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**Assignment Title: Construction Supervision Consultancy Services  
For Chennai Peripheral Ring Road, Section III  
Terms of Reference**

**1. BACKGROUND**

**1.1.** The Government of Tamil Nadu (GoTN) through the Government of India has applied for a loan from the Asian Infrastructure Investment Bank (AIIB) and the OPEC Fund for International Development (OFID) hereinafter referred to as “Lenders”, towards the construction cost of Chennai Peripheral Ring Road Sections II and III (the “Project”). AIIB is also providing financing for certain consultancies.

**1.2.** The Project is proposed to be implemented under Engineering Procurement Construction (EPC) contract mode with 7 years of maintenance. Tamil Nadu Road Infrastructure Development Corporation (TNRIDC) is the implementing entity (the Client ie., “Authority”) for the Project through its Project Monitoring Unit (PMU), and the Project Implementation Unit (PIU).

**1.3.** The proposed Project is a 6-lane access-controlled divided main carriageway with a 2-lane service road on both sides of the 6-lane carriageway, with a number of interchanges and various grade-separated crossings. This Project is expected to meet increasing traffic demands in Chennai Metropolitan Area and is part of the wider Chennai Peripheral Ring Road that has five sections under various stages of development, construction, and operation. The Project (Sections II and III) of the Chennai Peripheral Ring Road starts at Thatchur at NH-16 and ends at Sriperumbudur at NH-48. The Project traverses through Thiruvallur and Kancheepuram districts. Section II construction will be tendered under two separate EPC packages. Section III will be tendered under three separate EPC packages for which this TOR for supervision consultancy have been framed.

**1.4** This Terms of Reference (TOR) is for the Construction Supervision Consultants (the “Consultants”) to act as the “Authority’s Engineer” (AE) for the implementation of the Project EPC Agreement (the “Agreement”), to be entered in between the Authority and the EPC Contractor (the “Contractor”). There will be one Consultant for Section II (two separate EPC construction packages for Section II), which has already been procured, and another Consultant for Section III (three separate EPC

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construction packages for Section III). The tender for the EPC contracts will be invited through International open Competitive Tender (IoCT). The selection of EPC Contractor will be conducted following AIIB's procurement procedures.

- 1.4 This terms of reference is for selection of a Consultant for Section III (that starts from Thiruvallur Bypass and ends at Sriperumbudur at NH-48) following Quality & Cost Based Selection (QCBS) method. The Total Length of the project under Section III is 30.10 Km.**

## **2. ASSIGNMENT OBJECTIVES**

- 2.1.** To ensure that high quality construction is achieved and to ensure that all works are carried out in full compliance with the engineering design requirements, technical specifications, environmental and social requirements and management plans, and other stipulations of the EPC contract documents and within specified time periods;
- 2.2.** To demonstrate the efficacy of contract supervision by independent external agencies experienced in this field of work;
- 2.3.** To promote technology transfer to the Departmental Engineers.

## **3. DEFINITIONS AND INTERPRETATIONS**

- 3.1.** The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.
- 3.2.** References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Construction (EPC) Contract Agreement for which this service is procured, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.
- 3.3.** The rules of interpretation stated in the EPC Agreement shall apply, mutatis mutandis to this TOR.
- 3.4.** All definitions and interpretations related to the EPC agreement are described in the EPC Bid document.

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#### 4. SCOPE OF SERVICES

The principal responsibilities shall be, but not limited to the following:

##### 4.1 General

- 4.1.1 The Consultant shall carry out project related services viz., review and approval of the designs and drawings, approval of the quality of material, workmanship of works in co-operation and consultation with Client and its authorized representatives, supervision of the construction activities, maintenance and operation of the facility, ensuring road safety measures, environmental and social safeguards, and Land Acquisition & Resettlement and Rehabilitation (LARR) activities, submission of periodic reports indicating the progress of works, preparation of a construction supervision manual as well as all the duties of the "Authority's Engineer" as specified in the construction agreement, within the limitations specified therein.
- 4.1.2 **The "Authority's Engineer" is the consultancy firm engaged by the Client (Authority) for the Construction Supervision Consultancy services under this terms of reference.** The consultancy firm is however, required to appoint the Team Leader to act as "Authority's Engineer". The consultancy firm shall delegate the responsibilities to the Team Leader to act on behalf of the firm in carrying out the functions of the Authority's Engineer related to the construction agreement. The firm may have an internal regulatory and controlling arrangement with the Team Leader and for this purpose the Team Leader may interact with and receive directions from the firm as decided by the consultancy firm. The Client may also interact with the consultancy firm if required. **The term "Authority's Engineer" referred to in this contract document thus means the Team Leader appointed by the consultancy firm.** If the function of the Team Leader as Authority's Engineer is not satisfactory to the Client then the Client may request the firm to appoint or change the Team Leader. The consultancy firm may appoint the Resident Engineer for each contract (EPC 03, EPC 04 & EPC 05) or divided segments to be the "Authority Engineer's Representative" as defined in the contract, to carry out his duties at each section or divided segments.
- 4.1.3 The duties of the Authority's Engineer are to review and approve the design and drawings submitted by the Contractor, supervise the works and approve the materials

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and workmanship of the works in co-operation and in consultation with the Client, as spelled out in the contract documents for the works. The Authority's Engineer shall administer all the construction works contracts and will ensure that the contractual provisions, whether related to quality or quantities of work are duly implemented. As stated in the Engineering Procurement Construction (EPC) Works contract document, the "Authority's Engineer" shall have no authority to relieve the contractors of any of their duties or obligations under the contracts or to impose additional obligations not included in the contracts. The duties of the Authority's Engineer include issue of decisions, certificates and orders as specified in detail in the construction contract documents. The Authority's Engineer will co-ordinate the supervision teams, to ensure that the technical policies guided by the standard specifications and procedures laid down for execution of works are correctly and consistently implemented on all the road sections.

- 4.1.4 The Authority's Engineer shall discharge his duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- 4.1.5 The Authority's Engineer shall fully comply with all the provisions of the 'Terms of Reference', and shall be fully responsible for supervising the Designs, Construction and maintenance and operation of the facility in accordance with the provisions of the EPC Agreement and other schedules. Any failure of the Authority's Engineer in notifying the Client and the Contractor on non-compliance of the provisions of the EPC Contract Agreement and other schedules by the EPC Contractor, non-adherence to the provision of TOR and non-adherence to the time schedule prescribed under TOR shall amount to Non-performance.
- 4.1.6 The Authority's Engineer shall conduct a review on the adequacy / consistency of the provisions including Road Safety made in the EPC contract agreement with site conditions and report to Authority within 3 months from the date commencement of consultancy services.
- 4.1.7 The Authority shall appoint its authorized representative, who along with the Team Leader shall issue on behalf of the Authority's Engineer, the Provisional Completion Certification and Completion Certificate and shall carryout any such task

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as may be decided by the Client. The Authority's Engineer shall take prior approval of Client before issuing Provisional Completion Certification and Completion Certificate. The proposal submitted to the Client shall also include the name of the authorized representative along with the authorization letter and power of attorney.

