the BS 6100 Glossary of Building and Civil Engineering Terms. All abbreviations in this Specification is in accordance with the recommendations given in BS 5775.

1.3.2 Abbreviations

M.S	Malaysian Standards published by the Scientific and Industrial Research Institute of Malaysia (SIRIM).
B.S	British Standards published by the British Standard Institution
A.A.S.H.T.O	The American Association of State Highway and Transportation Officials
A.S.T.M.	The American Society for Testing and Materials
M.D.D.	Maximum Dry Density
O.M.C.	Optimum Moisture Content
C.B.R.	California Bearing Ratio
S.O.	Superintending Officer
B.Q.	Bill of Quantities
R.O.W.	Right Of Way
P. Eng.	Professional Engineer
S.O.R.	Superintending Officer Representative
CIDB	Construction Industry Development Board
DOE	Department of Environment
DOSH	Department of Occupational Safety and Health
EMP	Environmental Management Plan
JKR	Jabatan Kerja Raya
JPS	Jabatan Pengairan dan Saliran
MASMA	Manual Saliran Mesra Alam
DSM	Department of Standards Malaysia
BS EN	British Standard Euro Norm
SPB	Sistem Pengurusan Bersepadu

1.3.3 Units of Measurement

All units of measurement used in this Specification and in the Bill of Quantities shall be in accordance with the metric system unless stated otherwise.

1.4 PROGRAMME OF WORKS

Within fourteen (14) days from the receipt of the Letter of Acceptance of Tender, the Contractor shall submit to the S.O. for approval a detailed works programme using the Critical Path Method (CPM) as per **Appendix 1G – (Programme Using Critical Path Method (CPM))**, showing his proposals and the periods for carrying out the various sections of the Works in order to complete the whole works within the specified completion time. The proposal shall be supported by schedule of construction plant, resources mobilization schedule, such as estimated work production rates and manpower mobilization plan for the various sections/activities of the Works. The approved CPM shall be submitted in both hard copies and soft copies as required by the S.O.

If at any time should it appear to the S.O. that the actual progress of the Works does not conform to the approved programme referred therein, the S.O. shall instruct the Contractor to submit a revised works programme for his approval, showing the revised programme and additional resources necessary to ensure that the whole of the Works can be completed within the stipulated time for completion.

The Contractor shall employ trained and qualified planner/scheduler for this purpose. Where required elsewhere in the Contract Documents, the Contractor shall provide the original programme software and appropriate training for the proper operation of the CPM programme in monitoring the physical progress of the Works.

1.4.1 Method Statements

The Contractor shall also furnish in writing to the S.O., particulars of the Contractor's method statements for carrying out such works and of the construction plant and temporary works if any, which the Contractor intends to supply, use or construct as the case may be.

The submission to and approval by the S.O. of such programme or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities under the Contract. For the purpose of monitoring the work progress effectively, the Contractor shall carry out regular progress tracking against the planned progress.

1.5 LIMITATION OF SITE

The Contractor shall ensure that all his plants, materials, temporary workshops, stores and offices are kept within the Site at locations approved by the S.O.

Any approval given by the S.O. for the location of his temporary workshops, stores and offices shall not absolve the Contractor from his responsibility to ensure that the same will not affect the progress of works. Notwithstanding the above, should such land being used by the Contractor for temporary workshops,

stores for materials, offices, etc. are required to be relocated, the Contractor shall clear the site and re-erect his offices, stores, temporary workshops etc. elsewhere immediately.

Should the Contractor require land outside the site for his work yard, stores, offices, temporary haul roads or any other temporary structures, he shall on his own, purchase or rent any land area he may require. Area or areas to be rendered as part of the Site shall be subject to the S.O.'s approval.

The Contractor shall obtain written approval prior to removal of plants, materials, temporary workshops, stores and offices from the Works site.

1.6 SUPPLY OF MATERIALS

Goods, Materials and Workmanship

Materials and workmanship throughout the Works shall be in accordance with the Drawings and Specifications and to the approval of the S.O.

Only if necessary, and under unavoidable circumstances, any alternative to the goods or materials specified may be considered for acceptance provided that they comply in all respect with regards to appearance, quality and performance, and shall be approved by the S.O. subject to the provision relating to Variations in the Conditions of Contract.

1.6.1 Supply of Materials by Contractor

The Contractor shall submit samples of materials or execute samples of workmanship for the S.O. approval, and for further sampling as may be required, until the sample submitted or work executed are in accordance with the Specification. Samples, after approval, shall indicate the standard of materials and workmanship to be maintained in the execution of the Works.

If, however, the Contractor has shown beyond reasonable doubt that the specified goods or materials cannot be obtained and the S.O. is satisfied with regards to its non-availability, the benefit of cost savings, if any, resulting from the Contractor's proposal for the alternative goods or materials as approved by the S.O., shall be deducted from the Contract Sum.

1.6.2 Supply of Materials by Government

If the Contractor fails for any reason to supply any materials or goods, which he has contracted to supply, or if he fails to supply any such materials in sufficient time to enable the Contract to be completed by the agreed date for completion, the Government may supply any portion, or all of such materials.

If the Government supplies such material or goods, the cost in respect thereof to be borne by the Contractor shall be either the current market

rates or the actual cost to the Government, whichever is greater, plus 5% on-cost charges.

The cost to be borne by the Contractor, as detailed above, shall be deducted from any monies due or to become due to the Contractor under this Contract and failing which, such costs shall be recovered from the Performance Bond or as a debt due from the Contractor.

No action by the S.O. under this clause shall be deemed in any way to affect or modify the right of the Government to claim for damages in the event of the Contractor's failure to complete the Works by the agreed date of completion.

1.7 USE OF LOCAL MATERIALS

The Contractor shall use locally manufactured materials and goods as listed in the 'Senarai Bahan/ Barangan Binaan Buatan Tempatan' issued by **IKRAM QA Services Sdn. Bhd.** and/ or 'Senarai Bahan/ Barangan Buatan Tempatan' issued by **SIRIM QA Services Sdn. Bhd.**, whichever is relevant. If the Contractor fails to comply with this requirement, such materials supplied shall be rejected.

The locally manufactured materials and goods which are not listed aforesaid may be permitted if the materials have been tested and certified by IKRAM QA Services Sdn.Bhd. or SIRIM QA Services Sdn.Bhd., whichever is applicable. If the testing cannot be carried out by IKRAM QA Services Sdn.Bhd or SIRIM QA Services Sdn.Bhd., the Contractor may apply for the goods and materials to be tested by other agencies as approved by the S.O.

The Contractor shall place his orders for specified materials at the earliest possible date after notification of acceptance of tender or at such times as may be specifically stated for any particular material.

Under no circumstances will the Contractor be permitted to incorporate or supply imported materials, plants, equipment, or other goods into the Works or forming part of the Scope of Works except those approved by the Government, prior to the execution of the Contract. The Contractor shall substitute any materials, plants, equipment, or other goods proposed to be imported but not approved by the Government, with suitable local materials, plants, equipment, or other goods, including making any necessary subsequential changes or adjustments to the design of the Works to accommodate such substitution, all to the concurrence of the S.O.

The Contractor shall ensure that the procurement of approved imported materials, plant, equipment, or other goods are obtained directly from the country of origin based on Free-On-Board (F.O.B) or other similar basis. The transportation and insurance of such imported materials, plants, equipment, or other goods from the country of origin to the Site shall be arranged by the Contractor through approved **Government's Multi Modal Transport Operators (MTO)**. The Contractor shall

allow in his tender all costs and time required in complying with the requirements of this clause including the cost required for the services provided by the MTO.

The Contractor shall submit documentary evidence of compliance with this clause to the S.O within one (1) month from the date of each delivery to the Site of such materials, plant, equipment, vehicles or other goods.

1.8 SETTING OUT

Before commencing the Works at any location, the Contractor shall provide and install precast concrete reference beacons on both sides of the road centre-line at a spacing of 250 metres. The beacons shall be firmly sited at right angles to the center-line at a distance from the centre line of 15metres or such other distance as directed by the S.O. The beacons shall be not less than 75 mm square in plan and shall project at least 600mm above the surrounding ground. Each beacon shall be clearly marked with its chainage and elevation above datum. The Contractor shall take all practicable steps to safeguard the beacons and shall immediately replace any damaged beacons. The Contractor shall give the S.O. not less than 24 hours' notice of his intention to set out or give levels for any part of the Works in order that arrangements may be made for checking.

All temporary bench marks, reference markers, levels and coordinates as shown in Drawings shall be checked on the Site by the Contractor at his own expense and agreed upon by the S.O. prior to the commencement of clearing works.

The Contractor shall carry out the setting out of coordinates and levels for such control points as shown in the Drawings, as the established reference markers and bench marks. These may be distributed during the progress of the Works. The Contractor shall also carry out regular checks to ensure their accuracy.

To ensure a continuous and proper execution of the Works, the Contractor shall provide a Licensed Surveyor to carry out these survey works and the cost of this provision shall be deemed to have been included in the Contract price.

The Contractor shall provide all instruments and attendants required by the S.O. for checking the Works. Notwithstanding the provision, the Contractor shall not be relieved of his responsibility for the accuracy of the setting out of coordinates and levels. The Contractor shall remedy, at his own cost, any works wrongly constructed as a result of incorrect setting out, levels or coordinates.

1.9 DIMENSIONS, LEVELS AND COORDINATES

All temporary benchmarks, reference markers, dimensions, levels and coordinates as shown in the Drawings shall be checked on the Site by the Contractor at his own expense and to be confirmed by the S.O.

Before commencement of the Works or any part thereof, the S.O. and the Contractor shall, by means of a joint survey, carry out the original ground level survey to verify the levels of the existing ground surface within areas where earthworks are to be performed and bed levels of water courses. These may differ

from the locations and levels shown on the Drawings, owing to changes which could have taken place during the interval between the original survey and construction.

The levels, dimensions and coordinates taken by the Contractor jointly with the S.O. shall form the basis of measurement for the relevant work quantities.

1.10 PROTECTION OF WORKS

From the commencement of the Works to the date the Works are taken over by the Government, the Contractor shall be fully responsible for the care of the Works including all temporary works. In the event of any damage or loss to the Works and any part thereof or to any temporary works, the Contractor shall, at his own cost, repair and make good the same so that upon completion, the Works shall be in good order and in conformity with the requirements of the Contract. The Contractor shall also be liable for any damage to the Works caused by him in the course of any remedial works carried out during the Defects Liability Period.

1.10.1 Bridge Loading Restriction During Construction

The Contractor shall note that the bridge has been designed according to the loading laid down in the General Layout Drawings. At the time during construction, the Contractor is to ensure that the bridge is not overloaded such that the prestressed beams have tensile stresses at their soffits or in-situ deck slab is loaded before having attained sufficient strength.

