

**NEEDS STATEMENT  
FOR  
DESIGN AND BUILD WORKS**

**( Civil Works Requirements For Buildings Project )**

Revision:2015

# CONTENTS

(Civil Works Requirements)

Revision: 2015

INDEX	CONTENTS	PAGE
<b>A.</b>	<b>GENERAL</b>	<b>A - 1/8</b>
1.0	Scope of Works	A - 1/8
2.0	Special Requirements	A - 1/8
3.0	Design criteria	A - 2/8
4.0	Standard and Codes of Practice	A - 2/8
5.0	Independent Checker	A - 2/8
6.0	Soil Investigation	A - 3/8
7.0	Anti-Termite Treatment	A - 3/8
8.0	Materials and Workmanship	A - 5/8
9.0	Contractor's Proposal	A - 5/8
10.0	Samples	A - 5/8
11.0	Compliance to Rules and Regulations	A - 6/8
12.0	Sufficiency of Proposal	A - 6/8
13.0	Standard Specification	A - 6/8
14.0	Material Testing Laboratory and Staff	A - 6/8
15.0	Supervision, Inspection and Material Test	A - 7/8
16.0	Covering up of Works	A - 7/8
17.0	Submittals	A - 7/8
18.0	Quality Assurance Plan	A - 8/8
19.0	Familiarization with Site and Local Conditions	A - 8/8
20.0	Obligation of Contractor and Consultant on Safety on Site and Adjoining Properties	A - 8/8
21.0	As-Built Drawings	A - 8/8
<b>B.</b>	<b>CIVIL WORKS</b>	
<b>B1.</b>	<b>EARTHWORKS</b>	<b>B1 - 1/2</b>
1.0	General	B1 - 1/2
2.0	Site Clearing and Earthworks	B1 - 1/2
3.0	Turfing	B1 - 2/2
4.0	Earth Retaining Structures	B1 - 2/2
5.0	Slope Stability	B1 - 2/2
<b>B2.</b>	<b>DRAINAGE SYSTEM</b>	<b>B2 - 1/1</b>
1.0	General	B2 - 1/1
2.0	Design Consideration	B2 - 1/1
<b>B3.</b>	<b>ROAD WORKS</b>	<b>B3 - 1/5</b>
1.0	General	B3 - 1/5
2.0	Design Consideration	B3 - 1/5
3.0	Relocation / Protection of Utility Services	B3 - 2/5
4.0	Works under Water	B3 - 2/5
5.0	Survey, Subsurface Exploration and Design Requirements	B3 - 2/5
6.0	Roads Design Criteria	B3 - 3/5

# CONTENTS

(Civil Works Requirements)

Revision: 2015

INDEX	CONTENTS	PAGE
7.0	Pavement	B3 - 4/5
8.0	Intersection and Access	B3 - 4/5
9.0	Temporary Control Devices and Signs	B3 - 4/5
10.0	Road Marking	B3 - 4/5
11.0	Guardrails	B3 - 5/5
12.0	Temporary Works or Diversions	B3 - 5/5
13.0	Traffic Control Devices	B3 - 5/5
17.0	Slopes	B3 - 5/5
<b>B4.</b>	<b>EXTERNAL WATER SUPPLY SYSTEM</b>	<b>B4 - 1/3</b>
1.0	General	B4 - 1/3
2.0	Design Consideration	B4 - 1/3
3.0	Approvals	B4 - 1/3
4.0	Distribution Pipes	B4 - 2/3
5.0	Storage and Suction Tank	B4 - 2/3
6.0	Pump Station and M & E Works	B4 - 2/3
7.0	Instrument and Meter	B4 - 2/3
8.0	Location of Distribution Pipes	B4 - 3/3
9.0	Ancillary Works	B4 - 3/3
10.0	Testing and Commissioning	B4 - 3/3
11.0	Operation and Maintenance	B4 - 3/3
12.0	Defect and Liability Period	B4 - 3/3
13.0	Electricity Supply for Pumping Station	B4 - 3/3
<b>B5.</b>	<b>SEWERAGE SYSTEM</b>	<b>B5 - 1/3</b>
1.0	General	B5 - 1/3
2.0	Design Consideration	B5 - 1/3
3.0	Pipeworks	B5 - 1/3
4.0	Manholes	B5 - 2/3
5.0	Pump Station and M & E Works	B5 - 2/3
6.0	Standard of Effluent Discharge	B5 - 2/3
7.0	Sewage Treatment Plant (STP)	B5 - 3/3
8.0	Testing and Commissioning	B5 - 3/3
9.0	Operation and Maintenance	B5 - 3/3
<b>C1.</b>	<b>RENOVATION, UPGRADING AND REHABILITATION WORKS</b>	<b>C1 - 1/1</b>
1.0	General	C1 - 1/1
2.0.	Proposal	C1 - 1/1
3.0	Safety and Functionality	C1 - 1/1
	<b>ATTACHMENT</b>	
	A - SOIL INVESTIGATION REPORT	
	B - SCHEDULE FOR WORKS SUBMISSION ITEMS	

**SECTION A**

**A GENERAL****1.0 Scope of Works**

The Works shall cover planning, design, construction supervision, testing, commissioning and maintenance thereof for the period on the following works:-

- B1. EARTHWORKS
- B2. DRAINAGE SYSTEM
- B3. ROAD WORKS
- B4. EXTERNAL WATER SUPPLY SYSTEM
- B5. SEWERAGE SYSTEM
- C1. RENOVATION, UPGRADING AND REHABILITATION WORKS