4.1.8 The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of construction agreement, but subject to obtaining prior written approval from Client for the following:

- a) any Time Extension;
- b) any additional cost to be paid by the Client to the Contractor;
- c) the Termination Payment; or
- d) Any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a cumulative sum exceeding 0.2% of the respective EPC Contract price

4.1.9 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Client in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer on or before 7<sup>th</sup> day of the beginning of every month.

4.1.10 The Authority's Engineer shall ensure that road safety measures are properly incorporated in the design and drawing and duly implemented during construction. The Authority's Engineer is also responsible for the Safety during construction to the Workers and the Road users. The Authority's Engineer shall follow the necessary codal provisions during the implementation including the Indian Roads Congress (IRC) codes and the MoRTH specifications. The Authority's Engineer shall conduct road safety audit in the design phase, during construction and post construction and ensure all road safety measures are properly implemented by the EPC Contractor. Further the Authority's Engineer shall submit Road Safety compliance report as per the TOR with photos documented.

4.1.11 The Authority's Engineer shall aid and advise the Client on any proposal for Change of Scope under Article 13 (Change of Scope) of the EPC works agreement.

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- 4.1.12 In the event of any disagreement between the Client and Authority's Engineer regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.
- 4.1.13 The Authority's Engineer shall maintain a daily project diary which shall record all events pertaining to the administration and execution of the Contract.
- 4.1.14 The Authority's Engineer shall prepare specific engineering reports which shall include an analysis of problem encountered and proposed solution.
- 4.1.15 The Authority's Engineer shall carry out any other duties relevant to the project agreed during contract negotiation.
- 4.1.16 The Authority's Engineer shall ensure implementation of environment requirements as given in the approved Environmental Impact Assessment (EIA) Report and Environment Management Plan (EMP) and Environmental Monitoring Plan (EMOP) included in the construction agreement and shall submit periodic compliance/ progress/ monitoring reports.
- 4.1.17 The Authority's Engineer shall prepare a Construction Supervision Manual outlining routines and procedures to be applied in contract management, construction supervision and administration. The routines and procedures shall be in accordance with the requirements as specified in clause 13.2.1 of this TOR.
- 4.1.18 The Authority's Engineer shall issue payment certificates as stipulated in the construction agreement.
- 4.1.19 The Authority's Engineer shall assist the Client in preparation of documents required for dispute resolution procedures as given in the construction agreement. The Authority's Engineer shall prepare draft replies to the Dispute Resolution Board, Arbitration Tribunal etc.
- 4.1.20 **The reporting method for the Authority's Engineer for all the reports is as follows:**

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- a) The Team Leader (TL) shall report / communicate to concerned Divisional Engineer, TNRIDC after getting the remarks / recommendations of Residential Engineer (RE) with a copy marked to the Superintending Engineer, TNRIDC on routine contractual issues. In case of sensitive issues which may involve financial implications, the Team Leader shall address to Executive Director, TNRIDC with copies to SE, TNRIDC and concerned DE, TNRIDC.
  - b) The Divisional Engineer (H) has to forward the correspondence, approval and reports to the Executive Director's Office through the Superintending Engineer only.
  - c) The Authority's Engineer shall review Work Program submitted by the contractor in order to achieve various Milestones of the Contract and also review any further revisions, if any and intimate the contractor and the Client deficiencies, if any for rectification.

#### **4.2. Construction Period**

- 4.2.1 During the Construction Period, the Authority's Engineer shall review and accord approval through No objection for the Design and Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations (which has to be done in the presence of the Authority's Engineer), characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Road Safety Audit in accordance with the provisions of Clause 10.1.6 under Article 10 (Design and Construction of the Project Highway) of EPC contract agreement. The Authority's Engineer shall complete such review and send his observations to the Client and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended up to 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.
- 4.2.2 The Authority's Engineer shall review any revised Design and Drawings sent to him by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
- 4.2.3 The Authority's Engineer shall review and accord approval through No objection the Quality Assurance Plan submitted by the Contractor and shall convey its comments to

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the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.

- 4.2.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor and a copy to the Client.
- 4.2.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4 under Article 10 (Design and Construction of the Project Highway) of EPC contract agreement.
- 4.2.6 The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Client and the Contractor within 7 (seven) days of receipt of such report.
- 4.2.7 The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Road Safety Engineer.
- 4.2.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured materials, and any such other materials involved in the construction.
- 4.2.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practices for quality assurance. For this purpose, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works( Fifth Revision) - V issued by MORTH (the "Quality Control



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Manuals”) or any modification/substitution/amendment thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

- 4.2.10 The Authority’s Engineer shall test check 100 (hundred) percent of the quantity or number of tests prescribed for each category in MORT&H or type of test for quality control by the Contractor and also to be verified by the Client’s representatives including linear measurements of the Pavement / Structure. In which, the Resident Engineer shall check 50% of the prescribed tests in the presence of concerned ADE/AE and the TL (Authority Engineer) shall check 20% of the prescribed tests in the presence of concerned Divisional Engineer. The Quality Control Register shall be kept ready for inspection of the Authority and has to be handed over along with other documents to the Authority on the completion / termination of the service.
- 4.2.11 The criteria for acceptance/ rejection of the test results shall be determined by the Authority’s Engineer in accordance with the Quality Control Manuals as specified by the IRC Special Publication 11 (Handbook of Quality Control for construction of roads and Runways) and the specifications of Roads and Bridges ( Fifth Revision) V issued by MoRTH. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.
- 4.2.12 In the event that results of any tests conducted under Clause 11.10 under Article 11 (Quality Assurance, Monitoring and Supervision) of EPC Works Agreement establish any Defects or deficiencies in the Works, the Authority’s Engineer shall direct the Contractor to carry out remedial measures including redoing the same.
- 4.2.13 The Authority’s Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 under Article 21 (Force Majeure) of the EPC works agreement shall apply.
- 4.2.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority’s Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority’s Engineer determines that completion of the Project Highway is not feasible within the time specified in the

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Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Client and the Contractor forthwith.

4.2.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records (100%) and documents before the Completion Certificate is issued pursuant to Clause 12.4 under Article 12 (Completion Certificate) of the EPC works Agreement.

4.2.16 The Authority's Engineer may recommend to the Client for the suspension of the whole or part of the Works if the work threatens the safety of the users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Client recommending whether or not the suspension hereunder may be revoked.

4.2.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and users, and requires the the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Client forthwith, recommending whether or not such suspension may be revoked by the Client.

4.2.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K (Tests on Completion) of the EPC works agreement and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12(Completion Certificate) and Schedule-K (Tests on Completion) of the EPC works Agreement.

4.2.19 The Authority's Engineer is solely responsible to ensure 100% quality of construction to the standards and specifications.

4.2.20 The Authority's Engineer shall also submit various reports to the requirements of the Asian Infrastructure Investment Bank and OFID and also attend their inspections / mission meetings to appraise project status.

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- 4.2.21 The Authority's Engineer shall submit reports to the Government/ Client in the required format as and when requested.
- 4.2.22 The Authority's Engineer shall provide clarifications / replies to the observations made, from time to time by the Auditor.
- 4.2.23 In the case of termination of EPC contract, the Authority's Engineer shall have to prepare remaining (balance) quantity of works / value of the EPC contract and facilitate the Client/Client in the process of implementing the leftover works by way of providing related technical support including maintenance requirements till the new EPC contractor is engaged and supervising the maintenance works in the stop gap period.
- 4.2.24 The Authority's Engineer shall scrutinize and process all the payments applied by the contractor as per terms of latter's contract including any claims.
- 4.2.25 The Authority's Engineer shall maintain all records of working and nonworking periods with reasons for non-working. Records of weather conditions shall also be maintained. The working periods of major equipments and break-downs details shall be properly documented.