1.11 DESIGN OF TEMPORARY WORKS BY THE CONTRACTOR

Unless otherwise provided in the Contract, the Contractor shall submit to the S.O. for his approval, working or shop drawings produced by him and endorsed by a P. Eng., including all drawings made by his approved sub-contractors/suppliers before commencement of the temporary works. Notwithstanding the approval by the S.O., the Contractor is solely responsible for the adequacy and safety of his temporary works and for any necessary modification or addition whenever found necessary by the S.O.

1.12 CONTRACTOR'S SUPERINTENDENCE

The Contractor shall submit to the S.O. an Organization Chart showing all his employees involved in the superintendence of the Works for approval and provide the same during the execution of the Works and for as long thereafter as the S.O. may consider necessary for the proper fulfillment of the Contractor's obligations under the Contract.

A competent Site Agent, whose appointment shall be approved by the S.O., shall be employed by the Contractor for management on Site. The Site Agent shall have the authority to receive instructions from the S.O. and to act on behalf of the

Contractor. The Site Agent shall be stationed on Site for the whole duration of the Contract and shall not be replaced without the approval of the S.O.

If the Site Agent needs to be absent from the Site, the Contractor shall appoint another temporary site agent and notify the S.O. accordingly.

1.13 INSPECTION AND TESTS

The S.O. may, at any stage of the Works, carry out inspection, measurement and tests on any part of the Works to ensure compliance with the requirements of this Specification and of the Drawings. The Contractor shall provide the necessary attendance whenever required by the S.O. or his representative.

Notwithstanding any tests which may have been carried out, the S.O. shall be empowered to order further tests of any materials or goods to be made on the site and to reject such materials or goods should they fail to pass such tests on site.

The Contractor shall submit periodically and, when required, a copy of the result of any quality control test carried out by the Contractor on his own accord during the progress of the Works.

Where independent sampling and testing is required by the S.O., the Contractor shall grant the use of laboratory facilities, equipments, instruments and free access to mixing plants and storage depots, supply materials and provide all facilities for the S.O. or his representative to sample and carry out tests as instructed.

1.14 COVERING UP OF WORK

Before any part of the Works is permanently covered up, the Contractor shall give due notice to the S.O. for the inspection and measurement of dimensions and/or confirmation of levels. The S.O. shall attend without unreasonable delay for the purpose of examination and measurement unless he considers it unnecessary and advises the Contractor accordingly.

1.15 OFFICE ACCOMMODATION FOR S.O. AND HIS STAFF

The Contractor shall provide and maintain a site office for the use of the S.O. and his supervisory staff, all in accordance with the relevant Drawings, inclusive of all fittings and furniture as in **Appendix 1F – (Fittings and Furniture for S.O.'s Offices)** and **Appendix 1E - (Equipment and Facilities)** of this Specification. The Contractor shall provide/supply the land, free of all charges and encumbrances for the construction of the S.O. office(s).

In the event that the Contractor is unable to provide a site office of the JKR design type as shown in the relevant drawings, for the use of the S.O. and his supervisory

staff, then, subject to the S.O.'s approval, the Contractor shall propose an alternative site office as follows, i.e. either:

- i) Relocatable site office of equivalent floor area and standard not inferior to the JKR design type and equipped with similar furniture, fittings and equipment. Where a relocatable site office is to be provided, the Contractor shall submit details of the relocatable site office, which shall include floor area and layout, list of furniture, fittings, and brochures if available. The Contractor shall provide a new relocatable office, the quality of which is equivalent but not inferior to the JKR design type, and to be approved by the S.O., or
- ii) Rented shop lot, office space of equivalent floor area and standard not inferior to the JKR design type and equipped with similar furniture, fittings and equipment. Where a rented shop lot site office is to be provided, the Contractor shall submit details of the shop lot which shall include the layout and a list of furniture and fittings to be provided, to the S.O. for approval.

Unless otherwise shown on the Drawings, the location and construction of the site office as proposed by the Contractor shall be approved by the S.O., with the condition that in the event if there arises any necessity for relocation in the future, the Contractor shall do so immediately.

The Contractor shall make proper arrangements for, and pay, all charges in connection with conservancy. The site office shall comply with local Building By-laws. Within two (2) weeks of the acceptance of his tender, the Contractor shall submit full details of his proposed layout and construction for the offices, including surface drainage and other related works, to the S.O. for approval. All offices shall be erected or provided by the Contractor, fully furnished as specified and ready for occupation within four (4) weeks from the date of possession of Site.

Where electricity and piped water are available from public utility authorities, the Contractor shall arrange for the site office to be connected to the electrical and water supplies. Otherwise, the Contractor shall supply the site office with electric power from generator set(s) and shall provide adequate supply of water from an approved alternative source for in-house use including washing and potable filtered water for drinking purpose. Sanitary facilities with disposal to septic tanks located not nearer than 5m from the building shall be provided to the approval of the S.O. and the appropriate Authority.

All offices shall be illuminated by fluorescent fittings giving a general level of illumination of at least 215 lumens/sq.m. Additional lightings shall be provided where required by the S.O. Air-conditioners capable of maintaining a temperature below 23° Celsius in the office shall be provided.

The Contractor shall arrange for the installation of two (2) permanent telephone lines including provision of internet access or, as per preliminary requirement in the BQ for the exclusive use of the S.O. at all times. The Contractor shall be responsible for the payment of the purchase/rental of the telephone and internet services provided including pay all call charges and disconnection.

Where a telephone exchange is not within practical distance, an automatic mobile telephone such as the ATUR (Automatic Telephone Using Radio) or other alternative provider's service shall be made available.

Suitable external lighting shall be provided at the entrance to all buildings and in the parking areas. Adequate provisions for fire prevention as per **Fire & Rescue Department Of Malaysia** guideline shall be provided.

The Contractor shall construct suitable entry and exit roads from the nearest public road to the site office and shall provide a covered hard standing parking area in addition to that indicated in the JKR site office drawing for the exclusive use of the S.O. vehicles with additional allowance for parking bays.

All offices and laboratory shall be surrounded by a chain link security fence 1800mm high and steel gates with locks provided at entry and exit points where applicable.

The Contractor shall keep the offices accessible at all times, maintained in good condition and habitable for working purposes for as long as they are in use. All offices shall be properly cleaned each day and arrangements shall be made for the proper disposal of all waste material. The Contractor shall also provide such labour and cleaning materials as required in order to maintain the office in a thoroughly clean condition.

One full-time attendant shall be provided at the office compound whose services shall be available during normal working hours and outside of normal working hours if so required by the S.O.

The Contractor shall provide adequate first aid facilities throughout the duration of Contract for the offices and laboratory.

The Contractor shall provide, install and maintain throughout the Contract Period and six (6) months after the date of the Certificate of Practical Completion or, on closing of the Final Account as directed by the S.O, all the furniture, fittings, equipment and consumables as described in the **Appendix 1F- (Fittings and Furniture for S.O.'s Office)** and **Appendix 1E - (Equipment and Facilities)** of this Specification, all for the exclusive use of the S.O. and his representatives.

In the event of failure on the Contractor to provide or maintain any equipment or facilities as per requirement, the Government shall have the right to procure or maintain them from other sources, all expenses arising therefrom shall be borne by the Contractor and an appropriate adjustment be made to the Contract Sum.

Safety facilities to be provided for the use of the S.O and his supervisory staff and to comply with DOSH requirements should include safety boots, safety helmets, safety harness and life lines, protective gloves, safety goggles and safety jackets of the reflective type.

On completion of the Works, the Contractor shall further maintain the site office including its contents, access roads and hard standings as listed in the Contract throughout the contract period until six (6) months after the date of the Certificate

of Practical Completion (CPC) or, on closing of the Final Account as directed by the S.O.

The Contractor shall then dismantle and remove from site, the site office with all furniture, fittings and equipment which shall become the property of the Contractor and reinstate the site to the satisfaction of the S.O., or as directed by the S.O.

1.16 TRANSPORT SERVICES FOR THE S.O. AND HIS STAFF

The Contractor shall, within two (2) weeks of the date of site possession and on approval of the S.O, provide suitable transportation service by means of vehicle as listed in the B.Q. and stipulated in **Appendix 1C - (Transport Services for the S.O. and His Staff)**.

The Contractor shall provide comprehensive insurances including cover for all drivers and passengers, for the purpose of site supervision and transport and shall ensure that road tax is valid throughout the Contract period. All costs incurred and pertaining to the vehicle(s) transportation service, inclusive of the operating and maintenance costs shall be borne by the Contractor.

The Contractor shall ensure that the vehicle(s) is/are in a good and well-maintained condition subject to certification from **PUSPAKOM** at every six (6) months interval. The Contractor shall provide the vehicle(s) throughout the Contract Period until six (6) months after the date of the Certificate of Practical Completion or, on closing of the Final Account as directed by the S.O.

1.16.1 Arrangement for Transport and Failure to Provide Transport

The Contractor shall notify the S.O or S.O.R. should there be any delay in the delivery of vehicle(s). If the Contractor fails to provide the required transport, the Contractor shall arrange for an equivalent alternative vehicle(s). The Contractor shall bear all necessary expenses and an appropriate adjustment shall be made accordingly in the event an equivalent vehicle(s) cannot be provided.

1.17 CONTRACTOR'S OFFICE AND ACCOMMODATION

The Contractor shall provide and maintain a suitable office for himself and his staff at a location (s) in a position or positions to be approved by the S.O.

The Contractor shall submit full details of his proposed layout to the S.O. for approval and finish construction for the site office(s), plant yards and workshops in the shortest possible time after the date of possession of site or as directed and approved by the S.O.

In addition, the Contractor shall provide and maintain temporary accommodation, stores, workshops, etc., including all necessary facilities and services for water supply, drainage, sanitation and lighting for his staff. Before any works can commence the Contractor shall submit to the S.O., details of the proposed

buildings and services and shall obtain the S.O.'s approval together with any other necessary approvals in writing from the relevant Authorities.

The Contractor shall be responsible for all fees and other charges or expenses incurred in connection with such office and housing and shall keep the whole area in a clean, tidy and well-maintained condition. The Contractor shall provide adequate first aid facilities appropriate to the size and composition of his staff and labour force.

The Contractor shall be responsible for controlling all persons under his employment and those employed by his sub-contractors at the work site and shall take all necessary precautions to prevent damage and nuisance of any kind and shall indemnify the Government against any claim arising therefrom.

When instructed by the S.O. upon completion of the project, the Contractor shall remove all such buildings and appurtenant works from the site, clean up the area and restore it to the satisfaction of the S.O.

1.18 MATERIAL TESTING LABORATORY AND STAFF

The Contractor shall provide land area free of all charges to the Government for the construction of testing laboratory. The Contractor shall provide and maintain a laboratory at the Site at the location of S.O. office throughout the duration of the Contract and shall be equipped with the necessary laboratory equipments only, i.e. equipments for all tests required to be carried out for the project. Details of equipment, if required and necessary, are as detailed in **Appendix 1D – (List of Laboratory Equipment)** of this Specification. The minimum floor area for the laboratory shall be 20'x60', or as stipulated in the latest site office drawings, whichever is bigger.