**2.0 Special Requirements**

- 2.1 All Works with respect to investigations, design, construction and maintenance shall comply with all the Government Requirements Regulations and By-laws. The contractor shall at all times ensure that the works carried out at the site do not affect functionality, safety and security of the existing buildings in operation adjoining the site. Care shall also be taken to minimise impact on the buildings operation as well as patient to acceptable level. As such the contractor shall at his own cost provide all necessary barriers, netting, drainage system and other counter measures to the satisfaction of the Project Director (PD). Access road to the buildings shall not be used as access to the work site, unless otherwise approve by the PD.
- 2.2 All engineering investigations, design, construction and supervision shall be carried out, developed and refined by the Contractor who shall engage qualified Consultant(s) registered with the Board of Engineers Malaysia (BEM) referred to hereinafter as the Consultant. The Contractor through the Consultant shall undertake to do all detailed drawings and alterations as and when necessary at no cost variation to the accepted Tender Sum. The Consultant shall be a separate entity from the Contractor.
- 2.3 The Contractor shall engage License Surveyor to undertake surveys of site boundaries, spot levels and topographical features etc. within the site and extending beyond the site boundaries as warranted by the design requirement. The Contractor shall also undertake utility mapping within the site where necessary.
- 2.4 The Contractor shall also appoint another qualified Consultant registered with BEM as the Independent Checking Engineer (referred to hereinafter as the Checker) for this project, the Contractor shall submit and propose a minimum of 3 names to JKR for approval. The Checker shall take full responsibility for integrity, thoroughness and competence of his report and recommendation. It's adequately carried out in accordance with the accepted engineering practice and to ensure the structural integrity and stability of the proposed construction. The Checker's criteria and scope of services shall be referred to the relevant clauses below.
- 2.5 All designs shall optimally satisfy the requirement of the latest standard engineering practice in respect of functional adequacy, safety, robustness, suitability and effectiveness. The designs shall be approved by the local and the central authorities and be in the best layout with most suitable material to give the best economic and good aesthetic values.
- 2.6 The Contractor shall include the Design Development Plan (DDP) in the Critical Path Method (CPM) to be submitted to the Project Director (PD). The DDP shall include all the design phases in detail.
- 2.7 The Contractor shall submit detailed designs for all aspects of the Works mentioned in Clause 1.0. Any changes in the design shall be supported with design reports and subjected to the PD approval.
- 2.8 All engineering and shop drawings together with all relevant reports prepared by the Consultant shall be submitted to the PD's and when required to.
- 2.9 The onus of obtaining timely approval from each relevant Approving Authority for each design drawing shall be the Contractor's responsibility. Untimely receipt of approvals which may affect the Contractor's design / construction program shall not in any way be a basis / cause for consideration of time extension or variation to the contract.
- 2.10 All design calculations shall be prepared and signed by the respective Consultant. The calculations shall be submitted to the PD for approval.

## GENERAL

(Civil Works Requirements)

Revision: 2015

- 2.11 Approval or acceptance by the PD or the Approving Authority of the Consultants drawings and design calculations shall not relieve the Contractor of his responsibilities and liabilities in the design.
- 2.12 The Contractor shall submit his detail design including plan indicating progressive interactive submission and approval, within 2 weeks from the date of issuance of Letter of Acceptance (L.A).

### 3.0 Design Criteria

- 3.1 The Works shall be designed by the Consultants engaged by the Contractor in accordance with the particular design criteria and design methods as stated in the design statements. In the absence of any such statements for any design aspect or any design element, it shall be the responsibility of the Contractor to adopt well-known and internationally accepted updated edition of the Codes of Practice / Standards / criteria and method in the design.
- 3.2 All design criteria shall be subjected to the acceptance of the PD with the submission of the necessary justification-implication by the Contractor.
- 3.3 The design concept shall adhere to that shown in Pre-bid document.

### 4.0 Standards and Codes Of Practice

- 4.1 Codes of Practice, Manual and Standards adopted to cover design, materials workmanship, performance, etc. shall be the relevant Malaysian Standards or approved International Codes of Practice or Standards.
- 4.2 The preference order of Codes of Practice and Standards shall be Malaysian, European, British and followed by any other approved International Codes of Practice or Standards. Where International Codes of Practice or Standards are quoted in the Specifications, these shall be substituted by equivalent Malaysian Codes of Practice, Manual and Standards where available. Should there be any conflict in the Codes of Practice or Standards requirements, and then unless otherwise approved by the PD, the more stringent criteria shall be adopted.
- 4.3 The Contractor shall adopt the latest edition of each Standard, Manual and Code of Practice as at the time of award of Tender, notwithstanding the reference year of the edition of that stated in the Standards, Manual and Codes of Practice in the ensuing Clauses of this Specification.

### 5.0 Independent Checker

- 5.1 Professional Criteria
- The Contractor shall submit names and professional qualifications of at least one individual expert for the field of structural, geotechnical and civil disciplines respectively for JKR approval.
- The experts shall have at least 10 years of working experiences at the professional level in their respective design works or have published several technical papers in their specialised fields (not less than 5 technical papers in National / International seminar, conferences or journals); and by virtue of professional standing and experiences, deserving of such a designation.
- The Checker shall not have any financial or professional interest in the project he is undertaking such related materials. The report may include the Checkers suggestion, amendments, alternative solutions and designs for amendments and/or alternative solutions.

### 5.2 Scope of Services

The Checker shall issue a certificate in respect of the plans relating to the structure, geotechnical, civil and associated Works stating that, to best of his knowledge and belief, the plans so checked do not show any inadequacy in the design and details of the key elements.

The Checker shall evaluate, analyse and review the structural, geotechnical and civil design and details in the plan and perform such independent calculations with a view to determine the adequacy of key elements. The Checker shall verify that the key elements designed are consistent with general layout shown and in any amendments there to.

The Contractor shall make sure sufficient working drawing details and specifications be made available to the checker.

The checker in carrying out this is required to (but not limited):

- a. Verify the use of Code of Practice, Design Standards and Manual and Arahan Teknik JKR
- b. Check the design loadings
- c. Check the standards and specifications of materials to be used
- d. Ascertain the design concept used and identify the key elements
- e. Check the civil, structural and geotechnical detailing, and
- f. Determine the adequacy of other aspects of the design which are peculiar and other associated civil works.

### **5.3 Reporting**

The Checker's report shall be submitted in writing to the PD within 2 weeks of the Independent Check being done or otherwise as agreed in writing.

The report shall specifically describe the deficiencies, potential or real, which have been identified along with the relevant references to accepted standards, practices and design principles. The point shall be illustrated wherever practicable by marking-up the plans or with sketches, drawings and such related materials. The report may include the Checker's suggestion, amendments, alternative solutions and designs for amendments and/or alternative solutions.

### **6.0 Soil Investigation**

6.1 The Contractor shall carry out sufficient soil investigations prior to commencement of all civil and geotechnical design works.

The PD may provide the preliminary soil investigation result for the sole purpose of guiding the Contractor to provide the following costs estimate:

- a. Determination of the construction measures to be adopted by the Contractor, including temporary works, and
- b. Design considerations for all civil and geotechnical design works.

The PD will not be responsible for any inaccuracies of the soil data presented prior to tender.

6.2 The Contractor shall comply with the Rules and By-Laws of Local Authorities in executing the soil investigations works to ensure complete safety and harmony with the surroundings to the satisfaction of the PD.

6.3 The complete soil investigation report together with results of laboratory testing undertaken by the Contractor shall be submitted to the PD.

### **7.0 Anti-Termite Treatment.**

Anti-Termite treatment shall comply with the requirement of Architectural Needs Statement.