#### **4.4. Maintenance Period**

- 4.3.1 The EPC Contractor shall maintain the road for 7 years as stipulated in the construction agreement. The Authority's Engineer shall supervise maintenance works in the initial period of one year after completion of construction and establish a system for the Departmental Engineers to maintain the road for the remaining time period of 6 years. The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Program and for this purpose carry out a joint monthly inspection with the Contractor.
- 4.3.2 The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Client and the Contractor.
- 4.3.3 The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project

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Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.

- 4.3.4 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E (Project Facilities) of the EPC works agreement, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.
- 4.3.5 The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Client under Clause 14.5 under Article 14 (maintenance) of the EPC works agreement.

#### **4.4. Determination of Costs and Time**

- 4.4.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Construction Agreement.
- 4.4.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Construction Agreement.
- 4.4.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5 under Article 18 (Authority's Engineer) of the EPC works agreement.

#### **4.5 Payment to the Contractor**

- 4.5.1 The Authority's Engineer shall advise / recommend the Authority to withhold payments for the failure/defective works for which the Contractor fails to revise and

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resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d) of the EPC works agreement.

**4.5.2** All types of payment and related communication should be processed as follows:

Resident Engineer (RE) shall recommend the payment with the remarks of the concerned ADE (Highways) to the TL and the TL after scrutiny and up on satisfaction shall recommend the same to the Divisional Engineer for payment.

a. Authority's Engineer shall –

- i. Within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4 under Article 19 (Payments) of the EPC works agreement, determine the amount due to the Contractor and shall recommend the release of 50 (Fifty) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate after due verification in the site.
  - ii. within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4 under Article 19 (Payments) of the EPC works agreement, deliver to the Client and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10 under Article 19 (Payments) of the EPC works agreement, following the steps mentioned above.
- b. The Authority's Engineer shall, within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 19.6 under Article 19 (Payments) of the EPC works agreement, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.
- c. The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16 under Article 19 (Payments) of the EPC works agreement.

**4.6 Other Duties and Functions**

The Authority's Engineer shall perform all other duties and functions as specified in the EPC works Agreement.

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#### **4.7 Supervision of Works by Client's Representative**

Authority's Engineer shall be solely responsible for, but clear the following activities, as the case may be, jointly with Client's Representatives.

- a) Facilitating all the preconstruction activities viz., setting out works (fixing center line of road, verifying TBMs original ground level (OGL), finalizing the finished Road Level (FRL), Corridor of Impact, Proposed Right of Way (PROW) etc.
- b) Setting up plants and Equipment
- c) Approval for source of materials
- d) EMP documentation and reporting requirements
- e) Work programme
- f) Quality Assurance programme of contractor
- g) Request for inspection
- h) Quality control tests (100%)
- i) Certification/Verification of payment
- j) Test on completion
- k) Issue of provisional completion Certificate
- l) Issue of completion certificate
- m) Determination/Recommendation of any change of scope
- n) Determination/Recommendation of any extension of Time
- o) Pre-Monsoon inspection for maintenance.
- p) Any other instruction issued by the Client from time to time.
- q) Safety aspect and diversion.

#### **4.8 Environment and Social Related Activities**

- a. The Authority's Engineer shall review AIIB approved EIA reports including the Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMOP) prepared for the project to understand the environmental issues in the project area and mitigation and monitoring requirements of the project

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- b. The Authority's Engineer will assist TNRIDC to facilitate stakeholder's participation (including focus group discussions for vulnerable PAPs) and providing feedbacks on their comments regarding EMP and EMoP
  - c. After consultation with AIIB, the Authority's Engineer shall update the EMP and EMOP if there are any changes in the project alignment/sites or environmental conditions to incorporate all new environmental and social issues and mitigation measures including site specific details. Ensure that the revised EMP and EMOP are in compliance with the AIIB Environmental and Social Framework.
  - d. The Authority's Engineer will assist TNRIDC in facilitating stakeholder's participation (including focus group discussions for vulnerable PAPs) and providing feedbacks on their comments regarding RP.
  - e. The Authority's Engineer shall review and assist TNRIDC to approve all other environment related sub-plans such as borrow area management plan, debris disposal plan, camp layout plan and others.
  - f. The Authority's Engineer shall conduct regular site inspections to ensure that environmental mitigation measures are being implemented by the contractor in accordance with the most recent approved EMP and other sub-plans.
  - g. The Authority's Engineer shall provide training and on-site guidance to the contractor as needed
  - h. The Authority's Engineer shall prepare periodic environmental and social monitoring reports based on site inspections and reports submitted by the contractor. Prepare semi-annual monitoring reports – following a report template agreed with AIIB – for submission and disclosure.
  - i. Assist TNRIDC to establish GRM for workers and monitor the labour working conditions and other rights in conformity with applicable Legislations and Funding Agencies' Environmental and Social Policy.
  - j. The Consultant shall prepare traffic management plan for reduction of traffic congestion and avoidance of traffic accidents during Construction based on survey results.

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- k. Assist TNRIDC to coordinate with stakeholders and supervise Contractor for the traffic management plan implementation till the completion of consulting service.
  - l. Supervise the identification of underground utility facilities and buried materials.
  - m. Assist TNRIDC for supervision of utility relocation till the completion of consulting service.
  - n. Assist TNRIDC to coordinate with stakeholders and supervise Contractor for the utility relocation management plan implementation till the completion of consulting service.

#### **4.9 Miscellaneous**

- a. A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Client set as in para 4.1(u) forthwith.
- b. The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.
- c. Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, works progress photos in 2 (two) hard copies, Quality Control Registers(1 copy) and in micro film form or in such other medium as may be acceptable to the Client, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Client against receipt thereof.
- d. The Authority's Engineer, if called upon by the Client or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.
- e. The Authority's Engineer shall inform the Client and the Contractor of any event of Contractor's Default within one week of its occurrence.