Alternatively, the Contractor can propose an accredited laboratory approved by **SIRIM**, for the approval of the S.O. All works subject to laboratory tests such as earthworks and concreting works, shall not be permitted to commence until the laboratory and all necessary equipment have been provided.

The said laboratory shall be constructed of durable weatherproof materials suitably treated and painted for weather resistance. Roofing shall be of approved suitable material which shall be leak-proof lapped. The roof shall overhang the verandah by at least 1m and the floors shall be raised a minimum of 150mm above the existing ground level. The laboratory shall be painted internally and externally, according to the colour scheme approved by the S.O. The false ceiling shall span the full length and width of the laboratory space to provide a headroom of 3m above floor level. The window area at the testing area of the laboratory shall be a minimum of 35% of the floor area. The Contractor shall submit full details of his proposed layout and construction of the laboratory, including surface drainage, and certified by a P.Eng., to the S.O. for approval and completion of its construction within three (3) weeks of the possession of Site.

The Contractor shall arrange for, provide and maintain water and electricity supplies to the laboratory. The Contractor shall be responsible throughout the Contract period to provide and maintain all such equipment and instruments deemed necessary only, for laboratory tests to be carried out for the project, details of which as listed in **Appendix 1D – (List of Laboratory Equipment)** of this Specification.

The Contractor shall also provide a lockable weatherproof storage shed, with a concrete floor, for the storage of soil samples and concrete cubes and cylinders adjacent to the laboratory.

Waste materials from the laboratory shall be disposed of by the Contractor who shall provide a tip area to be approved by the S.O., and shall clear the tip area at intervals as required.

The laboratory, is to be jointly used by the S.O. and the Contractor for this project only, to carry out any test(s) as required under the Contract or as instructed by the S.O. However, the Contractor shall provide suitable laboratory assistant / technician who shall carry out the necessary laboratory tests and shall be witnessed by the S.O.

On completion of the Works, all laboratory equipment shall become the property of the Contractor and the building including its contents, access roads and hard standing shall be removed from the Site, which shall then be restored to the satisfaction of the S.O.

1.19 PROVISION FOR SURVEY INSTRUMENTS, EQUIPMENTS AND PERSONNEL

The Contractor shall provide for the use of the S.O. and his staff all such instruments, equipment and survey personnel as the S.O. may require until six (6) months after the date of Certificate of Practical Completion or, on closing of the Final Account as directed by the S.O, so as to enable him to check and confirm the accuracy of measurements taken. The survey personnel shall have knowledge of Bahasa Malaysia or English and, as far as possible, the same men shall be provided and maintained throughout the Contract period.

The Contractors shall be responsible throughout the Contract period for all such instruments, equipment and personnel, and shall ensure that the instruments and equipment are at all times in good working condition and calibrated in accordance to the manufacturer's instruction. All instruments and equipment shall remain the property of the Contractor upon completion of the Works or on closing of the Final Account as directed by the S.O.

1.20 MAINTENANCE OF EXISTING ROADS AND PROTECTION OF TRAFFIC

1.20.1 Maintenance of Existing Roads, Bridges, Culverts, etc.

The Contractor shall maintain all sections of existing and access roads, bridges, drains and culverts included therein within the Site to the condition as existing at the time of possession of Site for the full duration of the Contract. Such maintenance shall include routine activities such as grass cutting, clearing of drains, patching of potholes, etc. He shall also be responsible for maintaining the free flow of traffic on these sections of existing road.

The Contractor shall arrange for the conveyance of materials and plants so as to cause minimum damage to existing roads and installations and the least inconvenience to the public. He shall not deposit any earth, rubbish or materials on any road, street, pavement or footway so as to cause hindrance or obstruction to vehicles or pedestrians.

The Contractor shall be responsible for any damage caused by any works carried out by him and his construction vehicles to any existing roads or installations and shall repair, maintain and reinstate the same to their original condition to the satisfaction of the S.O. The Contractor shall also keep such roads clear of slurry, boulders and loose earth which may be caused by construction vehicles during the transportation process.

Upon failure on the part of the Contractor to fulfill his obligations under this Section, the S.O. may take whatever action and means necessary to satisfy the requirements of the Contract, and all costs incurred by the S.O. shall be deducted from any amount of monies due or to become due to the Contractor under this Contract.

1.20.2 Temporary Diversions

Temporary diversions shall be constructed wherever the Site is intersected by existing roads, footpaths, cycle tracks, access to properties, etc.

Such diversions shall be of a standard of construction at least equivalent to that of the original road, path, track or access. They shall be constructed in advance of the closure of the existing passage and regularly maintained, for as long as required, in a satisfactory condition. On completion of the Works, the existing passages shall be reinstated to their original condition to the satisfaction of the S.O. At least fourteen (14) days notice in writing of any proposed temporary diversion of traffic shall be given to the S.O. for his approval.

Where access roads are to be permanently closed due to the construction of the permanent works, as shown on the Drawings, such closures shall not be effected until a specified permanent access has been provided and only with the written approval of the S.O.

The Contractor shall maintain reasonable access to all properties adjoining the Works where such access exists during construction, and shall ensure

that all the necessary fences, planking and gangways are adequately lit for public safety, to the satisfaction of the S.O.

Where the Contractor proposes to use existing local passageways as temporary diversions, he shall give at least fourteen (14) days notice in writing of his proposal to the S.O. for his approval. The Contractor shall maintain and/or reinstate these temporary diversions to their original condition throughout the entire duration of the temporary diversion, all to the satisfaction of the S.O. If the Contractor fails to maintain and/or reinstate these temporary diversions to the satisfaction of the S.O., the S.O. shall have the right to carry out these works and all costs incurred shall be deducted from any amount of monies due or to become due to the Contractor under this Contract.

Where, in the opinion of the S.O., a detour is not feasible, construction on existing public roads shall be undertaken only half of the full width of the roadway at any time. The length of such half-width construction shall be as short as is practicable. For all temporary diversions, the Contractor shall provide, install and maintain adequate temporary construction signs in accordance with Sub-section 1.20.4.

1.20.2.1 Demolition of Existing Structure And Construction Of Temporary Road Diversion And River Crossing

Before the demolition of the existing bridge, the Contractor shall construct the temporary road diversion and temporary river crossing at the position as approved by the S.O. for the maintenance of the existing traffic flows and pedestrian movement.

Where the Contractor is required to propose a suitable temporary crossing, the following conditions shall be met;

As soon as possible after the acceptance of the Tender, detailed drawings of the temporary crossing as specified in the Scope of Works required for the execution and maintenance of the work shall be submitted by the Contractor to the S.O. for approval prior to the commencement of the demolition of the existing bridge.

The drawings shall be submitted with the calculation and description as necessary, in such order as will enable the S.O. to consider simultaneously related portions of the Works. A Professional Engineer shall sign all submissions inclusive of declaration form as shown in Schedule A as per **Appendix 1K – (Consultant's Submissions And Declaration Form (Schedule A))** of the Specification.

The design of the temporary river crossing shall comply with the requirements of Jabatan Pengairan dan Saliran (JPS) Malaysia and other relevant Authorities.

All drawings shall be in metric A1 size. Any works contained therein the drawings shall not proceed until the drawings have been approved by the S.O. No deviation from the construction procedure of temporary works, which the drawings have been approved by the S.O., shall be permitted.

Approval by the S.O. of the Contractor's proposed drawings or documents shall not in any way relieve the Contractor of any of his duties or responsibilities under the Contract. The Contractor shall be and remain entirely responsible for the proper execution, completion and maintenance of the Works in accordance with the provisions of the Contract.

The Contract Sum shall be deemed to include the cost of preparation, supply, delivery of all drawings, information, and copies thereof, which the Contractor is required to provide under the terms of the Contract.

The temporary river crossing shall have a carriageway of 7.5m width with a 1.5m pedestrian sidewalk on both side of the crossings or as required by the JPS. It shall be capable of carrying all classes of traffic loads using the existing road.

Detailed drawings accompanied by design calculations shall be submitted to the S.O. for his approval prior to the commencement of demolition of the existing bridge. The design of the temporary river crossings shall be in compliance with the requirements of the JPS and other relevant Authorities

The temporary road diversions and temporary river crossing shall be regularly maintained in a satisfactory condition during the full duration of construction of the new bridge. On completion of the Works, the temporary road diversions and river crossings shall be removed and the materials disposed of the site and the ground reinstated to its original condition, all to the approval of the S.O.

1.20.3 Half-width Construction and Traffic Control

Where half-width construction is necessary, work on culverts shall be completed and the embankment adjacent to them must be reinstated to a satisfactory condition so that at least half the carriageway shall be available for use by the public at all times.

Where one-way traffic becomes necessary on any particular length of the Works, or on the entire stretch of the Works, or on the approaches to the Works, the Contractor shall maintain through traffic routes by providing a width of at least 3.5 meters for a single-way traffic. The Contractor shall also provide prior approved, electrically operated signals for traffic control on the affected lengths and any additional traffic signs as may be required. The electrical signal lights shall be automatic in operation, but the S.O.

may, however, at any time, require them to be hand operated by competent operators, if necessary.

The Contractor shall make suitable arrangements for emergency servicing of the electrically operated traffic signals to be available at all times. Manually operated "Stop/Go" signs shall only be used with the prior approval of the S.O. and shall be of the size, colour and type as shown on the Drawings and complying with the requirements of the latest **ARAHAN TEKNIK (JALAN) 2C/85 - (Manual on Traffic Control Devices for Temporary Signs and Work Zones Control)**, published by Ibu Pejabat JKR, Kuala Lumpur.

At least fourteen (14) days notice in writing of any proposed one-way traffic system shall be given to the S.O. for his approval before such a system can be implemented.

1.20.4 Temporary Traffic Signs

The Contractor shall at all times assume full responsibility and take all necessary precautions to ensure the safety of all traffic through and around the Work Site and of traffic that is diverted owing to the Works.

To this end, the Contractor shall erect and maintain on the Site and at prescribed points on the approaches to the Site, all traffic signs, signals and warning lights necessary for the direction and control of traffic. The sizes of all such signs and the lettering and wording shall be as shown on the Drawings. Construction and excavation shall be sign posted and shall, during periods of darkness, be lit up as required, to the approval of the S.O.

Temporary traffic signals and signages shall comply with the requirements of the latest ARAHAN TEKNIK (JALAN) 2C/85 published by Ibu Pejabat JKR, Kuala Lumpur and shall be reflectorized and kept clean and legible at all times.

The Contractor shall position, cover or remove these signs as necessary and/or when directed by the S.O.

1.20.5 Temporary Works

The Contractor shall provide, maintain and remove on completion of the Works, all temporary works including diversion ways, tracks, staging, bridging, etc., and shall make them safe and suitable for carrying all plants and materials and for all purposes related to the Works.