### **8.0 Materials and Workmanship**

8.1 All materials to be incorporated in the Works shall be new and the workmanship throughout the work shall be of high quality. Unless otherwise specified, all materials and workmanship shall comply with JKR Standard Specifications for Building Works 2014 as the minimum criteria, Malaysian Standards and Manual and with all relevant Specifications and Codes of Practice.

8.2 The Contractor shall provide the necessary facilities for any tests and inspections and arrange for certification as specified in the civil works requirement and/or deemed necessary by the PD.

8.3 Whenever in the Specification any proprietary materials are specified such are to be deemed as being the minimum standard/quality acceptable, alternatives of such materials may be considered for acceptance by the PD provided they comply in all aspects with strength, size appearance and quality to that specified. The Contractor shall submit to the PD, proof and proper technical evidence of such alternative material to substantiate their compliance with the Specifications. The Contractor shall comply with the requirements of all tests deemed necessary by the PD for such alternative material. The Contractor is responsible for all such test implications, cost-wise and time-wise.

8.4 Approval or acceptance by the PD of materials and workmanship shall not relieve the Contractor of his responsibility under the Contract for the quality of materials and standard of workmanship required in the Works.

### 9.0 Contractor's Proposal

The Contractor's proposal for the Works shall include the following details and information:

- a. Description on the Scope of Works;
- b. Layout plans denoting the limit of works including detail components of earthwork layout, drainage system, Erosion & Sediment Control Plan (ESCP), water supply system, sewerage system and internal road system;
- c. Design criteria, loading data, design standards and calculations, wherever appropriate;
- d. The design proposal shall be professionally developed and refined to meet its proper function. The Contractor shall undertake to do all the alterations to the detail working drawings prior to construction at no cost variation;
- e. Any associated works, temporary or otherwise, deemed necessary for the proper execution of the final permanent works. The cost of these associated works having been already included in the pricing for the Works;
- f. Materials and Components Specifications;
- g. Works Specifications;
- h. Original technical information for all proposed system; and
- i. Project Quality Assurance which shall include procedures for selection, testing of materials, method statement, acceptance of works, remedial of defective works etc.

### 10.0 Samples

The Contractor shall submit samples of materials together with supporting technical information for approval prior to incorporating them in the Works and as when required. Where so directed test certificates shall be produced. All samples which are approved shall indicate the standard to be maintained in the execution of the Works. Materials which are rejected shall not be used in the Works.

### 11.0 Compliance to Rules And Regulations

11.1 All Works shall be in accordance with good engineering practice and shall comply with the By-Laws and latest Rules and Regulations of all Approving Authorities. A copy of all correspondences with approving authorities shall be extended to the PD.

11.2 Prior to the commencement of the construction works and handing over at the end of the contract period, approval from all Relevant Authorities must be obtained.

11.3 All designs and drawings shall be prepared and endorsed by the Consultant. Detailed working drawings, shop drawings, amendments etc. shall be submitted and agreed by the PD prior to construction or fabrication.

11.4 The functional adequacy and professional liabilities of the design shall be the sole responsibilities of the Contractor.

**12.0 Sufficiency of Proposal**

The Contractor shall have satisfied himself before submitting his proposal as to the correctness and sufficiency of his proposal for the Works and the Contract Sum, except in so far as is otherwise provided in the Contract, shall cover all his obligations under the Contract and all matters and things necessary for the proper design, construction, completion, maintenance and guarantee of the Works.

**13.0 Standard Specification**

13.1 The following standard specifications including any relevant amendments thereof, shall be adopted by the Contractor, as listed:

- a. Uniform Building By-Laws
- b. JKR Standard Specification for Bridgeworks (JKR/SPJ/2013-S13)
- c. JKR Standard Specification for Structural Steel Work (JKR 20601-0191-12)
- d. JKR Standard Specification for Building Works 2014
- e. JKR Standard Specification for Road Works (JKR/SPJ/1998)
- f. Standard Specification for Road Works (Section 3: Drainage Works) (JKR 21300-0057-14)
- g. Standard Specification for Road Works (Section 6: Road Furniture) (JKR 21300-0037-12)

including any relevant amendments thereof, shall be adopted by the Contractor. All concrete works shall be in accordance to Needs Statement For Design and Build Works (Structural Engineering Requirements For Building Projects). Where the words Superintending Officer or S.O. appear in the Standard Specification they shall be taken to mean the PD.

13.2 For works which are not covered by the Standard Specifications and for any details where the Contractor deems necessary to make modifications, the Contractor shall submit addendum to the Standard Specifications in his proposal, giving complete details of the proposed specification or modifications.

**14.0 Material Testing Laboratory And Staff (If Required)**

14.1 The Contractor shall provide, maintain laboratory at the site throughout the duration of the Contract. Earthworks, road works, concrete and structural works etc. shall not commence until the laboratory and staffs have been equipped. The laboratory shall be staffed with a full time competent technician well experienced in material testing.

14.2 The Contractor shall provide all testing equipment necessary to carry out any test requirements for civil and structural works etc. The Contractor shall carry out test on materials and a complete record of all test results shall be kept up to date by the Contractor.

14.3 Without limiting the Contractor's responsibility as above, the facilities of the laboratory shall be available for the use of the PD who may wish to perform control tests on the workmanship and materials.

14.4 Testing which are specifically required by the Standards/Codes of Practice to ensure compliance with the Contract but cannot be done in the site testing laboratory shall be carried out at approved laboratory and the cost incurred shall be borne by the Contractor.

**15.0 Supervision, Inspection and Material Test**

15.1 The Consultant shall be responsible for the supervision of the civil and structural works including certifications of all works.

15.2 Where laboratory at site is not provided, all tests which are specifically required by the Standards / Codes of Practice to ensure compliance with the contract shall be carried out at an approved laboratory and the cost incurred shall be borne by the Contractor.

15.3 The PD may at any stage of the Works carry out inspection, measurement and tests on any part of the Works to ensure compliance with the contract. The Contractor shall provide the necessary attendance whenever required by the PD.