## 5. Team Composition & Qualification Requirements

### 5.1 Key and Sub key Personnel:

The Team Leader and Resident Engineer offices shall be tentatively located along with separate supporting staffs as follows;

**Table 5.1.1 Location of Office**

<b>Team Leader</b>	Thiruvallur
<b>Resident Engineer (EPC 03)</b>	Thiruvallur
<b>Resident Engineer (EPC 04)</b>	Thiruvallur
<b>Resident Engineer (EPC 05)</b>	Thiruvallur

**Table 5.1.2 Requirement of Key Personnel during Construction Period**

<b>S. No</b>	<b>Description</b>	<b>Quantity</b>	<b>Input</b>	<b>Total Man Months</b>
	<b>Key Personnel-Common</b>			
1.	Team Leader cum Senior Highway Engineer	1	Continuous	<b>36</b>
2.	Resident Engineer(EPC03) Road work	1	Continuous	<b>36</b>
3.	Resident Engineer (EPC04) Road work	1	Continuous	<b>36</b>
4.	Resident Engineer (EPC05) Road work	1	Continuous	<b>36</b>
5.	Senior Structural/ Bridge Engineer	1	Continuous	<b>36</b>
6.	Cost & Contracts Engineer	1	Continuous	<b>36</b>
7.	Quality & Material Engineer (EPC 03)	1	Intermittent	<b>30</b>
8.	Quality & Material Engineer (EPC 04)	1	Intermittent	<b>30</b>
9.	Quality & Material Engineer (EPC 05)	1	Intermittent	<b>30</b>
10.	Senior Road Safety Engineer	1	Intermittent	<b>24</b>
11.	Geotechnical Engineer	1	Intermittent	<b>4</b>
12.	Senior ITS Specialist	1	Intermittent	<b>6</b>
13.	Health Expert	1	Intermittent	<b>3</b>

	<b>Total Key personnel</b>			<b>343</b>
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**Table 5.1.3 Requirement of Sub Key Personnel during Construction Period**

**The Authority's Engineer shall provide sub key personnel as detailed below as a minimum. The sub-key personnel shall possess:**

- Educational Qualification: B.E Civil or equivalent or Diploma in Civil Engineering
- General experience: 5 years for Degree or 10 years for Diploma
- Experience in the Highways sector: 3 years for Degree or 5 years for Diploma
- WB/ADB/Other MF/ BOT/ PPP/ EPC assignments: 1 year for Degree or 2 years for Diploma is preferable.
- The Electrical Engineer shall possess graduation in electrical engineering with 5 to 7 years experience in field of electrical utility laying and shifting and liaising with service department.

S. No	Non-Key Personnel	Quantity	Input	Total Man Months
	<b><u>Non-Key Personnel Common</u></b>			
1.	Environmental Engineer	1	Intermittent	18
2.	Road Safety Engineer	1	Continuous	36
3.	Electrical Engineer	1	Intermittent	12
4.	Quantity Surveyor	2	Intermittent	48
	<b>Sub-Total</b>			<b>114</b>
	<b><u>EPC-03</u></b>			
5.	Field Engineer - Roads	1	Continuous	36
6.	Field Engineer - Bridges	2	Continuous	72
7.	Pavement Engineer	1	Intermittent	12
8.	Material Engineer	1	Continuous	36
9.	Lab Technician	2	Continuous	72
10.	Surveyor	1	Continuous	36

	<b>Sub-Total</b>			<b>264</b>
	<b><u>EPC-04</u></b>			
11.	Field Engineer - Roads	1	Continuous	36
12.	Field Engineer - Bridges	1	Continuous	36
13.	Pavement Engineer	1	Intermittent	12
14.	Material Engineer	1	Continuous	36
15.	Lab Technician	2	Continuous	72
16.	Surveyor	1	Continuous	36
	<b>Sub-Total</b>			<b>228</b>
	<b><u>EPC-05</u></b>			
11.	Field Engineer - Roads	1	Continuous	36
12.	Field Engineer - Bridges	2	Continuous	72
13.	Pavement Engineer	1	Intermittent	12
14.	Material Engineer	1	Continuous	36
15.	Lab Technician	2	Continuous	72
16.	Surveyor	1	Continuous	36
	<b>Sub-Total</b>			<b>264</b>
	<b>Total non-key personnel</b>			<b>870</b>

**Table 5.1.4 Qualification Criteria for Key Personnel**

Sl. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar Capacity	Preferable Experience in Multi-lateral / Bi lateral Funded Projects	Description
1.	Team Leader cum Senior Highway Engineer	Bachelor Degree in Civil Engineering.  <b>Preferably Master Degree in Civil Engineering or equivalent.</b>	20 years	15 years	10 years	3 years	<ul style="list-style-type: none"> <li>➤ The Team Leader should have expertise of <b>One</b> major Project <b>in similar or equivalent contracts in terms of scope, nature and size</b> in the capacity of Team Leader or Resident Engineer Preferably in external aided (World Bank/ADB/JICA) Projects.</li> <li>➤ The candidate shall worked in at <b>least ONE large highway projects (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.3500 million).</b></li> <li>➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential.</li> <li>➤ Thorough experience in supervision and management of major highway projects is essential.</li> <li>➤ Experience in design of highway, knowledge of various codes pertaining to highway design is required and should have involved in design of similar highway projects;</li> </ul>

							➤ Knowledge of international ‘best practices’ and modern highway construction technology is preferable.
2.	Resident Engineer (EPC 03, EPC 04 & EPC 05)	B.E Civil (Master degree Preferable) or equivalent	15 years	10 years	7 years	3 years	➤ The candidate shall worked in <b>at least ONE large highway projects (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million).</b> ➤ The candidate should have expertise of projects <b>in similar or equivalent contracts in terms of scope, nature and size</b> Preferably in external aided (World Bank/ADB/JICA) Projects. ➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential. ➤ Thorough experience in supervision and management of major highway projects is essential. ➤ Knowledge of international ‘best practices’ and modern highway construction technology is preferable.
3.	Senior Structural/ Bridge Engineer	B.E. Civil and Master degree in Structural / Bridge Engineering or equivalent	15 years	10 years	7 years	3 years	➤ The candidate shall have worked in <b>at least ONE large highway/bridge project. (at least two major bridges involving pre/post stressed concrete superstructure).</b> ➤ The candidate should have expertise of projects <b>in</b>

							<p><b>similar or equivalent contracts in terms of scope, nature and size</b> Preferably in external aided (World Bank/ADB/JICA) Projects.</p> <ul style="list-style-type: none"> <li>➤ The candidate must have the experience of planning &amp; monitoring geotechnical and hydraulic investigations for the bridges and interpreting the findings thereof.</li> <li>➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential.</li> <li>➤ Knowledge of international ‘best practices’ and modern highway construction technology is preferable.</li> </ul>
4.	Cost & Contracts Engineer	B.E Civil (Master degree Preferable) or equivalent	20 years	15 years	10 years	3 years	<ul style="list-style-type: none"> <li>➤ The candidate shall have worked in at least ONE large highway projects (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million)</li> <li>➤ The candidate should have expertise of projects <b>in similar or equivalent contracts in terms of scope, nature and size</b> Preferably in external aided (World Bank/ADB/JICA) Projects.</li> <li>➤ Thorough experience in contract management, dispute/ litigation management, cost control,</li> </ul>