1.21 RELOCATION, TEMPORARY PROTECTION AND TEMPORARY DIVERSION OF PUBLIC UTILITY INSTALLATIONS AND OTHER SERVICES

The Contractor shall be responsible for locating the positions of all public utility installations, including water mains, overhead and underground cables, pipes, sewers and drains and all service connections to buildings, and where necessary, shall adopt such methods of excavation as may be required by the appropriate Approving Authorities or service owners to ensure that no damage is caused to them.

The Contractor shall make good, at his own expense, any damage caused by him to the existing services to the approval of and in accordance with the instruction of the appropriate Service Authority or owner concerned, and shall keep the Government indemnified at all times from all claims, costs and expenses which may arise due to any damages (whether permanent, temporary or recurring) to the said services, failing which the S.O. reserves the right to settle the incurred costs and expenses by way of deduction of monies due or may become due to the Contractor. This shall in no way relieve the responsibilities of the Contractor under this clause.

All such installations which are encountered in the course of the Works shall be adequately supported, slung-up, strutted or otherwise protected from injury, to the satisfaction of the respective Service Authority.

The temporary diversion or relocation of any service within or outside the Works to permit the construction of the Works shall be the responsibility of the Contractor. The Contractor shall be responsible for arranging with the appropriate Authorities for all temporary diversions required in connection with the Works. The Contractor shall keep the S.O. fully informed of his liaison with the relevant Service Authorities.

During the execution of the Works, the S.O. may coordinate all services operations in close liaison with the appropriate Authorities involved to ensure expeditious progress of the Works. The Contractor shall make such necessary adjustments to his programme from time to time to accommodate the actual progress achieved as a result of temporary diversions undertaken by whomsoever. Where temporary diversions of services are required in connection with the Works, they shall be carried out as agreed with the appropriate Service Authorities.

All temporary diversions shall be subjected to the approval of the S.O. The cost of all temporary diversions whether undertaken by the Contractor, or the relevant Service Authorities or their contractors shall be borne or paid by the Contractor.

Temporary diversion shall mean works involved in the diversion of services that will be reinstated to their original position and condition on completion of the works in the affected areas. In planning his work for the diversion or relocation of services, the Contractor shall make reasonable allowance for the time duration necessary to obtain the S.O.'s and the relevant Service Authorities' approvals of the works to be carried out.

1.22 WATER AND ELECTRICITY SUPPLY

The Contractor shall provide at his own risk and cost, all water, lighting and electric power where required for use in the Works and shall pay all costs, fees and charges and comply with all safety regulations, requirements and by-laws in connection therewith.

The Contractor shall also provide and maintain temporary water storage together with any plumbing works associated with it in the case of non-availability of water or water supply disruption and ensure its removal on completion of the Works.

Where electricity cannot be obtained from Tenaga Nasional Berhad (TNB) or local electricity supply company, generator set(s) may be used but with safety precautions as outlined by TNB or the relevant Authority, strictly adhered to.

1.23 PROJECT SIGNBOARDS

The Contractor shall provide, erect and maintain signboards at locations to be decided by the S.O. throughout the duration of the construction period, and pay all charges and fees in connection therewith, including obtaining permission, etc. Each sign board shall comply with the design and specification as shown on the Drawings. On completion of the project, the Contractor shall dismantle and remove the signboards from the project site.

1.24 PHOTOGRAPHIC RECORD OF WORKS

The Contractor shall provide a new camera of reasonably good quality as specified in the **Appendix 1E - (Equipment and Facilities)** for the sole use of the S.O.

The Contractor shall arrange to have the monthly progress photographs and slides (both to be in color) of the Works taken from time to time and to cover such extent and interval of the Works as instructed by the S.O. The Contractor shall record the photographs taken, duly dated and captioned with a brief description of the work including chainage reference and direction of view, in a proper hard cover photograph album for safe keeping. One set of the photographs, stored in CD-ROM, shall be attached together with the photograph album.

The photographs shall be the sole property of the Government and no print or softcopy of these photographs shall be utilized by any other person(s) or party, other than for the purpose of the project only except with the consent of the S.O.

1.25 AS-BUILT DRAWINGS

The as-built drawings, as per requirement in **Appendix 1H – (As-built Drawings And Road Assets Inventory)**, of the Works shall be prepared by the Contractor, and endorsed by the Consultant with a P.Eng. chop stamped on them. The drawings, in digital format and the required number of hardcopies in A1 size (838mm x 584mm) duly signed and stamped with a P. Eng. chop, unless otherwise approved by the S.O., shall be supplied by the Contractor to the S.O. progressively as each section of the Works is completed.

All drawings shall be prepared and complete within one (1) month from the completion of the respective section of the Works or, the whole of the works, failing which, a reasonably substantial amount of remaining balance of payment or monies due to the Contractor shall be withheld by the S.O. until the Contractor fulfills his obligation under the Contract. In default of this, the S.O. reserves the right to appoint a third party to get the drawings completed and only on completion of the full set of as-built drawings as required under the Contract shall the balance of payment or monies due to the Contractor be released to him.

1.26 CLEARING THE SITE UPON COMPLETION

The Contractor shall make every effort to keep the Site in a reasonably clean and tidy condition for the duration of the Works. He shall, in addition, from time to time and on the completion of any area of the Works or where directed by the S.O., remove rubbish, surplus materials, or any other construction debris from such areas as may be attributable to his work under this Contract and leave the Site in a satisfactory condition, to the approval of the S.O.

The Contractor shall remove from the Site all such waste and surplus materials that are no longer required for the execution of the Works, at his own expense and to the satisfaction of the S.O. and shall indemnify the Government against any claims arising from the disposal of such waste and surplus materials.

1.27 ACCESSIBILITY TO THE SITE FOR OTHER CONTRACTORS

The Contractor shall, when required by the S.O., allow reasonable access to the Site to any other contractor(s) employed by the Government, their workmen, the workmen of the Government and other duly constituted authorities who may be employed in the execution on or near the Site of any other works not included in the Contract.

1.28 QUALITY ASSURANCE PLAN**1.28.1 Contractor to Submit Quality Assurance Plan**

- i. The Contractor shall submit to the S.O. an outline Quality Assurance Plan for comment within fourteen (14) days of the date of Letter of Acceptance. Within twenty eight (28) days thereafter the

Contractor shall submit to the S.O. for approval a properly documented Quality Assurance Plan that shall take proper account of the S.O.'s comment on the outline Quality Assurance Plan. The approval by the S.O. of such plan shall not relieve the Contractor of any of his obligations under the Contract. The Contractor shall update and revise the said Quality Assurance Plan during the progress of the Works in order to comply with the Contract, all to the approval of the S.O.

- ii. Details of all procedures and compliance documents shall be submitted to the S.O for information before each design for temporary works and execution stage of the Works is commenced. When any document of a technical nature is issued to the S.O, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.
- iii. Quality Assurance Plan shall set out the specific quality procedures, practices, resources and sequence of activities to meet the requirements of the Contract and Specifications and shall include the proposed organization structure of the Contractor including quality assurance team, quality procedures, Contractor's plants, construction programme, method statements, environmental management, health and safety, selection and testing of materials, placement, installation, site operational control, non-conformance reporting (NCR), closing out NCR for the taking over, coordination with local and statutory authorities, internal quality audit control, remedying of defects, commissioning and maintenance (if any).
- iv. All Quality Assurance Plan submitted by the Contractor to the S.O. shall conform to the relevant standards set out by the International Standards Organization (ISO) and in conjunction with the latest Public Works Department Quality Management System or known as the **Sistem Pengurusan Bersepadu (SPB), JKR.**

1.28.2 Contractor to Adhere to Quality Assurance Plan

The Contractor shall implement the quality assurance procedures in the approved Quality Assurance Plan and shall submit a monthly quality assurance report to be endorsed by a Quality Assurance Officer incorporating all test results, test certificates, photographs and lab reports relating to the quality of materials and workmanship.

1.28.3 Quality Assurance Team

- i. The Contractor shall appoint a suitably qualified and experience person to act solely as Quality Assurance Officer full time on Site to lead the Quality Assurance Team. The Quality Assurance Officer shall meet all the following requirements:

- a) Possesses a relevant technical Degree from a university recognized by the Government of Malaysia.,
- b) Possesses not less than 5 years experience in the construction industry,
- c) Possesses a **Construction Industry Development Board (CIDB)** Green Card, and
- d) Has any one of the following;
 - Minimum 2 years relevant experience in the implementation of MS ISO 9001 in the construction industry, or
 - Has attended field internal audit activities for MS ISO 9001, or
 - Possesses Internal Auditor Certificate from agency or body recognized by **MAMPU**
- ii. The Contractor shall provide a Quality Assurance Team and resources that are required to ensure the effective operation of the Quality Assurance Plan.

1.28.4 Verification of Implementation

- i. The Contractor shall, at his own cost, provide all access, assistance and facilities to enable the S.O.'s Representative to audit/verify the implementation of the Quality Assurance Plan according to the **Prosedur Perancangan Pelaksanaan Projek** under the latest **Sistem Pengurusan Bersepadu (SPB)**, **JKR – LAMPIRAN 4 (Pelan Kualiti Projek – Q-Plan)** and adherence thereto.
- ii. The S.O.'s Representative may, at his discretion, reject any of the Works which in his opinion have not been executed in accordance with the Quality Assurance Plan and which ultimately does not conform with the Specification, or the resultant execution of the work was not done in a good and workmanlike manner and to the accepted standards and good practice. The Contractor shall re-execute, at his own cost and without any entitlement to any extension of time, all such parts of the Works so rejected.

1.29 NOTICE OF COMMENCEMENT OF PERMANENT WORK(S)

No permanent works shall be undertaken without the S.O.'s approval and the Contractor shall give a minimum of 24 hours' notice prior to the commencement of any part of the Works so that the S.O. may make whatever arrangements necessary for the inspection thereof.

1.30 CONTRACTOR'S RESPONSIBILITY FOR WORKS

Where the S.O.'s approval is required prior to the commencement of work, the issue of such approval shall not relieve the Contractor of any of his liabilities, responsibilities or obligations as described in the Contract.

1.31 AVOIDANCE OF NUISANCE AND DAMAGES

The Contractor shall consider the close proximity of the Works to residential, commercial and industrial property and shall take full responsibility for and all reasonable precautions to avoid damage, as well as minimize all inconvenience and nuisance such as dust, noise and vibrations arising from his operations. In relation to this, the Contractor shall compile a dilapidation survey baseline record before, during and after construction.

1.32 PROHIBITION OF ADVERTISING

The Contractor shall treat the Contract Documents as private and confidential. In particular, the Contractor shall not publish any information, drawings or photographs related to the Works and shall not use the project Site for advertising purposes, except with the consent of the S.O. and subject to such conditions as the S.O. may prescribe.

1.33 UNAUTHORISED USAGE

The Contractor shall ensure that there is no unauthorized usage of the Site, and make good at his own expense any damage caused by his failure to prevent such unauthorized usage of the Site.