- 15.4 The Consultant shall ensure that the supervisory staff is stationed at the site as soon as the construction works commences and at all time until the construction is completed.
- 15.5 The Contractor shall follow strictly the instructions issued by the PD in carrying out the supervision of the works.
- 15.6 The Consultant shall show proof of the validation of the design inputs.
- 16.0 Covering Up Of Works**
- 16.1 Before any part of the Works is permanently covered up, the Consultant shall certify in writing that the work have been inspected by him and completed as per contract and all necessary quality control tests have been carried out and approved. A copy of the quality control test results shall be submitted to the PD.
- 17.0 Submittals**
- 17.1 The Contractor shall prepare and submit TWO (2) hardcopies and TWO (2) softcopies in CD / DVD / Thumb Drive of complete sets of detailed design documents for all permanent and temporary works to be reviewed / approved by the PD.
- 17.2 The detailed design documents shall include, but not limited to the following:
- Design criteria, Codes of Practice and Standards used;
  - Design calculation sheets, including computer input and output, if any, (where computer software used in the analysis is not available in the market, the Contractor shall demonstrate the accuracy of the software, and a copy of such software shall be made available to the PD for verification and checking);
  - Design and working drawings including notes and symbols;
  - Catalogues and other relevant information necessary for the PD to review the design documents;
  - Loading data sheets which shall include the data to be supplied by the suppliers of special building components to verify the loading used in the structural analysis;
  - Method Statements for the construction operation of permanent and temporary works;
  - Additional Design / work specifications, other than specified in 11.0;
  - An outline of the method of erection envisaged by the Contractor, giving the sequence for erecting the structure taking into account any phasing of the Works; and
  - Define the responsibilities at the interface between the steelwork and other trades.
- 17.3 All of the above must be endorsed by the Consultant in the relevant fields.
- 17.4 Items to be submitted and included in the Pre-bid Document shall be as listed in the Schedule for Works Submission in Attachment B. The schedule is to serve as a guide on the basic items to be submitted by the Contractor. The Contractor should consider and include all other items as required in the Needs Statement.
- 18.0 Quality Assurance Plan**
- The Contractor shall submit to the PD detailed Quality Assurance Plan prior to the execution of the Works. Each and every Quality Assurance Plan shall conform to the requirements of Sistem Pengurusan Bersepadu (SPB) JKR.
- 19.0 Familiarisation with Site and Local Conditions**
- 19.1 The Contractor is deemed to have visited the site and familiarised himself with all site and local conditions that pertain to the design and execution of this work. The Contractor shall take all necessary precautions during the construction works so as not to affect any surrounding buildings, structures and roadwork.
- 19.2 In addition to this, the Contractor shall familiarise himself with basic requirements and needs of the design as illustrated in the Architectural drawings and specifications.

**20.0 Obligation of Contractor and Consultant On Safety on Site and Adjoining Properties**

The Contractor and Consultant shall ensure adequate safety on site and to the adjoining properties. The Contractor shall ensure the full compliance to the requirements of the Local Authority, Jabatan Keselamatan dan Kesihatan Pekerjaan and the PD.

**21.0 As-Built Drawings**

21.1 All as-built drawings are to be duly prepared, updated and maintained throughout the contract period. All such drawings duly dated where applicable and duly certified by the Consultant shall be submitted to the PD not later than three (3) months after the completion of the construction works. All as-built drawings shall be endorsed by the Consultant and submitted in the format as follows:

- a. Linen Copy.
- b. Three (3) bound sets of drawings / prints in A1 size;
- c. One (1) full set of drawings in DVD format; and
- d. Digital 3D Model of as-built civil works component in format as approved by the PD.

**SECTION B**

**B1 EARTHWORKS****1.0 General**

- 1.1 The earthworks shall consist of all the required site clearing, excavation, filling, rock blasting, grading, levelling, compaction and other earthworks within the limits of the works. It shall include the removal and proper utilisation and hauling or disposal of all excavated material and constructing, shaping and finishing of all excavation over the entire of the works in conformity with the drawings and the specifications.
- 1.2 The excavation shall be executed in such manner and order as approved by the PD. The Contractor shall be responsible for the compliance with the Rules and Regulations and By-Laws of Local Authorities.
- 1.3 The Contractor shall propose a comprehensive erosion and sediment control plan (ESCP) conforming to MSMA requirement. These shall include provision of Best Management Practices (BMPs) such as turving, earth drains, check dams, sediment basin and others temporary control measures. Washing bays shall be provided to remove excessive sediment from out bound vehicles at all site access points.
- 1.4 The Contractor shall construct and maintain the ESCP measures above throughout the construction period. The Contractor shall be solely responsible to pay any fine imposed by the Local Authority as a result of his own negligence or that of his employees or agent in this connection. On completion of the works or whenever directed, the Contractor shall remove all ESCP BMPs including making good all damage done and payment of all charges.
- 1.5 The entire site formation levels shall be designed and filled higher than the known flood levels provided by Jabatan Pengairan dan Saliran. In absence of such information the flood level shall be determined by other reasonable means.

**2.0 Site Clearing and Earthworks**

- 2.1 The site shall be cleared and debris to be removed from the site. The top soil shall be stripped and stocked at suitable places to be used for turving and landscaping purposes as approved by the PD. Existing utilities and services that are affected by the construction shall be relocated.
- 2.2 Earthworks shall be carried out according to good engineering practice, conforming to the Malaysian / European / British Standards and Code of Practice EN 1997 and MSMA 2nd Edition where applicable.
- 2.3 The characteristic of the soil has to be studied to determine its engineering properties and its suitability as filling materials. The slope shall be designed for stability and suitable slopes protection has to be provided.
- 2.4 Earthworks shall be planned and constructed without causing silting up of canals, streams, drains, culverts or any other drainage structures. Precautions shall also be taken to prevent earth moving plants and vehicles from affecting cleanliness of public roads or causing objectionable dust to the atmosphere.
- 2.5 Temporary drainage shall be constructed within the site so as to prevent any ponding or water logging. Good surface drainage must always be maintained to prevent erosion and to stabilise cut and embankment slopes.
- 2.6 Unsuitable material such as running silt, peat, logs, stumps, perishable or toxic material, slurry, mud or any material that is soft shall be excavated to such depth and over such area. They shall be transported and disposed of in an approved manner. The Contractor shall be responsible for providing his own dumpsite for such unsuitable materials. Voids created due to removal of such materials shall be backfilled with suitable material compacted to a dry density not less than that of the surrounding or that specified for the respective part of the earthworks or as directed by the PD.
- 2.7 If the removal of unsuitable material is to be done under standing water, voids created due to removal of it shall be backfilled with hard clean crushed rock, natural gravel or sand having grading within the respective limits.
- 2.8 Prior to forming embankment over soft ground, the soil over which fill material shall be placed shall be given strength improvement treatment by means of replacement of unsuitable material as specified in Clauses 2.6 and 2.7 or other approved method. The first layer or layers of fill materials shall be deposited over the full width of the embankment in thickness and compacted using suitable compaction plant for working over soft ground.
- 2.9 The embankment shall be built to different heights in stages with or without surcharge with allowance for consolidation time periods in between stages. Where surcharge is specified, the Contractor shall be responsible for the provision of surcharge material and the removal and disposal of excess material on completion of consolidation or when directed by the PD.