							<p>handling variations and should have handled various types of contracts.</p> <ul style="list-style-type: none"> <li>➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential.</li> <li>➤ Knowledge of international ‘best practices’ and modern highway construction technology is preferable.</li> </ul>
5.	Quality & Material Engineer (EPC 03, EPC 04 & EPC 05)	B.E Civil and Master degree in Geotechnical/Material/Highway Engineering or equivalent	15 years	10 years	7 years	3 years	<ul style="list-style-type: none"> <li>➤ The candidate shall have worked in <b>at least ONE large highway projects (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million)</b></li> <li>➤ The candidate should have expertise of projects <b>in similar or equivalent contracts in terms of scope, nature and size</b> Preferably in external aided (World Bank/ADB/JICA) Projects.</li> <li>➤ Thorough experience in quality control, quality assurance, various testing methods and construction methodologies.</li> <li>➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential.</li> <li>➤ Knowledge of international ‘best practices’ and modern highway construction technology is</li> </ul>

							preferable.
6.	Senior Road Safety Engineer	B.E. Civil and specialized in Road Safety or equivalent	15 years	10 years	7 years	3 years	<ul style="list-style-type: none"> <li>➤ The candidate shall have worked in <b>at least ONE large highway projects (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million)</b></li> <li>➤ The candidate should have expertise of projects in <b>similar or equivalent contracts in terms of scope, nature and size</b> Preferably in external aided World Bank/ADB/JICA) Projects.</li> <li>➤ Experience in road safety audit in design, during implementation and post construction.</li> <li>➤ Experience in preparing and implementing road safety arrangement plan and should have knowledge of IRAP star rating.</li> <li>➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential.</li> <li>➤ Knowledge of international ‘best practices’ and modern highway construction technology is preferable.</li> </ul>
7.	Geotechnical Engineer	B.E. Civil and Master degree in Soil Mechanics & Foundation/ Geotechnical Engineering or equivalent	15 years	10 years	7 years	3 years	<ul style="list-style-type: none"> <li>➤ The candidate shall have worked in <b>at least ONE large highway projects (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million)</b></li> <li>➤ The candidate should have expertise of projects in <b>similar or equivalent contracts in terms of</b></li> </ul>



							<p><b>scope, nature and size</b> Preferably in external aided (World Bank/ADB/JICA) Projects.</p> <ul style="list-style-type: none"> <li>➤ Candidate must have thorough knowledge of geotechnical investigations, planning, surveys, interpretation of reports, sound knowledge in soil &amp; foundations, working out of bearing capacity for structure foundations, Software based slope stability analysis.</li> <li>➤ Experience and knowledge in FIDIC contracts, EPC contracts are essential.</li> <li>➤ Knowledge of international ‘best practices’ and modern highway construction technology is preferable.</li> </ul>
8.	Senior ITS Specialist	<p>Bachelor Degree in Civil Engineering.</p> <p><b>Preferably Master Degree in Highway Engineering / or equivalent.</b></p>	15 years	5 years	5 years	1 years	<ul style="list-style-type: none"> <li>➤ The candidate must have worked on similar or equivalent position on <b>at least ONE large highway projects (50 km 2lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million).</b></li> <li>➤ Thorough knowledge and experience in ITS design, <b>Road Safety Audit</b> Construction with knowledge of international best practices is essential.</li> </ul>

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9.	Health Expert	Bachelor of Medicine and Bachelor of Surgery (Practitioner)	5 years	-	-	-	➤ Experience in General Medicine, Managing Contagious diseases.
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For the maintenance period of 1<sup>st</sup> year, following personnel are required as a minimum:

**Table 5.1.5 Requirement of Key and Sub Key Personnel During Maintenance Period**

Sl. No	Description	Quantity	Input	Total Man Months
	<b>Key Personnel</b>			
1.	Team Leader Cum Senior Highway Engineer	1	Continuous	12
2.	Senior ITS Specialist	1	Intermittent	12
			<b>Total</b>	<b>24</b>
	<b>Sub Key Personnel</b>			
3.	Field Engineer – Roads	1	Intermittent	12
4.	Quantity Surveyor	1	Intermittent	12
			<b>Total</b>	<b>24</b>

\*Preferable age limit for Team Leader is 65 years, Key-personnel is 60 years and non-key personnel is 55 years on the date of signing of agreement.

**If the age of key/ non-key personnel is above the preferred age limits, it is requested to establish good health condition by producing a physical fitness certificate to do the field works on the Mobilization of concerned key personnel.**

Note: The concerned key-personnel should be available in case of any eventuality that might arise where there is a change in the schedule of construction activities as such the personnel should be re-deployed at a particular period of time where his service is necessary without cost compensation.

*The required key and non-key personnel are needed to be deployed to suit the schedule of construction activities of respective project roads included in this package. In prior consultation with the client, the Authority's Engineer shall mobilize, schedule and deploy the personnel depending upon the site requirement within the total man-months prescribed/ agreed.*

## 5.2 Tasks and Responsibilities of Key Experts:

**Table 5.2.1**

Sl. No.	Position	Tasks/Responsibilities
1	Team Leader cum Senior Highway Engineer	<ul style="list-style-type: none"> <li><input type="checkbox"/> Provide overall day-to-day coordination between the consultant team members in delivering the tasks under this consultancy service assignment;</li> <li><input type="checkbox"/> Review designs, drawings for the roadwork;</li> <li><input type="checkbox"/> Suggest modifications, if required as per actual site conditions;</li> <li><input type="checkbox"/> Carry out design of any realignment, redesign/modifications of the roadwork components, if necessary, as per site conditions;</li> <li><input type="checkbox"/> Review horizontal and vertical alignment for the road based on review of tender drawings and topographic survey carried out by the contractor including amending the alignment plan and profile based on updated topographic surveys;</li> <li><input type="checkbox"/> Review road safety provisions in the tender drawing and suggest modifications for construction if necessary;</li> <li><input type="checkbox"/> Ensure provision of road safety during construction and pre-opening stage by the contractor;</li> <li><input type="checkbox"/> Provide overall quality control on the deliverables and outputs by each consultant team member;</li> <li><input type="checkbox"/> Assist the Client in the administration of all civil works contracts;</li> <li><input type="checkbox"/> In coordination with relevant consultant team members, interpret the Technical Specifications and Contract Documents;</li> <li><input type="checkbox"/> Obtain related approvals from concerned authorities for any redesign of road realignment, modifications and redesign of bridges;</li> <li><input type="checkbox"/> Review the contractor's securities being in approved format;</li> <li><input type="checkbox"/> Ensure receipt of requisite insurances as per contract requirement;</li> <li><input type="checkbox"/> Review documentations and advance actions for handing over of site and advise on issuing notice to set the commencement date;</li> <li><input type="checkbox"/> Ensure contractor effects and implements Quality Assurance System;</li> <li><input type="checkbox"/> Issue approval to the contractor's detailed work programme, suggest modifications if any, and ensure contractor compliance with the work programme;</li> </ul>

Sl. No.	Position	Tasks/Responsibilities
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Issue approval to the contractor's Superintendence Personnel with modifications if any;</li> <li><input type="checkbox"/> Scrutinize contractor's mobilization of equipment in accordance with the contractor's program;</li> <li><input type="checkbox"/> Scrutinize and approve contractor's construction methods statement;</li> <li><input type="checkbox"/> Issue finalized or revised "Good for Construction drawings" and additional detailed drawings required for the execution of the work;</li> <li><input type="checkbox"/> Issue to contractor amended alignment plan and profile drawings based on review of tender drawings and updated topographic surveys;</li> <li><input type="checkbox"/> Issue bridge details and modified drawings wherever required due to change in founding level, as a result of change in founding strata or any other reason at the time of execution;</li> <li><input type="checkbox"/> Approve contractors working drawings based on setting out details;</li> <li><input type="checkbox"/> Approve setting out data for the works finalized as a result of ground verification and survey;</li> <li><input type="checkbox"/> In coordination with relevant team members, monitor supervision of all works and ensure proper supervision as per contract requirement;</li> <li><input type="checkbox"/> Monitor closely and regularly the progress of work and advise the contractor about corrective measures;</li> <li><input type="checkbox"/> Monitor status of contractor's equipment, plant, machinery installations, housing and medical facilities;</li> <li><input type="checkbox"/> Direct and/or advise contractor to avoid and/or reduce the risk in case of any emergency;</li> <li><input type="checkbox"/> Advise contractor in all matters covering safety and care of work, environmental aspects and labor welfare;</li> <li><input type="checkbox"/> Review the test results / certificate of all construction material and/or sources of materials to ensure quality;</li> <li><input type="checkbox"/> Review mix designs proposed by the contractors;</li> <li><input type="checkbox"/> Verify and recommend, if in order, contractors requests for advance and interim payment certificate;</li> <li><input type="checkbox"/> Assist the Client in arranging relocation of services;</li> <li><input type="checkbox"/> In coordination with relevant team members, maintain a permanent record of all payments made to the contractor;</li> <li><input type="checkbox"/> Prepare consolidated monthly reports;</li> </ul>