1.34 ACCESS TO SITE

Each tenderer shall, before submitting his Tender, satisfy himself regarding the existing access to the Site and shall include in his Tender, the cost of any additional works, improvements, extensions and maintenance works which may be required to enable him to perform his obligations under the Contract or which may be required by any regulation or requirement of any Authority, unless otherwise stated in the Contract.

1.35 MOBILISATION AND DEMOBILISATION

The item for mobilization and demobilisation in the Bill of Quantities shall include the supply of all labour, materials, tools, equipment and incidentals necessary for moving into the Site and out of it on completion, and shall deem to include:

1.35.1 Mobilisation

The transportation and installation of any construction plant necessary to complete the Works from the ports of unloading, places of assembly in Malaysia or other locations to the Site where they are to be used for the Works.

1.35.2 Demobilisation

On completion of the Works and before the S.O. issues the Certificate of Practical Completion (CPC) in accordance with the Conditions of the Contract, the Contractor shall, with the approval of the S.O., dismantle and remove from the Site, all plants, temporary staging, traffic signs, project signboard and anything else not included in the Permanent Works.

1.36 SAFETY, HEALTH AND WELFARE

The Contractor shall be required to provide a complete First Aid Kit as stated under the **Factory and Machinery (Safety, Health And Welfare) Regulation 1970** which shall be kept and properly maintained in the Contractor's site office. The kit shall be in the charge of either the Contractor's site representative or some other responsible person who shall be on the Site during all working hours to ensure that the first aid facilities are available without delay at all times when Works is in progress. At least one (1) designated person of the Contractor's staff shall be trained in first aid duties.

The Contractor shall refrain from dumping and/or depositing any form of materials that are capable of collecting water which can afford breeding places for mosquitoes, rodents, insects and vermins of any kind. All excavation and any portion of the site where water stagnates or accumulates shall be kept dry by pumping, bailing or other operations. The Contractor shall pay all charges as may be required by the Ministry of Health and/or Local Authority and employ whatever destructive measures as are necessary in order to rid of them.

All Works shall be carried out under controlled conditions of acceptable noise and dust emission levels. The Contractor shall take measures to ensure that all equipment and machinery are in proper working condition so as to minimize the amount of noise and dust generated. The S.O. may require the Contractor to submit a proposal on how to reduce excessive noise and dust, to which the Contractor has to respond in an efficient and fast manner.

The Contractor is prohibited from discharging oil and grease to any water course. Storage tanks for oil and grease shall be placed on concrete base with upstand edges to contain any spillage. Any spilled oil and grease shall be promptly removed by the Contractor. The Contractor shall collect and store used oil, grease

and other scheduled wastes and dispose these according to methods approved by DOE.

Where the Contract Period is more than six weeks, the Contractor shall register with DOSH within seven (7) days after commencement of Works.

All safety measures shall be carried out in accordance with **Occupational Safety and Health Act (OSHA) 1994** or its latest version, **JKR Specifications For Occupational Safety and Health (OSH) for Engineering Construction Works 2011 (items 4, 5, 6, 7.1 and 9, where applicable**, for projects below RM20 million or project cost based on prevalent policy and guideline) or its latest version and relevant local by-laws. The Contractor shall be held solely responsible for all accidents arising from any negligence in this respect. The Contractor shall employ throughout the entire Contract period a competent and qualified person as the Safety and Health Practitioner as below:

- (i) Site Safety Supervisor (SSS) to be stationed minimum 15 hours a week for all projects.
- (ii) Safety and Health Officer (SHO) to be stationed full time for contracts worth more than RM20 million or that based on prevalent policy and guideline

The Contractor shall ensure all sub-contractors who employ more than 20 persons shall appoint a Contractor Safety Supervisor (CSS) to be stationed minimum 5 hours a week.

The Contractor shall submit Safety and Health Plan (S-Plan) in writing duly signed by the Director of the company to the S.O. within one (1) month after the receipt of the Letter of Acceptance. The S-Plan shall be as per **Prosedur Kawalan Keselamatan dan Kesihatan Pekerjaan**, under the latest **Sistem Pengurusan Bersepadu (SPB), JKR - (LAMPIRAN 1 – Format Pelan Keselamatan dan Kesihatan Pekerjaan, S-PLAN)**. The Contractor shall submit the revised S-Plan whenever required.

The Contractor shall form a Safety and Health Committee in accordance with the Occupational Safety and Health Regulations 1996 and organise meetings at minimum once in every three (3) months.

The Contractor shall conduct Occupational Safety and Health (OSH) related training and programmes for the workmen including sub-contractors.

The Contractor shall carry out site safety and health inspections and submit monthly safety and health reports to the S.O. in accordance with **Prosedur Kawalan Keselamatan dan Kesihatan Pekerjaan** under the latest **Sistem Pengurusan Bersepadu (SPB), JKR - (LAMPIRAN 5 – Format Laporan Keselamatan dan Kesihatan Pekerjaan)**.

The Contractor shall provide and maintain safety and health statistic scoreboard at the entrance of site office and workplace.

The Contractor shall provide and maintain adequate traffic safety signage,

warning signs and warning lights at place of Works and close proximity to public.

The Contractor shall provide and maintain traffic control by competent persons including provision of flagmen where Works is in close proximity to public roads and accesses.

The Contractor shall carry out site safety and health audits as per **DOSH** requirements and/or as instructed by the S.O.

1.37 SANITATION

The Contractor shall provide and maintain sufficient temporary toilets at appropriate locations on site as approved by the S.O. Toilets shall be complete with adequate water closets, urinals, hand-basins with proper sanitary system and maintained in a clean and sanitary condition in accordance with the requirements of the Ministry of Health. All wastewater must be treated such that its discharged effluent meets the requirements of all existing legislation and regulations.

1.38 WASTE MANAGEMENT

The Contractor shall ensure that all waste generated on site shall be managed in accordance with the **Solid Waste And Public Cleansing Management Act 2007 and Environmental Quality Act 1974** as follows:

- (i) The Contractor shall submit in the approved format the Construction Waste Management Plan (CWMP) to the S.O. for approval within fourteen (14) days from the date of site possession.
- (ii) The Contractor shall provide Roll-On Roll Off (RORO) for construction waste and Mobile Garbage Bin (MGB) for domestic waste
- (iii) The Contractor shall provide a minimum of one (1) location on site for segregation and collection of construction and domestic waste.
- (iv) The Contractor shall appoint a licensed contractor(s) to collect the construction waste, scheduled waste and domestic waste from the site to approved locations for disposal or to recycle the waste.

1.39 ENVIRONMENTAL PROTECTION WORKS

1.39.1 Environmental Management Plan (EMP)

The Contractor shall prepare the Environmental Management Plan (EMP) for the following situations:

- i. Projects worth more than RM20 Million including earthworks.
- ii. Project sites located in Environmental Sensitive Area (ESA) as

defined in the National Physical Plan by Jabatan Perancangan Bandar dan Desa (JPBD).

- iii. Projects where Environmental Impact Assessment (EIA) has been carried out.

The EMP shall be prepared by a registered Environmental Consultant and submitted to the S.O for approval within 14 days from the date of possession of Site. The EMP shall be concise, up to date and site specific. The EMP shall make reference to the following, but not limited to :

- i. Department of Environment (DOE) format for the preparation of EMPs
- ii. The approved EIA report and conditions imposed (if any)

The Contractor shall submit the following documents as per **TABLE 1** to the S.O. for approval :

TABLE 1 : PERIOD FOR SUBMISSION OF DOCUMENTS

Documents	No. Of Copies	Reporting Frequency	Timing
EMP	5	Once only (to be updated when necessary)	Within 14 days from the date of Possession of site
Environmental Quality Report (EQR)	5	Monthly	14 days after monitoring *
Environmental Monitoring And Audit Report (EMAR)	5	Quarterly	14 days after audit *
Closure Audit Report (CAR)	5	Once Only	14 days prior to issuance of Certificate of Practical Completion (CPC)*

Note * to be carried out by registered environmental consultant

1.39.2 Environmental Officer (E.O.)

The Contractor shall appoint a person to be responsible to ensure the implementation of the EMP and to monitor and report on the site compliance on a daily basis.

1.40 WATER AND AIR QUALITY, NOISE AND VIBRATION CONTROL

1.40.1 Monitoring Water and Air Quality, Noise and Vibration Control

The Contractor shall carry out monitoring of water and air quality, noise and vibration as indicated in the EMP and tests to be carried out by

accredited laboratories. Parameters to be tested are as specified in **Appendix 1J - Environmental Quality Standards (Table A2)** to be complied with by the Contractor.

1.40.2 Air Quality

The Contractor is not allowed to carry out open burning of cleared vegetation, debris and construction waste, etc. and shall not be allowed unless prior approval is obtained from the **Director General of the Department of Environment**.

The Contractor shall provide suitable spraying equipment for regular spraying of water over the existing roads, tracks and access roads, near settlements, completed as well as incomplete road and other barren areas of the site used by the Contractor, especially during the dry season or as and when directed by the S.O.

When the Contractor's trucks or equipment utilizes public or private roadways, all dirt and materials shall be removed from the trucks/equipments by means of hosing, lorry wash-trough, etc. before leaving the site.

The Contractor shall provide for the prompt removal of all dirt and other materials spilled from his or his sub-contractor's vehicles on public or private roadways.

For Contractor's trucks carrying sand, aggregates, earth and other loose construction materials liable to spillage, tarpaulin must be used to cover such open trucks when passing through villages or settlements and on all roadways.

The Contractor shall also ensure dust control at quarry / batching plant (if any) complies with the environmental requirements as stipulated in the **Environmental Quality (Clean Air) Regulations, 2014**

1.40.3 Noise And Vibration Control

The Contractor shall ensure that at any time, the vibration levels resulting from his works at or across real property boundary should not exceed the Recommended Limit as specified in Table A2 (Appendix 1J). No person, unless duly authorized by law or carrying out legitimate duties, shall use explosives or that which results in explosions that create a vibration disturbance across a real property boundary or on a public space or right of way.

The Contractor shall comply with the general recommendations set out in **DOE Interim Planning Guidelines for Vibration Limits and Control in**

the Environment together with any specific requirements described in the Contract.

The Contractor shall indemnify and keep indemnified the Government, S.O. and the S.O.'s Representatives against any liability for damages on account of vibration disturbance created while or in carrying out of the Works and from and against all claims, demands, proceedings, damages, costs charges and expenses whatever with regard to or in relation to such liability.