## EARTHWORKS

(Civil Works Requirements)

Revision: 2015

- 2.10 The Contractor shall also be responsible to provide ground monitoring instrumentations such as piezometer, settlement markers and plates and inclinometer within embankment and soil replacement area such as to facilitate the monitoring and reporting phase of any ground improvement methods/slope stabilization method where necessary or as directed by the PD.

### 3.0 Turfing

- 3.1 All slopes and open areas shall be turfed. Slope shall be turfed immediately after construction and completed within 2 weeks.
- 3.2 All turfing works shall conform to the JKR Standard Specification for Building Works 2014 and JKR Green Mission.

### 4.0 Earth Retaining Structures

All Earth Retaining Structures shall be designed in accordance with the:

Needs Statement For Geotechnical Works; and

Needs Statement For Design and Build Works (Structural Engineering Requirements For Buildings Projects).

### 5.0 Slope Stability

- 5.1 All slopes shall be provided with adequate protection against soil erosion and lined drains shall be provided for each berm and bench of all slopes. If any, all unstable rock slopes shall be adequately protected and stabilized with acceptable techniques.
- 5.2 All cut and fill slopes shall be designed in accordance with the Needs Statement For Geotechnical Works.

**B2. DRAINAGE SYSTEM****1.0 General**

- 1.1 The drainage works shall consist of all required design and construction of the drainage system and shall conform to the requirements of Jabatan Kerja Raya, Jabatan Pengairan dan Saliran and Local Authorities.
- 1.2 Proper sustainable drainage system shall be provided in compliance with MSMA. All drains shall be properly designed and constructed to give the best hydraulic features. There shall be no flooding, ponding, silting-up either during construction or after completion of the works.
- 1.3 Drains shall be designed around buildings, on both sides of the roads and at other necessary locations so as to prevent flooding, settlement, erosion and instability of soil and slopes. All perimeter drains around buildings shall be covered or concealed.
- 1.4 Final discharge point shall be identified and approved by the PD and relevant authorities. Drainage system outside the boundary within the vicinity of the project shall also be considered in overall project design. If necessary the drainage system shall be upgraded in order to ensure adequate and fully functional drainage system is provided for the project.
- 1.5 Drainage system shall include construction of drains, sumps, culverts, scupper drains, cascading drains, subsoil drains, interceptor drains and pumping stations etc. where necessary.

**2.0 Design Consideration**

- 2.1 The Stormwater Quantity Design Criteria shall comply with MSMA.
- 2.2 Drainage system shall be designed with regard to both operation and ease of maintenance. Adequate gradients shall be provided to enable self-cleansing flow.
- 2.3 Side walls of drains, wing walls and apron of culverts shall be properly designed and constructed to prevent erosion or scouring.
- 2.4 All structural works such as culvert and related components are to be designed and constructed in accordance with the relevant Malaysian / European / British Standards and Codes of Practice.
- 2.5 All deep sumps, deep drains shall be covered with high strength grating to ensure safety of pedestrian or vehicles. All drains at the entrances and exits to buildings as well as public area must be properly covered by suitable cover slabs or grating.
- 2.6 Other safety structures like parapet wall, guardrails shall be provided where necessary.
- 2.7 Rain water harvesting system shall be designed whenever indicated to recycle rainwater for non-portable use such as cleaning and landscaping.

**B3. ROAD WORKS****1.0 General**

1.1 The starting point for the proposed alignment of the road network will form a junction at the existing roads towards the site proper. The alignment shall be proposed by the Contractor.

1.2 The road works shall comprise the following major components:

- a. Construction of access road(s) from the Federal / State and municipal road including all the works required by Local Authorities / JKR;
- b. Construction of an internal road network within the site;
- c. Construction of earth retaining structure where necessary along the proposed road;
- d. Construction of proper drainage system to drain out water from areas along the road to suitable discharge points;
- e. Construction of road intersections, road markings, road furniture, traffic control devices, public utilities service culvert, relocation/protection of existing services, street lightings, traffic lights, pedestrian sidewalk, landscaping, environmental protection and all other associated works;
- f. Construction of hard-standing at required areas; and
- g. Carrying out traffic study and / or Traffic Impact Assessment (TIA) when required by the PD / Local Authority.

**2.0 Design Consideration**

2.1 All designs shall optimally conform to REAM Guidelines / Arahan Teknik (Jalan) JKR and other approved International Standard (when required) in respect of visual elegance, functional adequacy, safety, suitability, robustness, ease of maintenance, cost effectiveness and aesthetics.

2.2 The Contractor shall collect and analyse all available data, records, proposals, and drawings. Any further study, survey or investigation shall be carried out if additional information is required for the design and construction of the whole works.

2.3 The Contractor shall verify ground details such as topographical features, existing tracks and location of existing utility services to confirm the information contained in the existing survey drawings. Additional field survey shall be carried out if further information is required.

2.4 The Contractor shall prepare the specification on work methods, materials and workmanship for the works which is not covered by the latest JKR Specifications.

2.5 The Contractor shall identify all public utilities inclusive of High Tension Transmission lines affected by the works and provision for relocation and protection of services to the satisfaction of the relevant utility authorities or companies.

2.6 The Contractor shall identify all associated drainage facilities comprising culverts, sub-surface and surface drainage works and the relocation, repair and removal of existing drainage structures where required in full compliance to all JKR / JPS / Local Authorities requirements.

2.7 The Contractor shall ensure that all other works and services necessary to satisfactorily design, construct, complete and maintain the whole works to comply with the Government's Requirement.

**3.0 Relocation/Protection of Utility Services**

3.1 The Contractor shall, during the design stage, liaise with all affected utility companies or authorities with regard to existing utility installations on the necessity of relocation/protection or diverting such installations. The Contractor shall, if required, establish exact locations of these installations by trial trenching. The Contractor shall put up detailed plans and proposals for the relocation, temporary or otherwise, of such services if affected by the Works.

3.2 The Contractor shall also incorporate necessary safeguards to protect the existing services against damage or destruction during construction. Design and construction of such relocation/protection works shall be subjected to the approval of the respective utility companies or authorities. The cost of such relocations and protection works shall be deemed to be included in the Contract Price. These services should include utility gas pipes, electrical and telecommunication lines, water pipes and others.

#### 4.0 Works under Water

The Contractor shall be deemed to have ascertained for himself before pricing, of the extent of the work which will have to be carried out under water and his rates and prices shall include for all costs and charges whatsoever arising out of such working.

#### 5.0 Survey, Subsurface Exploration and Design Requirements

##### 5.1 General

The Contractor shall search and study all reports on feasibility study, development plans and investigations related to the Works so as to enable full understanding of factors which may affect the works. Notwithstanding requirements stipulated herein the Contractor shall ensure that all designs satisfy the aspects of aesthetics, functional requirements, safety, suitability and effectiveness completely to the intent of the Works.