Sl. No.	Position	Tasks/Responsibilities
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Approve as-built drawings;</li> <li><input type="checkbox"/> Inspect the works on completion of each milestone before accepting the work and report to the PIU;</li> <li><input type="checkbox"/> Inspect works at appropriate intervals during Defect Notification Period and advise the PIU;</li> <li><input type="checkbox"/> In coordination with the environmental and social specialist, ensure the contractor implements and maintains the environmental and social monitoring in compliant with the Environmental Management Plans (EMPs);</li> <li><input type="checkbox"/> Assist PIU staff to carry out all the duties as apply to Maintenance Works Contract;</li> <li><input type="checkbox"/> Assist PIU in dispute resolution activities, if necessary, during the pendency of the contract; and</li> <li><input type="checkbox"/> Perform regular coordination with the Project Management Consultant (PMC) team with regard to the preparation and application of the Project Management.</li> <li><input type="checkbox"/> Verify 20% of the tests and measurements along with Divisional Engineer, PIU.</li> <li><input type="checkbox"/> To manage Physical and financial progress and to report PIU/PMU</li> </ul>
2	<b>Resident Engineers (EPC 03, EPC 04 &amp; EPC 05)</b>	<p>In performing the following tasks, the Resident Engineer must be in coordination and consultation with the TL and other relevant consultant team members:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Interpret the Technical Specifications and Contract Documents;</li> <li><input type="checkbox"/> Ensure contractor effects and implements Quality Assurance System;</li> <li><input type="checkbox"/> Verify and recommend for approval to the contractors detailed work programme, suggest modifications if any and ensure the contractor compliance with the programme;</li> <li><input type="checkbox"/> Issue approval to the contractor's Superintendence Personnel with modifications, if any;</li> <li><input type="checkbox"/> Scrutinize the contractor's mobilization of equipment in accordance with the contractor's programme;</li> <li><input type="checkbox"/> Scrutinize and recommend the contractor's construction methods statement;</li> </ul>

Sl. No.	Position	Tasks/Responsibilities
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Scrutinize and recommend to finalized or revised “Good for Construction drawings” and additional detailed drawings required for the execution of the work;</li> <li><input type="checkbox"/> Scrutinize and recommend to TL for contractor amended alignment plan and profile drawings based on review of tender drawings and updated topographic surveys;</li> <li><input type="checkbox"/> Issue bridge details and modified drawings wherever required due to change in founding level, as a result of change in founding strata or any other reason at the time of execution;</li> <li><input type="checkbox"/> Verify and recommend, the contractor’s working drawings based on setting out details;</li> <li><input type="checkbox"/> Approve setting out data for the Works finalized as a result of ground verification and survey;</li> <li><input type="checkbox"/> Monitor supervision of all works and ensure proper supervision as per contract requirement;</li> <li><input type="checkbox"/> Monitor closely and regularly the progress of work and advise the contractor about corrective measures;</li> <li><input type="checkbox"/> Monitor status of the contractor’s equipment, plant, machinery installations, housing and medical facilities;</li> <li><input type="checkbox"/> Direct and/or advise the contractor to avoid and/or reduce the risk in case of any emergency;</li> <li><input type="checkbox"/> Advise the contractor in all matters covering safety and care of work, environmental aspects and labor welfare;</li> <li><input type="checkbox"/> Review the test results / certificate of all construction material and/or sources of materials to ensure quality;</li> <li><input type="checkbox"/> Review mix designs proposed by the contractor;</li> <li><input type="checkbox"/> Verify and recommend, if in order, contractors requests for advance and interim payment certificate;</li> <li><input type="checkbox"/> Assist the Client in arranging relocation of services;</li> <li><input type="checkbox"/> Maintain a permanent record of all payments made to the contractor;</li> <li><input type="checkbox"/> Verify the entire measurements recorded by the Cost and Contract Engineer and keep the track of BOQ in line with the contract agreement.</li> <li><input type="checkbox"/> Prepare monthly reports;</li> <li><input type="checkbox"/> Prepare financial statement;</li> </ul>

Sl. No.	Position	Tasks/Responsibilities
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Verify and recommend “as-built” drawings;</li> <li><input type="checkbox"/> Inspect the works on completion of each milestone before accepting the work and report to the PIU;</li> <li><input type="checkbox"/> Inspect works at appropriate intervals during Defect Notification Period and advise the PIU;</li> <li><input type="checkbox"/> Ensure the contractor implements and maintains the environmental and social monitoring in compliant with the EMP;</li> <li><input type="checkbox"/> Assist PIU Staff to carry out all the duties as apply to Maintenance Works Contract; and</li> <li><input type="checkbox"/> Monitor Field Engineer (Roads) and Field Engineer (Bridges).</li> <li><input type="checkbox"/> Verify 20% of the tests and measurements along with Assistant Divisional Engineer/ Assistant Engineer, PIU.</li> </ul>
3.	<b>Senior Structural / Bridge Engineer</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Review and recommend designs, drawings for bridges, culverts or any other structures;</li> <li><input type="checkbox"/> Suggest modifications and design, if required as per actual site conditions;</li> <li><input type="checkbox"/> Carry out any design, if required for bridges or culverts or any other structures;</li> <li><input type="checkbox"/> Check and modify design and drawings, if required due to change in founding level, or any other reason as a result of scrutiny of geotechnical data;</li> <li><input type="checkbox"/> Scrutinize contractors working drawings for temporary works for structure;</li> <li><input type="checkbox"/> Carry out supervision of all bridge works and CD works as per approved methods statements;</li> <li><input type="checkbox"/> Examine contractor’s preparation and completed position of work as per “Request for Inspection” and advise the contractor promptly;</li> <li><input type="checkbox"/> Monitor closely and regularly the progress of work on bridges or CD works and report to the TL;</li> <li><input type="checkbox"/> Supervise the contractor in all matters concerning safety and care of the works; and</li> <li><input type="checkbox"/> Witness sampling and testing being carried out by contractor particularly of bridge and CD works components;</li> <li><input type="checkbox"/> Closely monitor the Field Bridge Engineer’s duties and assignments.</li> </ul>