1.41 NOMINATED SUB-CONTRACTORS

The Contractor shall allow in his tender price, for attendance and facilities, upon all nominated sub-contractors, if any. such attendance and facilities shall include the following :

- i. Making good of roadworks, related structures, etc. and finishes thereto including touching up of all completed works necessitated, damaged or disturbed by the Nominated Sub-contractor's work.
- ii. Supplying all setting out information.
- iii. Giving all necessary dimensions and taking responsibility for their accuracy.
- iv. Affording free and full use of standing scaffolding or other temporary structures whilst it remains erected on the Site.
- v. Affording free and full use of storage accommodation for materials, equipment and plant which are for incorporation into the Works and/or which require protection against weather and deterioration, messrooms, sanitary and welfare facilities.
- vi. Providing site space only for Nominated Sub-contractor's temporary office, workshops, workmen's accommodation and storage of materials, tools, plant and equipment which are not for incorporation into the Works and not requiring protection against weather or deterioration.
- vii. Providing temporary water supply, electric power supply, artificial lighting and paying all fees and charges for fuel, water and electricity consumed, including for testing and commissioning of the whole NSC works.
- viii. Liaising with the relevant service/utility authorities for the expeditious installation of the connections for permanent water and electricity supplies in the Works making available such supplies to the Nominated Sub-contractors; and paying all fees and charges for such installation, deposits for such supplies/services on behalf of the Government. All such payments made, shall be reimbursed to the Contractor on production of receipted bills.

- ix. Providing competent personnel in compliance with the latest Electricity Regulations to take responsibility for the operation of the electrical installation from the time the permanent electricity supply is made available until testing, commissioning and handing over of the Works.
- x. Protecting, watching and taking full responsibility for all Nominated Sub-contractor's work and unfixed materials and goods intended for use thereon.
- xi. Removing rubbish and debris off the Site and cleaning the Works internally and externally.

It is deemed that the Nominated Sub-contractor shall include in the Sub-contract Sum, inter alia, the costs in connection with the following :

- i. Unloading, getting in, storing and all handling and hoisting of these materials, plant and tools into required positions.
- ii. Providing, erecting, maintaining and removing of all his temporary office, workshops and workmen's accommodation including paying all assessment and other charges.
- iii. Connecting to temporary water and power supplies made available by the Contractor for the execution of the Works, supplying and running distribution pipes, hoses, cables, leads, electrical gear, etc. but excluding payment for water and electricity consumed.
- iv. Provision of fuel, gas, steam, oil lubricants, chemicals and everything else necessary (other than water and electricity) for the test running and commissioning of the Sub-contract Works.
- v. Any scaffolding, staging, etc. that are required for the Sub-contract Works but not covered in the relevant paragraph.

1.42 NOMINATED SUPPLIERS

The Contractor shall allow in his tender, price for attendance upon all nominated suppliers which is to include taking delivery, unloading, setting in, checking and accepting delivery, returning empties, handling, storing and hoisting of the materials/goods supplied by the nominated suppliers. Packing and carriage to site shall be borne by the nominated supplier unless specifically stated to the contrary.

1.43 COORDINATION OF MECHANICAL AND ELECTRICAL SERVICES

1.43.1 General

This section shall describe the scope of works, qualifications, competency, roles and responsibilities of the mechanical and electrical (m&e) services coordination team.

1.43.2 Scope Of Work

The Contractor shall be responsible for coordinating the implementation of all M&E works and related activities within the project scope. For this purpose the Contractor shall appoint M&E services coordinators full-time on Site during the whole duration of the Works. The appointment shall be approved by the S.O.

The Contractor shall ensure all M&E requirements are implemented in a timely manner and adequately integrated with all other services involved such as architectural, structural and other related services.

The Contractor shall conduct regular coordination meetings among all sub-contractors, nominated or otherwise, from all related disciplines to evaluate and resolve all issues or problems regarding the integration and coordination of all services involved.

1.44 MINIMUM REQUIREMENT OF M & E SERVICES COORDINATOR BASED ON PROJECT COST

Project Cost (RM)	Minimum Requirement of M & E Coordinator
Between 10 – 50 million	1 Engineer & 1 CoW
> 50 million	1 Engineer & 2 CoW

1.45 QUALIFICATION AND COMPETENCY OF M & E COORDINATORS

1.45.1 Engineer

Possesses a Degree in related engineering field with minimum 3 years of working experience in Building Construction.

1.45.2 Clerk of Works (CoW)

Possesses a Diploma in related engineering field with minimum 5 years of working experience in Building Construction.

1.46 RESPONSIBILITIES OF M & E SERVICES COORDINATOR

The M&E Services Coordinator shall be responsible, on behalf of the contractor for :

- i. Guiding the overall M&E works and implementation of related activities within the project scope and providing timely and relevant information.
- ii. Ensuring that all layout, schematic, detail and Builder's-Work-in-Connection (BWIC) drawings (for architectural, structural, mechanical and electrical works) are received from the S.O.
- iii. Supervising all the installation and construction works to ensure the works are sufficiently coordinated.
- iv. Identifying and resolving issues or problems related to integration and coordination of services.

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APPENDIX 1A

GENERAL DESCRIPTION OF THE PROJECT

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APPENDIX 1B

SCOPE OF WORKS

The Scope of Works may include all or part thereof (as mentioned clearly and/or inferred indirectly in the Bill-of-Quantities and/or Drawings), but not necessarily limited to the following:-

ROAD WORKS

1. Site clearing of the required width of the right-way as shown on the drawing of all trees, shrubs and undergrowth, grubbing up of roots, and demolition of buildings, structures and superficial obstructions on the site in the way of or otherwise affected by the works.
2. Provision and subsequent removal of all necessary temporary river crossings. Road diversions, an access roads, etc. for the necessary execution of the construction works.
3. Earthworks and rock excavation to formation level including excavation of any unsuitable material and the formation of slope on the approaches to the level shown in the drawings. Where necessary, the Contractor shall provide his own source of fill material, transport it to the site, compact and consolidate it as his own expense and settle all the necessary royalties required on the earth transported by him.
4. Turfing and soiling of the embankments, cut slopes, benches and rounding off portions.
5. Traffic diversion works as per required of relevant authorities and S.O..
6. Maintenance of all roads and any access affected by construction in a safe and motor able condition at all times.
7. Flexible pavement works.
8. Demolition of existing bridge / culvert and construction of new culverts.
9. Provision and subsequent removal of all temporary staging necessary for the proper construction of box culverts.
10. Construction of retaining walls comprising rubble or reinforced concrete.
11. Supply, drive and test piles for box culverts.
12. Drainage works including culverts, sumps, interceptor drains, cascading drains and sub soil drains where necessary.

APPENDIX 1B

13. Protection of existing or new services such as water supply, electricity supply telephone lines and to maintain the services to the local population whilst resiting works are carried out.
14. Installation of guardrails, traffic signs and signals, kerbs, road pavement markings, interlocking pavers for footpaths, hoardings, fencing, site offices / temporary buildings.
15. Associated M & E Works associated with street lighting and traffic signalization as well as electrical ducting and cabling etc.
16. Miscellaneous works and all other works incidental to the Project including any modifications and variations carried out within the terms of the Contract.

BRIDGE WORKS

The contractor shall provide all labour, materials, plants and everything necessary for the proper execution and completion of the works in accordance with the condition of Contract, the Specification and the Drawing.

1. All preliminary items and works described in the general items.
2. Demolition of existing bridge
3. All piling works including testing
4. Excavation and replacing with specified material as foundation.
5. Construction of bridge abutments and wing walls in reinforced concrete.
6. Installation of laminated elastomeric bearings pads including epoxy mortar
7. Placing of prestressed beams.
8. Construction of diaphragms, deck slabs, parapets and approach slabs in reinforced concrete.
9. Construction of the proposed approach road works.
10. All other miscellaneous.

APPENDIX 1C

TRANSPORT SERVICES FOR S.O. AND HIS STAFF

1.0 General

- 1.1 The Contractor shall provide suitable transportation service by means of:
 - a) * locally assembled motorcycles
 - b) * locally assembled air-conditioned four (4) wheel drive vehicle(s) complete with competent driver(s) for the S.O. and his staff or any other persons permitted by the S.O. for the supervision of the Works and administration of the Contract as and when required by the S.O. or his staff at all times from the commencement of the Contract until the issuance of the Certificate of Practical Completion. The JKR logo and the name of the project shall be printed on the left and right front doors of the vehicles(s).
- 1.2 The Contractor shall ensure that the vehicle(s) are accident free and are in a well maintained condition subject to certification from PUSPAKOM at every six (6) months.
- 1.3 The vehicle(s) shall be in the custody of the Contractor at all times.
- 1.4 The Contractor shall provide comprehensive insurances to cover all drivers and passengers and ensure that all road tax are valid throughout the contract period.

2.0 Arrangement for Transport and Failure to Provide Transport

- 2.1 The Contractor shall provide the necessary transport from the office(s) of the S.O. or his staff or from designated pick-up points to the Site and vice versa as requested by the S.O. or his staff. The transport shall at all times be readily available for the sole use of the S.O. and his staff. Replacement vehicles shall be provided when the normal vehicle is not available such as during periods of servicing, maintenance or repair.
- 2.2 The Contractor shall notify the relevant officer should there be any delay in the pick-up times. If the Contractor fails to notify of the delay or fails to provide the required transport, the officer shall have the option to arrange alternative transport and the Contractor shall bear the expenses and an appropriate adjustment shall be made to the Contract Sum.

APPENDIX 1D**LIST OF LABORATORY EQUIPMENT**

The Contractor shall provide and maintain the following testing laboratory equipment, those which are deemed necessary only for the project, and shall become the property of the Contractor at the end of the Contract:-

	<u>No.</u>
(a) Soil Testing Equipment	
1. Moisture content tins – 76mm x 25mm with lids.	25
2. Electric balance of 1 kg capacity, accurate to 0.1g with a tare correction of not less than 100g.	1
3. Electric forced draught oven, capacity of 0.08 cu.m.	1
4. Atterberg limit machine calibrated with a grooving device as specified in B.S. 1377.	1
5. Glass plates – 457mm x 609mm x 6mm	2
6. Linear shrinkage moulds – 254mm	5
7. Spatulas – 152mm	2
8. 203mm diameter B.S. sieves – 75mm, 63mm, 50mm, 37.5mm, 28mm, 25mm, 20mm, 14mm, 12.5mm, 10mm, 9.5mm, 6.3mm, 5mm, 4.75mm, 3.35mm, 2.36mm, 2mm, 1.18mm, 60um, 425um, 300um, 212um, 150um, 75um, lid and pan together with vibrating machine.	1 of each
9. 203mm diameter B.S. sieves – 75um, 425um,	2 of each
10. Wash sieves – 75um.	2
11. Sample splitter – 50mm	2
12. Sample splitter – 12mm	2
13. Balance of 10kg capacity, accurate to 1g	1
14. Standard compaction hammer, electric motor operated, as specified in B.S. 1377.	1
15. Standard compaction mould as specified in B.S. 1377.	1