##### 5.2 Surveys

The Contractor shall carry out when required additional land surveys of the proposed site of the Works, which may be necessary to supplement available survey information, for the satisfactory execution of design and construction of the Works. Survey plans shall be prepared in scales appropriate to their purpose.

##### 5.3 Subsurface Exploration

The Contractor shall undertake additional soil investigation and material surveys for the purpose of preparing of engineering design and construction of the Works.

##### 5.4 Detailed Design, Drawings and Specifications

The Contractor shall carry out and prepare detailed analysis, design, drawings and specifications following the approval of the preliminary design by the Government. This shall include the following:

- a. Detailed analysis and design of the Works;
- b. Scale plans and drawings for the complete construction of the Works. These shall include:
  - i. Layout plans of the earth retaining structure and road showing details of geometric elements and existing ground levels;
  - ii. Detailed setting out plans for the road alignment, intersections, slope protection, drains and culverts and other related structures all to a suitable scale including the invert levels and reduced levels at appropriate intervals and locations;
  - iii. Typical cross-sections of the road, culverts, connecting roads, temporary diversion roads and crossings, earth embankments, retaining walls, etc. showing the various dimensions of the elements at appropriate locations;
  - iv. Longitudinal sections of the road, culverts, connecting roads, temporary diversion roads and crossings, earth embankment, retaining wall, etc. showing the existing levels, proposed levels, super-elevation and also invert levels of drains and culverts;
  - v. Drainage and sub-soil drainage plans, showing details such as type, size and length and other dimensions of the proposed drainage system;
  - vi. Structural drawings for the structures shall include the engineering design of the foundations, and the design of the earth retaining structure;
  - vii. Plans showing road layout, lane markings, traffic signs including advance directional signs and Traffic Management Plan during construction Plans showing proposal for environmental protection and mitigation works. Plans showing details of public utility services, which shall include 'ducting'; and

viii Land acquisition plans as the case may required.

## 6.0 Roads Design Criteria

### 6.1 Road Geometrics

The geometric design of the road and bridge structures shall satisfy the minimum criteria for JKR R3/U3 standard laid down in Arahan Teknik (Jalan) 8/86 - "A Guide to Geometric Design of Roads", where appropriate. In selecting the design alignment the following requirement should be considered:-

- a. Minimum land acquisition and minimum overall construction cost;
- b. Minimizing services relocation works; and
- c. Minimizing the number of river, stream / canal crossing.

### 6.2 Vertical Alignment

A desirable grade shall be allowed for the approach roads.

### 6.3 Lane width

Lane width shall be a minimum of 3.0 meter with an additional marginal strip of 0.25 meter throughout the whole stretch unless specified otherwise elsewhere in the Pre-bid document.

### 6.4 Road Shoulders

Road shoulder shall be a minimum of 1.5 meter on both side unless conditions require otherwise.

### 6.5 Road Median (if required)

Road median shall be of 3.0 meter wide.

### 6.6 Pedestrian Walkway

The pedestrian walkway shall be a minimum of 2.0 meter wide throughout the whole stretch of the road on both sides of the road or only at one side of the road where space is restraint for the construction of the walkways.

### 6.7 Road Drainage

A minimum drain reserve of 1.5 meter wide shall be provided for on both sides of the road. Surface runoff, stream and river flow in the vicinity of the roadway shall be computed and from such computation design shall be made for drainage system of the road which includes culvert, roadside drain, subsoil drain, interceptor drain, etc. All drainage design shall be in accordance with the guidelines and criteria established by JKR as well as procedures in MSMA. The structural design of reinforced box culverts shall be in accordance with Eurocode 2 and the loading shall be in accordance with that of MS EN 1991.

### 6.8 Design Flood Levels

The following criteria for estimation of design flood levels shall be adopted:

- a. For embankments in areas subjected to flooding, the final road level shall be designed to be at least 150mm above the 25-year ARI (Average Recurrence Interval).
- b. Surface drains shall be designed for a minimum of 5-year ARI and shall cater for efficient removal of stormwater from road surface, erosion protection and slope stabilisation.

## 7.0 Pavement

The pavement for roadwork shall be of flexible type and designed in accordance with the Arahan Teknik (Jalan) 5/85 (Pindaan 2013) while the pavement structures shall be comply to the Catalogue of Pavement Structures in the Figure 3.2 Traffic Category T 2: 1.0 to 2.0 Million ESALs (80 kN) or REAM Guidelines. The design life of the flexible pavement shall be 15 years.

**8.0 Intersection and Access**

The layout, design and type of control at intersections shall be prepared to suit the traffic volume.

**9.0 Temporary Control Devices and Signs**

Temporary control devices and signs during construction shall be in compliance with relevant JKR and REAM Guidelines with respect to traffic control devices, temporary sign and work zone control.

**10.0 Road Marking**

The design covers all road markings such as centre line, edge line, chevron, arrows, etc. The marking shall be made from reflective paints. Types and colour of the markings shall be designed in accordance to Arahan Teknik (Jalan) 2D/85 published by JKR.

**11.0 Guardrails**

The design of traffic guardrails shall generally follow the "Design Guidelines for Longitudinal Traffic Barrier - Arahan Teknik Jalan (Rev.1/89)" published by JKR.

**12.0 Temporary Works or Diversions**

The Contractor shall include in his design any temporary work or diversion that are needed during the construction period. All temporary works shall be able to cater for uninterrupted flow of traffic for the period concerned. All temporary control devices and signs shall be in accordance with the Standard Road Specification JKR/SPJ/1998 and Arahan Teknik (Jalan) 2C/85 "Manual on Traffic Control Device, Temporary Signs and Work Zone Control" published by JKR.

**13.0 Traffic Control Devices**

The Contractor shall provide adequate traffic control devices and roadside furniture such as directional signs and pavement markings all in accordance with JKR Arahan Teknik (Jalan) 2A/85, 2B/85, 2D/85 and 2E/87.

**14.0 Slopes**

All slopes shall be designed to the requirement of Geotechnical Needs Statement.