Sl. No.	Position	Tasks/Responsibilities
4.	<b>Cost &amp; Contracts Engineer</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Measure quantities of work, record measurements and verify BOQ items/work quantities executed in the contractor's monthly statement;</li> <li><input type="checkbox"/> Verify and examine interim payment certificates received from contractor;</li> <li><input type="checkbox"/> Maintain a permanent record of all measurement for the work quantities;</li> <li><input type="checkbox"/> In coordination with the TL, assist the Client and the Engineer in the administration of civil works contracts;</li> <li><input type="checkbox"/> In coordination with the TL, interpret the Technical Specifications and Contract Documents;</li> <li><input type="checkbox"/> In coordination with the TL, review and ensure conformity of contractor's securities in approved formats;</li> <li><input type="checkbox"/> In coordination with the TL, ensure requisite insurances furnished by the contractor being contract compliant; and</li> <li><input type="checkbox"/> In coordination with the TL, assist PIU in dispute resolution activities, if necessary, during the pendency of the contract;</li> <li><input type="checkbox"/> He shall assist TL for arriving Budget in all stages.</li> </ul>
5.	<b>Quality &amp; Material Engineer (EPC 03, EPC 04 &amp; EPC05)</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Assist the TL and to finalize sampling methods and criteria and acceptance criteria for quality control and assurance;</li> <li><input type="checkbox"/> Examine the contractor's preparation and completed portion of work as per "Request for Inspection" and advise the contractor promptly;</li> <li><input type="checkbox"/> Monitor closely and regularly the progress on materials procurement and quality and report to the TL;</li> <li><input type="checkbox"/> Carry out inspection of the contractor's laboratory equipment and report to the TL;</li> <li><input type="checkbox"/> Ensure and witness sampling and testing being carried out by the contractor and undertake additional tasks as necessary to ensure quality of works;</li> <li><input type="checkbox"/> Scrutinize test results/certification of all construction materials and/or sources of materials and undertake additional tests if necessary and report to the Resident Engineer and the TL;</li> <li><input type="checkbox"/> In coordination with the Pavement Specialist, Quality and Material Engineer, scrutinize mix design proposed by the contractor;</li> <li><input type="checkbox"/> Maintain a permanent record of all tests carried out for monitoring the quality of works;</li> </ul>

Sl. No.	Position	Tasks/Responsibilities
		<input type="checkbox"/> In coordination and consultation with the Pavement Specialist, Quality & Material Engineer and the Senior Environmental Engineer, issue and approve borrow areas and quarries; and <input type="checkbox"/> Monitor and maintain quality of Construction Materials in all aspects.
6.	Senior Road Safety Engineer	<input type="checkbox"/> Scrutinize contractor's construction method statement for its being compliant to road safety aspects; <input type="checkbox"/> Supervise the contractor in all matters concerning road safety aspects; <input type="checkbox"/> Monitor compliance with the Road Safety as per IRC standards by the contractor; <input type="checkbox"/> Assist PIU in undertaking and monitoring of road safety measures; <input type="checkbox"/> Identify and report any road safety related issues that may arise during construction to the TL and the Clients; and <input type="checkbox"/> Perform regular coordination with the PMC team for any matters related to implementation, monitoring and reporting of road safety policy. <input type="checkbox"/> Identify the accident spots and plan to safeguard. <input type="checkbox"/> During diversion traffic safety has to be guaranteed.
7.	Geotechnical Engineer	<input type="checkbox"/> Verify the Geo-Technical Reports of contractor <input type="checkbox"/> Check and recommend for modification of design and drawings, if required due to change in founding level, or any other reason as a result of scrutiny of geotechnical data; <input type="checkbox"/> Scrutinize the sub-soil particulars of site/ foreign materials and recommend to TL for adoption
8.	Senior ITS Specialist	<b>For All Stages (Civil, ITS)</b> <input type="checkbox"/> Lead the all stages of the consulting works including Basic Design, Tender Assistance (ITS), Construction Supervision (ITS), and O&M. Ensure all deliverables are prepared in accordance with quality and time constraints. <input type="checkbox"/> Coordinate with the related organizations during the contract as necessary <b>For Detailed Design</b> <input type="checkbox"/> Administer and supervise site investigation and design and documentation activities related to ITS. <b>For Basic Design (ITS)</b>

Sl. No.	Position	Tasks/Responsibilities
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Administer and supervise site investigation and design and documentation activities.</li> <li><input type="checkbox"/> Ensure that the specifications of ITS prepared by basic design team members include necessary functions with sufficient quality to fulfill the requirement of HMPD.</li> <li><input type="checkbox"/> Ensure that tender document is suitable for procurement under ICB with PQ in accordance with the procurement guidelines of AIIB.</li> </ul> <p><b>For Tender Assistance (ITS)</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Assist HMPD to appraise bids as part of the bid evaluation process.</li> </ul> <p>For Construction Supervision (ITS) and O&amp;M</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Prepare monthly progress reports and quarterly progress reports in a form agreed with HMPD and submit the reports within 10 days before the end of the month or quarter to which they refer.</li> <li><input type="checkbox"/> Prepare a final report, which will be a compilation and condensation of the data presented in regular monthly progress reports, together with copies of as-built drawings within two months from the issuance of the defects liability (performance) certificate.</li> <li><input type="checkbox"/> Confirm the training programme and conduct lecture to operator and maintenance team.</li> <li><input type="checkbox"/> Confirm the fairness of SLA report before submission to Client.</li> </ul>
9.	<b>Health Expert</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> To provide health and safety training of Contractor's Personnel as appropriate to fulfill banks ESHS guidelines.</li> <li><input type="checkbox"/> To engage the Contractor's Personnel in promoting understanding, and methods for, implementation of health and safety requirements, as well as in providing information to Contractor's Personnel, training on occupational safety and health, and provision of personal protective equipment without expense to the Contractor's Personnel.</li> <li><input type="checkbox"/> To establish and implement a system for regular (not less than six-monthly) review of health and safety performance and the working environment.</li> <li><input type="checkbox"/> The procedures to establish and maintain a safe working environment without risk to health at all workplaces, machinery, equipment and processes under the control of the Contractor, including control measures</li> </ul>

Sl. No.	Position	Tasks/Responsibilities
		<p>for chemical, physical and biological substances and agents.</p> <ul style="list-style-type: none"> <li>□ The measures to be taken to avoid or minimize the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases.</li> <li>□ The measures to be implemented to avoid or minimize the spread of communicable diseases (including transfer of Sexually Transmitted Diseases or Infections (STDs), such as HIV virus) and non-communicable diseases associated with the execution of the Works, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups. This includes taking measures to avoid or minimize the transmission of communicable diseases that may be associated with the influx of temporary or permanent Contract-related labor.</li> </ul>

## 6. **REPORTING REQUIREMENTS**

6.1 The Authority's Engineer shall prepare the following reports.

- Construction Supervision Report / Manual
- Quality Assurance Plan
- Operation & Maintenance Manual
- Training Manual
- Monthly Report
- Quarterly and Annual Report
- Special Report if any
- Draft Completion Report
- Final Completion Report
- Environmental Compliance Report
- Social Safeguards Monitoring Report
- Road Safety Compliance Report

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### **6.1.1 Construction Supervision Report/ Manual**

The Authority's Engineer shall prepare a detailed construction supervision report/manual defining the principles of supervision for the various categories and levels of supervisory staff. The manuals shall address, inter alia, the following aspects of supervision:

- a. What to inspect
- b. How to inspect (with flow charts detailing scheduling of tasks for inspection)
- c. Evolving effective Quality assurance measures for adoption
- d. Role of survey department in supervision - Role of supervision in laboratory testing
- e. Role of key professional & sub professional staff in supervision
- f. Procedure for inspection and approval of individual activities and parts of the works
- g. Report shall be furnished within 50 days of inception

### **6.1.2 Quality Assurance Plan**

The Authority's Engineer shall prepare a quality assurance plan for achieving quality in construction based on national/ international codes and best practices. Step by step procedures to be indicated in an elaborate manner. Report shall be furnished within 50 days of inception.