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	<u>No.</u>
16. Compaction mould extruder as specified in B.S. 1377.	1
17. Steel scoop	1
18. Rubber mallet	1
19. Measuring flasks – 1000c.c	1
20. Vernier calipers – 152mm	1
21. Steel rule – 305mm.	1
22. Compression machine suitable for laboratory and field C.B.R.s with all fittings necessary for field and laboratory operation as specified in B.S. 1377.	1
23. C.B.R. moulds fitted with collars and base plates for compaction and soaking and tripods for small measurement fitted with dial gauges having 0.01mm divisions and 25mm travel as specified in B.S. 1377	10
24. 2.26kg surcharge weights – ring type	6
25. 2.26kg surcharge weights – horseshoe type	9
26. Complete field density kit, sand replacement type suitable for volume measurement of 0.005cu.m to an accuracy of not less than 0.0001 cu.m as specified in B.S. 1377.	2
27. Hand auger suitable for boring to depths of 5m and supplied with 100mm diameter heads suitable boring in cohesive and cohesion's soils.	1
28. Crowbar, pick and spade.	1 of each
29. Drying pans – 406mm x 406mm x 76mm	6
30. British Standard 1377 – “Method of Test for Soils for Civil Engineering Purposes” , latest edition.	1
31. Mackintosh / JKR Probe	1

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		<u>No.</u>
(b)	Concrete Testing Equipment.	
1.	152mm x 152mm 152mm standard concrete test cube steel moulds as specified in B.S. 1881.	6
2.	Slump cones with tamping rods as specified in B.S. 1881.	2
3.	Compacting factor apparatus as specified in B.S. 1881.	1
4.	Tank for curing of concrete specimens to accommodate 50 Nos. x 152mm cubes in layers not more than 50mm deep.	1
(c)	Flexible Pavement Testing Equipment	
1.	Metal tray, 0.6m square or similar suitable for measuring spray rates of bituminous materials and spread rates of cover aggregates for surfaces dressing.	4
2.	Metal thickness gauge (or set of slotted sleeves) as specified in M.S. 30 for determination of aggregates flakiness index.	1
Additional items required for asphaltic concrete and/or bituminous Macadam :-		
3.	Balance of 2kg capacity, accurate to 0.1g suitable for weighing samples suspended in liquid.	1
4.	Steel moulds for Marshall test specimens (100mm diameter) with base, extension collar, extraction collar and extraction plate as specified in B.S.598.	6
5.	Extractor for removing Marshall test specimens from moulds without distortion or shock as specified in B.S. 598.	1
6.	Compaction hammer and automatic compactor for Marshall test specimens as specified in B.S. 598.	1 of each
7.	Compaction pedestal and mould holder for Marshall test as specified in B.S. 598.	1
8.	Thermostatically controlled hot plate	1

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		<u>No.</u>
9.	Thermometers for use in laboratory and in asphaltic mixes for Marshall test as specified in B.S. 598.	2 of each
10.	Rubber and heat resistant gloves.	2 pairs of each
11.	Filter papers – 100mm diameter.	As needed
12.	Containers for heating aggregates and bituminous materials.	As needed
13.	Pavement coring machine of the thin-walled diamond bit type for obtaining 100mm diameter samples of bituminous surfacing.	1
14.	100mm diameter thin-walled diamond bit for use with pavement coring machine.	As needed
15.	Tools for cutting and trimming pavement cores	As needed
16.	Metal bottles of suitable capacity or bitumen extraction, by direct determination as specified in B.S. 598.	As needed
17.	Machine to rotate the bottles about their longitudinal axes at a speed of between 10 rev/min to 30 rev/min as specified in B.S. 598.	1
18.	Volumetric flasks of suitable capacity.	As needed
19.	Centrifuge capable of developing an acceleration of 25,000m/sq second as specified in B.S. 598.	1
20.	Filtration apparatus for extraction of bitumen by direct determination as specified in B.S. 598.	1
21.	Recovery apparatus for extraction of bitumen by direct determined as specified in B.S. 598.	1
22.	Pressure filter of appropriate size, air pump and funnel for extraction of bitumen by direct determination as specified in B.S. 598.	1 of each

Further items required for asphaltic concrete :-

23.	Wire basket of 6.5mm or smaller mesh with wire hanger as specified in M.S. 30, for determination of specific gravity and water absorption of aggregates.	1
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	<u>No.</u>
24. Airtight container of similar capacity as wire basket above.	1
25. Gas jar – 1.5 litre	1
26. Pyconometer – 1 litre	1
27. Warm air blower	1
28. Mechanical mixer of 2kg capacity, for preparation of asphaltic concrete mixtures.	1
29. Thermostatically controller water bath for Marshall test specimens as specified in B.S. 598.	1
30. Steel Marshall testing head as specified in B.S. 598.	1
31. Compression testing machine with proving ring, capable of applying loads of up to at least 22kN at a constant rate of strain of 50mm \pm 3mm per minute and recording the maximum load achieved as specified in B.S. 598.	1
32. Dial gauge and mounting assembly for measuring Marshall test flows of up to 10mm with accuracy of \pm 0.1mm as specified in B.S. 598.	1

Testing which is specifically required in the Contract and any test defined in quoted British Standard Specifications which are required to ensure compliance with the Contract but cannot be done in the Site Testing laboratory shall be carried out at approved laboratories off the Site. These tests shall be carried out as directed by the S.O.. The cost incurred by the Contractor shall be deemed to have been included in the tendered rates.

APPENDIX 1E

(*Revision subject to the latest requirement)

EQUIPMENT AND FACILITIES

The Contractor shall provide the following equipment and facilities for the use of the Superintending Officer (S.O) and/or his staff. All equipment provided shall be new, and shall be delivered, tested and installed within a month of the issuance of the Letter of Acceptance. The place of delivery and installation shall be as directed by the S.O. The facilities provided shall be maintained by the Contractor or his appointed agent throughout the contract period until the issuance of the Certificate of Practical Completion. Maintenance shall include all necessary monthly servicing according to manufacturer's specification and supply of accessories and consumables.

Upon the issuance of the Certificate of Practical Completion, the Contractor shall remove all equipment and facilities from its location.

If the Contractor fails to provide or maintain any equipments as specified below, the Government shall have the right to procure the equipment(s) from other sources or maintain it and all expenses arising shall be borne by the Contractor and an appropriate adjustment shall be made to the Contract Sum.

1. * COMPUTER SYSTEM AND OTHER REQUIREMENT

1.1 Each set of microcomputer system shall comprise of and be supplied complete with the following minimum requirements as listed below:-

- **Intel® Core™ i7-4790S Processor (Quad Core, 8MB, 3.20GHz w/HD4600 Graphics)**
- **16GB (2x8GB) 1600MHz DDR3L Memory SDRAM**
- **Up to 2TB SATA hard drive (5400RPM)**
- **Intel® 8 Series/ LynxPoint Q87 Chipset**
- **Intel® Integrated Graphics**
- **Intel I217LM gigabit network connection**
- **Wireless Keyboard and Mouse**
- **23" Wide Viewing Angle display, Full HD 1920x 1080 resolution with anti-glare coating; optional projected capacitive touch screen**
- **52x Speed EIDE CD-ROM Drive**
- **Multiple DVDRW⁵, Combo, DVD-ROM configurations available (min)**
- **Altec Lansing ACS 45.1 Speaker with subwoofer**
- **2 USB, 2 Serial, 1 Parallel.**

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Software

The operating system to be supplied shall be the * **latest update in the version**. Indicated, and free of defect or bugs. The operating system shall comprise of;

- Latest version of Windows operating system
- Latest Antivirus software
- Latest version of Microsoft Project
- Latest version of Microsoft Office

Other Peripheral

- Automatic Voltage Regulator – 600VA
- Multimedia Keyboard and wireless optical mouse
- USB 2.0 high speed Thumb drive (latest)

Printer

HP colour Laser Jet Printer 5550 or * **latest equivalent version** with the following features (to include resolution)

- Support A3 Size Printing
- Speed :16 ppm (page per min) and 100 Mhz RISC Processor
- 100 sheet /10 Envelope Multipurpose tray
- 16 Mbytes Standard RAM
- Printer cable

Accessories

- Computer table (Artwright TX35 or equivalent)
- Computer Chair
- Printer Table (Artwright TX 10A or equivalent)
- Uninterrupted Power Supply model PK US2000 or equivalent:

Consumable Items

- 3.5" HD diskettes (10 Pcs Pack : 10 boxes)
- CDRW (10 Pcs Pack : 5 boxes)
- CDR (10 Pcs Pack : 5 boxes)
- CD and Diskettes Containers
- Printing Paper A4(80g):60rims
- Printing Paper A3 size : 20rims
- Toner/Cartridge : 10 nos.

APPENDIX 1E

- 1.2 All software to be supplied under this contract shall be original and legal. Copies of the software shall be registered in the name of the contractor. The contractor shall submit all the documentary evidence of the originality and legality of the software.
- 1.3 Upon issuance of the Certificate of the Practical Completion, all equipments and the relevant inventory shall be handed over to the contractor.

2. COPIER MACHINE

- 2.1 The copier machine shall be of the following minimum requirements as listed below:-

Toshiba e-STUDIO 202L Copier machine or equivalent complete with the following accessories :-

- A-3, A-4R Cassete and by-pass feed
- One selenium drum
- Toner
- Developer
- Key Counter
- Trolley
- Sorter

And the following specification:-

- | | | |
|-----------------------|---|---|
| • Type | : | Desk Top (Stationery Palaten) |
| • Process | : | Dry Electrostatic Trantex System |
| • First copy speed | : | Approximately 2 minutes |
| • Multi copy speed | : | 6 seconds (A4) |
| • Maximum copy speed: | | A3 (297x420mm), Fool |
| | | Scap (8"x13"), A3-A6 by feed |
| | | by-pass |
| • Reduction | : | 1:0.930, 1:0.816, 1:0.707, 1:0.647 |
| • Enlargement | : | 1:1.154, 1:1.224, 1:1.1414 |
| • Paper Feed | : | Three Cassete Plus by-pass feed |
| • Paper weight | : | 50g/m ² - 110 g/m ² |
| • Quantity Selector | : | 1-999, Automatic Reset |
| • Zoom up and down | : | From 65% to 155% (in 1 increments) |

Upon the issuance of the Certificate of Practical Completion, the copier machine shall be reverted to the Contractor.

APPENDIX 1F

FITTINGS AND FURNITURE FOR S.O.'S OFFICES

The Schedule lists out the minimum fittings and furniture to be supplied and installed for each room. The fittings and furniture shall be suitable for its intended use in each room and shall be approved by the S.O. before ordering and installation. The items supplied shall become the property of the Contractor at the end of the Contract or such extended time required by the S.O. until formally vacated.

List of Consumable Stores

Provide each of the offices and the Testing laboratory with an adequate supply for the duration of the works of all necessary consumable stores, as required by the S.O. including the items scheduled here. All items shall be new.