**B4. EXTERNAL WATER SUPPLY SYSTEM****1.0 General**

- 1.1 The Works shall consist of all required design and construction of the external water supply system in order to provide reliable and sufficient water supply to the proposed project. The external water supply system shall be designed and implemented in harmony with other utilities and surroundings to meet the Client's needs in terms of functionality ease of operation & maintenance and durability.
- 1.2 The information in relation to the project such as location, number of buildings, building height, the basic functions of the buildings etc., shall be obtained from the Architectural Needs Statement or other documents in the Pre-Bid Document.
- 1.3 The total water demand for the project shall be estimated based on the basic function of the proposed project. The Contractor shall design, construct, complete and commission the external water supply systems to cater for the total demand.
- 1.4 The criteria for estimating daily water demand and total water demand shall be based on the Uniform Technical Guideline or as per specified (by SWA) whichever is higher.
- 1.5 The State Water Authorities / Companies (SWA) shall provide the source of water supply. In the case where the unable to supply the water quantity required, the Contractor shall propose alternative supply subject to the approval of the PD. The Contractor shall be responsible to identify and connect to the SWA supply mains. The Contractor shall satisfy himself that all cost incurred to supply the water to the site deemed to have been included.
- 1.6 The works may comprise but not limited to the following items:
- a. Tapping from the approved SWA supply mains
  - b. Distribution pipes from tapping points to elevated water tank or roof top storage tanks of the proposed buildings with/without pumping system or with/without suction tank depending on the available pressure at the tapping points;
  - c. Suction tank and booster pump house complete with Mechanical & Electrical (M & E) system and automatic control system, where pumping system is required;
  - d. Elevated water tank;
  - e. Instruments and meters;
  - f. Testing and commissioning; and
  - g. All ancillary works necessary for the completion of the project.

Any item which is not specifically stated in the Scope of Works but is necessary for the completion of the project shall deem to be included and provided for in terms of design and pricing.

**2.0 Design Consideration**

- 2.1 All design shall be generally based on the MWA Design Guidelines for Water Supply Systems published by The Malaysian Water Association. However, the Contractor shall at all time comply with the requirements of the Local Authorities. All construction works shall be carried out in accordance with the relevant specifications and requirements as per Section A, Clause 12.
- 2.2 All workmanship, materials, components, equipment and instruments shall be chosen, considering the environment, medium of contact and service life. It shall be of high quality and resistant to corrosion. Supporting literature and specifications from the manufacturers should be obtained to substantiate this. It shall comply with the relevant and current Malaysian Standards or Codes of Practice on the date submission of proposal.

**3.0 Approvals**

The Contractor shall be required to obtain the approval of the various authorities concerned for the works, related to water consumption demand, power supply, consent of landowners and other relevant authorities, etc. The Contractor shall pay all fees, charges or contributions to the relevant authorities where applicable, unless stated explicitly elsewhere in the Pre-Bid Document.

**4.0 Distribution Pipes**

- 4.1 The Contractor shall propose distribution pipes in complete and functional reticulation system for cold water supply and external fire hydrants for the project.
- 4.2 In case of available pressure at the tapping point is not adequate, pumping system shall be required for the distribution of water to all the building blocks of the project. The system shall consist of suction tank, pump house, M&E equipment and pumping mains to the roof tanks. However, subject to practicality and number of blocks in the project, the Contractor may need to construct external elevated water storage tank of nominal capacity equivalent to the required storage of the total water demand. Water shall be pumped to this storage tank and then gravitated to all the buildings' roof tanks.
- 4.3 Material for all water tanks shall be approved by the PD and the water authorities.
- 4.4 Air valves complete with isolating valve, scour valves and gate valves must be adequately and strategically provided.
- 4.5 Hydrants of minimum size of 100mm shall be adequately installed to the approval of Jabatan Bomba. All hydrants shall be of double outlet type. Separate hydrant line and meter may be proposed subject to the approval of water authorities.
- 4.6 All pipes shall be anchored or restrained by thrust blocks where necessary.

**5.0 Storage and Suction Tank**

The storage and suction tanks shall be designed and constructed using approved products (by SWA) as below:

- a. Reinforced concrete tank;
- b. Stainless steel tank; and
- c. Steel tank with coating and lining (Glass Fused / Glass Coated / Epoxy Lining / HDPE Lining / Composite Stainless Steel Lining).

The capacity for the suction tank shall be one third of the total storage requirement.

For medical, security and other special buildings / complexes, storage capacity requirements shall not be less than two (2) days of total water demand. Minimum daily water demand for medical building / complexes shall be in accordance with Uniform Technical Guideline or as per specified (by SWA) whichever is higher.

**6.0 Pumping Station and M & E Works**

All works shall be designed and constructed in accordance with Mechanical & Electrical Needs Statement and Uniform Technical Guideline.

**7.0 Instrument and Meter**

The Contractor shall propose, supply, install, calibrate and commission all instruments and meters that are necessary to the highest standard of operation reliability and safety. The instrumentation panel shall be installed within the pump house.

The instruments required shall be but not limited to the following:

- a. Flow meters at suitable location in order to register water consumption. Separate meters shall be installed for cafeteria / canteen, staff quarters etc. as may be required; and
- b. In-situ level indicator or meter for suction and elevated tanks.

**8.0 Location of Distribution Pipes**

The distribution pipes shall not be laid under the road pavement except pipe crossing.

**9.0 Ancillary Works**

The Scope of Works shall cover all other ancillary work necessary for the completion of the project.

**10.0 Testing and Commissioning**

All piping, metering and instrumentation system including equipment after installation shall be tested and commissioned. The Contractor shall carry out tests on all individual sections of each system and the system as a whole to the required performance. The testing and commissioning shall be carried out by qualified and competent personnel and shall be witnessed by the PD or his representative.

If the whole or parts of the installation or equipment fail, the Contractor shall be required to carry out necessary modification or replacement of the same at his own cost.

All energy, water etc. consumed during the testing and commissioning shall be borne by the Contractor. A complete record of the tests and results of such tests shall be submitted in two (2) sets to the PD.

**11.0 Operation and Maintenance**

The Contractor shall provide two (2) sets of Manual of Operation & Maintenance of all facilities including pump-sets, instrumentation control, metering system and itemized list of equipment and spare parts which the manufacturers consider as essential to be kept in ready stock for operation and maintenance.

**12.0 Defect and Liability Period**

The defect and liability period shall be as mentioned in the Pre-bid document. The Contractor shall be responsible for all the maintenance and operation of the completed works throughout the above said period. The Contractor shall repair or replace all defects and carry out scheduled and preventive maintenance works throughout defect liability period.

**13.0 Electricity Supply for Pumping Station**

The Contractor shall be responsible for estimating power requirements for the pumping system for his work. The Contractor shall comply fully with the requirement of TNB or other relevant power authorities. Sufficient power points must be provided for all installations. Where power supply is not available, the Contractor shall provide an alternative power supply.

**B5. SEWERAGE PIPELINES****1.0 General**

1.1 The sewerage works shall cover design, construction and installation of the external sewerage and waste water system.