### **6.1.3 Operation & Maintenance Manual**

The Authority's Engineer shall prepare an Operation & Maintenance manual indicating the operating and maintenance requirements and indicators for evaluating the quality of road etc. Report shall be furnished before 90 days of completion of project

### **6.1.4 Training Manual**

The Authority's Engineer shall prepare a detailed training manual including modules to be used for the various disciplines that will be involved in the project, such as:

- a) Inspection for supervision
- b) Survey techniques
- c) Laboratory test
- d) Accounting & Monitoring

- 
- e) Quantity survey & other Engineering aspects
  - f) Personality development

Report shall be furnished within 90 days of inception.

#### **6.1.5 Monthly Report**

The Authority's Engineer shall inspect the construction works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Authority's Engineer.

The Authority's Engineer shall, no later than the seventh working day after the end of each month, prepare a brief progress report summarizing the work undertaken by each of the supervision teams for the preceding month.

The report will outline any problems encountered (administrative, technical or financial) and give recommendations on how these problems may be overcome. Brief work progress summaries will be included for ongoing road and bridge works, outlining problems encountered and recommending solutions.

The report should record the status of payment of contractor monthly certificates, of all claims for cost or time extensions, and of actions required of government and parastatal agencies to permit unconstrained works implementation. The reports shall be submitted in electronic format (Compact Disc/ USB /Hard disks) in addition to the hard copies.

#### **6.1.6 Quarterly and Annual Reports**

The Authority's Engineer shall, by no later than the seventh working day after the end of each quarter, prepare a comprehensive report summarizing all activities under the services at the end of each quarter. The annual report should be submitted by no later than the seventh working day after the end of each year, and also at other times when considered warranted by either the Engineer or the Client because of delay of the construction works or because of the occurrence of technical or contractual

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difficulties. Such reports shall summarize not only the activities of the Engineer and the Engineer's Representative but also the progress of the Contracts, all contract variations and change orders, the status of Contractor claims, if any, brief descriptions of the technical and contractual problems being encountered, details of physical and financial progress in approved formats, financial status of the contracts as a whole consisting the cost incurred, and cost forecast, as well as financial plan (by Bank and the Government) and other relevant information for each of the ongoing contracts. The reports shall be submitted in electronic format (Compact Disc/ USB /Hard disks) in addition to the hard copies.

#### **6.1.7 Special Reports / Engineering Reports**

The Engineer shall prepare specific reports, required in the event of particular or unforeseen circumstances. Such reports shall be prepared on an "ad-hoc" basis and shall include an analysis of the Engineering matter in question and shall propose possible solution thereto. The reports shall be submitted in electronic format (Compact Discs/ USB /Hard disks) in addition to the hard copies.

#### **6.1.8 Draft and Final completion reports**

The Authority's Engineer shall prepare a comprehensive final Completion Report for the construction contract, which reaches a stage of substantial completion during the period of the services. These reports which must be submitted immediately within a period of 3 months from the stage of substantial completion of the EPC works contract, shall summarize the method of construction, the construction supervision performed, problems encountered, solutions undertaken and recommendations for future projects of similar nature to be undertaken by the Client. The Authority's Engineer shall summarize and consolidate in a single Team Final Report the key information from the individual sectional completion reports.

The reports shall also be submitted in electronic format (Compact Discs/ USB /Hard disks) in addition to the hard copies mentioned above.

#### **6.1.9 Environmental Compliance Report**

The Authority's Engineer shall prepare and submit compliance report on implementation of contract specific Environment Management Plan and

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Environmental Monitoring Plan, and also indicate any problems encountered suggestions on improvement of EMP etc. on semi-annual basis and shall submit the report in the first week of January and July of every year. The reports shall be submitted in electronic format (Compact Discs / USB /Hard disks) in addition to the hard copies.

#### **6.1.10 Social Safeguard Monitoring Report**

The Authority's Engineer shall prepare and submit Social Safeguard Monitoring report on implementation of contract specific social safeguards activities, and also indicate any problems encountered, suggestions on improvement of Social Safeguard tasks etc. on semi-annual basis and shall submit the report in the first week of January and July of every year. The reports shall be submitted in electronic format (Compact Discs/ USB /Hard disks) in addition to the hard copies.

#### **6.1.11 Road Safety Compliance Report**

The Authority's Engineer shall prepare and submit compliance report on implementation of road safety management plan. The reports shall include outcome of road safety audit conducted by the Engineer and also incorporate recommendations for improving road safety. The reports shall be also be submitted in electronic format (Compact Discs/ USB /Hard disks) in addition to the hard copies. Report shall be furnished within 30 days of submission completion reports of respective roads.

### **6.2 A Summary of the Reports to be provided is indicated below:**

**Table 6.2.1 Reporting requirements of Authority Engineer**

<b>Sl. No.</b>	<b>Description</b>	<b>No. of Copies</b>
1	Construction Supervision Report/ Manual	6
2	Quality Assurance Plan	6
3	Operations/ Maintenance Manual	6
4	Training Manual	6
5	Monthly Reports	3
6	Quarterly Reports	3
7	Annual Reports	3
8	Special Report (if any)	3



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Sl. No.	Description	No. of Copies
9	Draft Completion Report	3
10	Final Completion Report	3
11	Environmental Compliance Report	3
12	Social Safeguards Monitoring Report	3
13	Road Safety Compliance Report	6

Soft copies of all the above reports shall be furnished in the Compact Disks and External hard disk.

## **7. Clients Input Counterpart Personnel**

### **7.1. Facilities**

7.1.1. Office Building: As part of the scope of the Contractor, the Contractor will construct or provide Team Leader office and Resident Engineer office at the locations mentioned in 5.1 as per Good industry practice. Till the building is made ready, rented accommodation will be provided by the Contractor.

7.1.2. Office furniture: The office furniture shall be arranged by the contractor to the extent stated in the construction agreement. Other furniture required by the Authority's Engineer shall be arranged by Authority's Engineer themselves as per Good industry practice.

7.1.3. Quality Control Lab: As part of the scope of work, the Contractor shall construct and provide quality control lab with all testing equipment mentioned in the MORT&H and as listed in the construction contract.

7.1.4. Vehicles: Vehicles required for the key and sub-key professionals shall be arranged by Authority's Engineer themselves as per good industry practice.

7.1.5. Accommodation: Accommodation for key and sub-key professionals shall be arranged by Authority's Engineer themselves as per good industry practice.

### **7.2. Services & Data**

Copy of Updated DPR and other relevant Documents.