- Office stationery
- Soap, toilet rolls and hand towels
- Washing-up liquid, dish cloth
- Torch lights and batteries
- Replacement for first aid boxes
- Toilet brushes, brooms, mop
- Polythene bags, 760mm x 510mm

List of Protection Clothing

- 30 no. Safety helmets
- 15 pairs safety glasses (PVC)
- 15 pairs safety boots
- 15no.sets PVC or similar waterproof outfits

- sand for all insitu dry density tests
- Solvent for determination of binder
Content – 8 drums (50 gal per drum)

APPENDIX 1FSchedule of Fittings and Furnishing for S.O.'s Offices

The schedule Lists out the minimum fittings and furnishings to be supplied and installed for each room. The Fittings and Furnishings shall be new be and suitable for its intended use in each room and shall be approved by the S.O. before ordering and installation. The items supplied shall become the property of the Contractor at the end of the Contract or such extended time required by the S.O. until formally vacated.

Item Description	1 Chief Resident Engineer	2 Employer's Representative (Engineer)	3 Resident Engineer	4 Assistant Resident Engineer	5 General Office Clerk/ Recep.	6 Conference Room	7 Drawing Office Supervisor	8 Laboratory & Survey Store
(1.82 x 1.22 x 0.76)m high table with Lockable drawers together with suitable reclining chairs			1	1				
(1.22 x 0.91 x 0.76)m high table with Lockable drawers together with suitable chairs							1	
(1.22 x 0.91 x 0.76)m high table for typist with adjustable height type chair					1			
Stand size drawing tables with drawings boards tee square together with sitting stool							1	
Steel cabinets with 4 drawers file			1	1	1			
Steel cabinets with 2 drawers file			1	1	1			

APPENDIX 1F

Item Description	1 Chief Resident Engineer	2 Employer's Representative (Engineer)	3 Resident Engineer	4 Assistant Resident Engineer	5 General Office Clerk/ Recep.	6 Conference Room	7 Drawing Office Supervisor	8 Laboratory & Survey Store
Conference Table for 15 persons with suitable arm rest chairs						1		
Plan file – 6 drawers horizontal 125w x 8900 x 430c/w 3 shelves					2			
Full height storage cupboard 1800H x 900 x 150 s/w 3 shelves					1			1
Soft board wall paneling 2100 x 1200			1			1		
Soft board wall paneling 1200 x 900				1				
White board (Procelain Magnetic Surface stand type 2100 x 1200 (double surface))			1	1	1	1		
White board (Procelain Magnetic Surface Wall 1200 x 900			1	1	1			4
T-square							1	
Set Square			1	3			1	
Waste paper basket			1	2		2		2

APPENDIX 1F

Item Description	1 Chief Resident Engineer	2 Employer's Representative (Engineer)	3 Resident Engineer	4 Assistant Resident Engineer	5 General Office Clerk/ Recep.	6 Conference Room	7 Drawing Office Supervisor	8 Laboratory & Survey Store
Electronic Typewriter					1			
Heavy duty hole puncher and heavy duty stapler			1	1	1		1	1
Fire extinguisher			1					1
First Aid Kit			1			1		1
Additional 13 amp socket outlets			2	4	2	2	1	2
Electric Kettle							1	1
Handheld Calculators		1 HP41CV with card reader	1 HP41CV with card reader	1 Casio	1 Casio			
Shelving 300mm wide x 25mm thick								2
Camera with zoom lens 20 degree to 105 degree								
Furniture setting			1					

APPENDIX 1G

PROGRAMME USING CRITICAL PATH METHOD (CPM)

Programme

Within 14 days after the receipt of the letter of Acceptance, the Contractor shall submit to the S.O. for approval a detailed work programme using the Critical Path Method (CPM) showing his proposals and the periods for carrying out the various sections of the works in order to complete the whole works within the completion time specified. The proposal must be together with schedule of construction plant and labour strength plan for the various periods and section of the works.

This programme must be presented in Gantt chart form and network diagrams indicating the critical activities and non-critical activities complete with all interface dates (Early Start, Late Start, Early Finish, Late Finish and Float / Slack times). This programme is inclusive of copies of all data on computer medium and printed hard copies together with the software and manuals.

The Contractor shall also furnish in writing to the S.O. or S.O.'s Representative particulars of the contractors method statements (method and sequence) for carrying out such works and of the construction plants and temporary works if any which the contractor intends to supply, use or construct as the case may be. The submission to and approval by the S.O. or S.O.'s Representative of such programme or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities under the contract.

For the purpose of monitoring the work progress effectively, the contractor shall carry out regular check on progress achieved against the planned progress. The contractor shall be required to update all information and maintained the planned programme using CPM periodically by trained and qualified personnel or as when instructed by the S.O.

For any Projects in which JKR furnish the Work programme, the Contractor shall provide all the necessary resources required as specified in the programme, or the Contractor may propose an improved programme which shall not exceed the contract period stipulated, in which case, the CPM must also be used, denoting all the critical milestones for the successful implementation and completion of the project. Notwithstanding the above, the Contractor shall submit method statements for carrying out such works and temporary works, if any, which the Contractor intends to supply, use or construct as the case may be.

If anytime it should appear to the S.O. that the actual progress of the Works does not conform to the approved programme referred to herein before, the Contractor shall submit for approval, a revised programme showing the modifications to the previously approved programme and additional resources necessary to ensure the completion of the whole works within the time set for completion.

APPENDIX 1H**AS-BUILT DRAWINGS AND ROAD ASSETS INVENTORY**

The Contractor shall prepare and submit as-built drawings, final Right of Way surveyed drawing in tracing, print, CAD format in computer CD as follows :-

	<u>No.</u>
1. All as-built construction drawing and final Right of Way Surveyed drawings in tracing (A1)	2 Sets
2. All as-built construction drawing and final Right of Way Surveyed drawings in prints (A3)	3 Sets
3. All as-built construction drawing and final Right of Way Surveyed drawings in CAD format in computer CD Rom	5 Sets

As-built construction drawings are to be approved by the S.O.

Final Right-of-Way surveyed drawings are to be prepared and certified by an approved licensed Land Surveyor.

As-built construction drawings shall be supplied by the Contractor to the S.O. progressively as sections of the works are completed within one month after the completion of the respective section.

The Contractor shall prepare and submit road asset inventory consist of the following:-

1. Inventory for culvert and bridges	2 Sets
2. Inventory for slope protection	2 Sets
3. Inventory for road furniture	2 sets

Inventory for road assets shall follow the latest format as per JKR requirement, with sufficient details as required and instructed by the S.O.

APPENDIX 1J

ENVIRONMENTAL QUALITY STANDARD (TABLE A2)

TABLE A2 : ENVIRONMENTAL QUALITY STANDARDS TO BE COMPLIED WITH BY THE CONTRACTOR

Aspects	Parameter	JKR EMS Set Target	Environment Quality (Sewage) Regulations, 2009		National Water Quality Standards (NWQS)	
			Standard A	Standard B	Class IIA	Class IIB
Soil	Soil loss	Minimum earthwork Phase construction ≤ 6 berms/benches for slopes (≤ 6m per berm) Reuse topsoil				
Water ^{1,2}	Turbidity	≤ 200 NTU	-	-	≤ 50 NTU	
	Suspended Solid	≤ 100 mg/l	≤ 50 mg/l	≤ 100 mg/l	≤ 50 mg/l	
	Biochemical Oxygen Demand ₅ @ 20°C (BOD) ₅	≤ 50 mg/l	≤ 20 mg/l	≤ 50 mg/l	≤ 3 mg/l	
	Chemical Oxygen Demand (COD)	≤ 100 mg/l	≤ 120 mg/l	≤ 200 mg/l	≤ 25 mg/l	
	pH	5.5 – 9	6 – 9	5.5 – 9	6 – 9	
	E-Coli	≤ 400 counts / 100 ml	-	-	≤ 100 counts / 100 ml	≤ 400 counts / 100 ml
	Dissolved Oxygen (DO)	≥ 4 mg/l	-	-	5 – 7 mg/l	
	Oil and Grease	≤ 10 mg/l	≤ 5 mg/l	≤ 10 mg/l	≤ 40 µg /l, N	
	Ammoniacal Nitrogen (river)	-	≤ 10 mg/l	≤ 20 mg/l	≤ 0.3 mg/l	
Air ³	Total Suspended Particulate (TSP) (24hr) Particulate Matter (PM10)(24hr)		≤ 250 µg/m ³ /day ≤ 150 µg/m ³ /day			
Noise ⁴	Equivalent Noise Level (L _{eq}), L ₁₀ ,L ₉₀		Receiving Land Use (residential)			
			Day time (7.00 am – 7.00 pm) L ₉₀ ≤ 60dBA; L ₁₀ ≤ 75dBA; L _{max} ≤ 90dBA;			
			Evening (7.00 pm – 10.00 pm) L ₉₀ ≤ 55dBA; L ₁₀ ≤ 70dBA; L _{max} ≤ 85dBA;			
			Night time (10.00 pm – 7.00 am) Noise Sensitive Areas : L _{Aeq} ≤ 40dBA			
			Suburban Areas : L _{Aeq} ≤ 45dBA Urban Areas : L _{Aeq} ≤ 50dBA			
Vibration ⁵	Vertical Vibration Peak Velocity (mm/s)		Not more than 3 mm/s at receiver location or across real property boundary			

Reference :

- 2nd Schedule (Regulation 7), Environmental Quality (Sewage) Regulations 2009, Environmental Quality Act 1974.
 - Standard A : For location with downstream water intake
 - Standard B : For location with no downstream water intake
- National Water Quality Standard for Malaysia
 - Class IIA : Water Supply II – conventional treatment required
 - Fishery II – sensitive aquatic species
 - Class IIB : Recreational use with body contact
- Recommended Malaysian Guidelines on Ambient Air Quality
- Schedule 1 & Schedule 5, Planning Guidelines for Environmental Noise Limits & Control, (DOE, 2004)
- Planning Guidelines for Vibration Limits and Control of the Environment (DOE, 2004)

Note: N – No visible floatable materials or debris or no objectionable odour, or no objectionable taste

APPENDIX 1K

CONSULTANT'S SUBMISSIONS AND DECLARATION FORM (SCHEDULE A)

Schedule A

Temporary Crossing

Declaration by the Professional Engineer

I hereby certify that I have designed and supervised the construction of the temporary crossing _____ for _____ bridge _____ across _____ in accordance with the required load and in compliance with all existing statutory requirements and JKR Specifications.

Engineer's Signature
(with official stamp or seal)

Contractor's Signature
(with official stamp or seal)

(Full name)

(Full name)

(Address)
:.....

(Address) :.....

(Date)

(Date)

APPENDIX 1L
(LAMPIRAN 1)

FORMAT PELAN KESELAMATAN DAN KESIHATAN PEKERJA (S-PLAN)

REFER TO LATEST JKR.PK(O).04B-1

(please refer to S.O/S.O.R. for latest version of document)

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APPENDIX 1M
(LAMPIRAN 4)

FORMAT PELAN KUALITI PROJEK (Q-PLAN)

REFER TO LATEST JKR.PK(O).01-4

(please refer to S.O/S.O.R. for latest version of document)

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FORMAT LAPORAN KESELAMATAN DAN KESIHATAN PEKERJA

REFER TO LATEST JKR.PK(O).04B-5

(please refer to S.O/S.O.R. for latest version of document)

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