The works shall consist of design, construction and installation of the sewerage pipelines and a Sewage Treatment Plant (STP) for the site as described in the Scope of Work.

If there is an existing public sewer system for the area, the sewerage pipelines within the sites shall be connected to system.

1.2 The Works to be carried out shall include the following:-

- a. Sewerage pipelines including STP or all the pipe work connecting to the public sewer;
- b. Connection of building soil drainage system to the sewerage pipelines;
- c. Maintenance services of the above works and equipment throughout the period stated in the Condition of Contract;
- d. The design, construction, installation, testing and commissioning of the system shall comply with SPAN and relevant authorities' requirements; and
- e. Demolition of any part or all of the existing sewerage system where required.

**2.0 Design Consideration**

2.1 The design, construction, installation, testing and commissioning of the system shall comply with the Malaysian Sewerage Industry Guideline (MSIG) published by SPAN.

2.2 The Contractor's proposal for the Works shall include the following details and information:

- a. Description on the scope of Work;
- b. Layout plan including sections, details and components of the system;
- c. Design report;
- d. Material and component specifications; and
- e. Original technical information for all proposed system.

2.3 The STP shall be optimally designed with minimum maintenance.

**3.0 Pipeworks**

Pipe shall be laid in straight line, tightly jointed and at correct gradient to ensure smooth flow of the effluent and prevent blockages or damages to the pipes.

Adequate cover and bedding shall be provided to all pipes to avoid damage due to external load and ground condition. Backfilling shall be done after satisfactory leakage test.

All materials shall conform to relevant Malaysian Standards and of type approved by SPAN and the relevant authorities. The minimum diameter of pipes used shall also meet the requirements set by SPAN.

The sewerage reticulation shall be designed to flow by gravity unless site condition dictated otherwise.

The pipes shall not be laid under the road pavement without proper protection.

**4.0 Manholes**

All manholes shall be of pre-cast concrete and installed at not more than 100 meter apart and at all junction and turning point.

Pre-cast concrete manholes shall conform to Specification for Precast Concrete Pipes and Fittings for Drainage and Sewerage – M.S. 881 and Specification for Unreinforced and Reinforced Concrete Manholes and Soakways - BS EN 1917:2002. Manholes shall be constructed with pre-cast concrete sections surrounded by in-situ concrete.

Manholes cover to be water tight and capable of withstanding external loading and conforming to Code of Practice for Design and Installation of Sewerage Systems – M.S. 1228.

The location of manholes on roadways shall be avoided.

**5.0 Pump Station and M & E Works**

If a pump station is required, the system shall be designed in accordance with the following documents:

- a. Malaysian Sewerage Industry Guideline (MSIG) published by SPAN; and
- b. Standard Code of Practice for Design and Installation of Sewerage Systems - M.S.1228.

**6.0 Standard Of Effluent Discharge**

The standards of effluent discharge from sewage and wastewater treatment plant shall comply with Standard A, Environmental Quality Act.

**7.0 Sewage Treatment Plant (STP)**

In general the STP shall be planned and designed to meet the following standard:-

- a. The STP shall be of precast compact package system type supplied by panel of suppliers listed in the latest Pekeliling Kontrak Perbendaharaan for "Kontrak Sistem Panel Bagi Perolehan Bekalan dan Pengiriman Sistem Perawatan Najis Kepada Semua Agensi Kerajaan di Seluruh Malaysia";
- b. The STP shall be activated sludge system and shall be approved by SPAN and / or relevant authorities;
- c. Compliance with effluent quality requirements;
- d. Optimized capital and operating costs of the plant; and
- e. Local environmental and aesthetic requirements, including the proximity to the nearest habitable premise, direction of the prevailing winds, local zoning requirements, socio economic aspects and compatibility of the treatment processes with the present and future land receiving waters.

**8.0 Testing and Commissioning**

The method of testing shall be generally as laid down in the latest Malaysian Standard Code of Practice for Design and Installation of Sewerage Systems – M.S. 1228 and MSIG by SPAN.

**9.0 Operation and Maintenance**

The Contractor shall provide two (2) sets of Manual of Operation & Maintenance of all facilities including pump-sets, instrumentation control and itemized list of equipment and spare parts which the manufacturers consider as essential to be kept in ready stock for operation and maintenance.

**C1. RENOVATION, UPGRADING AND REHABILITATION WORKS****1.0 General**

1.1 For works involving renovation, repairs and/or upgrading of existing facilities, the contractor shall engage a qualified consultant(s) who shall prepare a complete proposal in a manner as per described in clause A.2.2 of the Needs Statement.

**2.0 Proposal**

2.1 The Contractor's proposal for the works shall include the following details and information:-

If there is an existing public sewer system for the area, the sewerage pipelines within the sites shall be connected to system.

- a. Layout plans denoting the limit of works including detail components of renovation, upgrading and rehabilitation works layout on existing facilities;
- b. New works;
- c. Replacement works, connection and relocation of existing services;
- d. Making good on existing facilities; and
- e. Other relevant works deemed necessary in order to complete the proposed works.

**3.0 Safety and Functionality**

3.1 The contractor shall at all times ensure that the works carried out at site do not compromise the functionality, safety and security of the existing buildings adjoining the site. As such the contractor shall at his cost provide all necessary measures such as constructing safety barrier, nettings, drainage system, etc.

3.2 Requirement for independent checking engineer as per clause A.2.4 and clause A.5.0 of the Needs Statement shall not be applicable for this project.

**ATTACHMENT**

**SOIL INVESTIGATION REPORT**

**SCHEDULE FOR WORKS SUBMISSION ITEMS**

## SCHEDULE FOR WORKS SUBMISSION ITEMS

(Civil Works Requirements)

Revision: 2015

### Checklist for items to be submitted for the Civil Works:

		[Check]
<b>1.0</b>	<b>Strategy and Methodology</b>	
1.1	Specifications.	[ ]
1.2	Curriculum Vitae for Contractor and Consultant Staff.	[ ]
1.3	Organisation Chart.	[ ]
<b>2.0</b>	<b>Civil Works Design and Drawings</b>	
2.1	Design report including data input, analysis, and recommendations must be backup with data and economic evaluation.	[ ]
2.2	Preliminary design calculations.	[ ]
2.3	Preliminary layout and details drawings in A1 size, with P.E endorsement for each scope of work.	[ ]
2.4	Preliminary survey drawings.	[ ]
2.5	Brochures, other data, documents, etc. where appropriate.	[ ]

**THE ABOVE ITEMS TO BE INCLUDED IN THE ORIGINAL COPY OF THE PRE-BID DOCUMENT TO BE SUBMITTED**