

## TERMS OF REFERENCE (DRAFT)

### ***Authority's Engineer for Rehabilitation/Reconstruction of Work Contract EPC-04 Dhoridungri-Garasiyawada (Km 0+000 to 12+338) section of VR/MDR & Garasiyawada to Lunawada (Km 0+006 to 13+937) section of SH-63 on EPC mode under GSHP-II***

#### **1. Background**

The Government of Gujarat (GoG) through the Government of India has received a loan from the International Bank for Reconstruction and Development (the Bank) towards the cost of Second Gujarat State Highway Project (GSHP-II). A part of this financial assistance is to be applied towards civil works of upgradation, rehabilitation and improvement of about 185 km of State Highways. These works are proposed in 6 contract packages (namely EPC-01A (Mehsana-Sidhpur), EPC-1B (Sidhpur-Palanpur), EPC-1C (Mehsana Bypass), EPC-02 (Radhanpur-Chanasma), EPC-03 (Vallabhipur-Ranghola), and EPC-04 (Dhoridungri-Garasiyawada, Garasiyawada-Lunawada) under Engineering, Procurement and Construction (EPC) mode with 5 years maintenance period. It is intended to engage Authority's Engineer for supervision of EPC-04 contract package under this consultancy services.

#### **2. Works**

The details of road works under GSHP-II are given below.

<b>Package</b>	<b>Name of work</b>	<b>Length in Km</b>	<b>Construction period (in months)</b>	<b>Consultancy Contract period* (in months)</b>
EPC-04	Rehabilitation/Reconstruction of Dhoridungri-Garasiyawada (Km 0+000 to 12+338) section of VR/MDR & Garasiyawada to Lunawada (Km 0+006 to 13+937) section of SH-63	26.275	18	30

**\*Note:** Consultancy services period of 30 months shall comprise of: 18 months of construction period + 12 months of maintenance period.

The road rehabilitation/reconstruction works involves the following:

- a) Rehabilitation/reconstruction of existing Dhoridungri-Garasiyawada and Garasiyawada to Lunawada road.
- b) Raising the existing road if required based on longitudinal profile correction, flood history and pavement conditions.
- c) Providing necessary pavement crust in widening portion as per IRC 37 and overlay on existing pavement as per IRC 115 based on traffic characteristics and soil characteristics.
- d) Providing additional culverts (pipe / slab / box) based on the hydrology study and drainage requirements.
- e) Widening/ reconstruction/ Rehabilitation of culverts (pipe / slab / box) based on the condition survey, hydrology and road widening requirements.

- f) Widening/ reconstruction/ Rehabilitation of minor bridges, major bridges etc. based on the condition survey, hydrology and road widening requirements.
- g) Provision of ROBs/ grade separators based on the traffic and safety requirements.
- h) Provision of pucca (RCC) drains in built up areas and earthen drains in rural areas.
- i) Provision of traffic signs, road markings, delineators, Km stones, boundary stones etc.
- j) Provision of Project facilities includes bus bays, pedestrian foot path in urban areas with guard rails, street lighting.
- k) Provision of Road Safety measures such as protection works at pond, metal beam crash barriers in vulnerable stretches, footpath with guard rails, speed calming measures, warning signs, junction improvements, etc.
- l) Environment management measures such as compensatory tree plantation (1:10), roadside ponds protection and enhancement works, monitoring air, water & noise levels, specific enhancement for road side community structures etc.
- m) Under EPC mode, the Contractor's scope also includes 5 years maintenance after completion of construction.

The bids for the civil works are to be invited under NCB in EPC mode. The construction contract documents are based on World Bank modified EPC document. The supervision of civil works will be carried out by the Consultants with satisfactory experience in implementing projects of similar nature and size.

### **3. Objective**

The objective of this Consultancy Contract is:

- a) to ensure that high quality construction is achieved and all works are carried out in full compliance with the engineering design requirements, technical specifications, Environmental Management Plan and other stipulations of the EPC contract documents and within specified time periods;
- b) to demonstrate the efficacy of contract supervision by independent external agency experienced in this field of work; and
- c) to promote technology transfer.

### **4. Duties and Responsibilities of the Consultant**

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

#### **4.1 General**

- a. The Consultant shall carryout all the duties of the "Authority's Engineer" as specified in the EPC Agreement within the limitations specified therein.

*Note:*

- (i) *The words and expressions beginning with or in capital letters and not defined herein but defined in the EPC Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the EPC Agreement.*

- (ii) *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 EPC Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.*
- (iii) *The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the EPC Agreement shall apply, mutatis mutandis, to this TOR.*
- b. The “Authority’s Engineer” is the firm engaged by the Client for the supervision consultancy services. The firm is, however, required to appoint the Team Leader to act as the “Authority’s Engineer”. The Consultant 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 EPC 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 firm. The Client may also interact with the firm if required. The term “Authority’s Engineer” referred in this contract document thus means both the Team Leader and the consultancy firm and can be used interchangeably. The “Authority’s Engineer” may appoint the Resident Engineer for each section / EPC Contract to be the “Authority Engineer's Representative” as defined in the contract to carry out his duties at each section.
- c. The duties of the Authority’s Engineer are to review and approve the designs and drawings submitted by the Contractor, supervise the works and approve the materials and workmanship of the works as spelled out in the contract documents for the works. The Authority’s Engineer shall administer all the construction works contracts and shall ensure that the contractual provisions, whether related to quality or quantities of work are duly implemented. As stated in the 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 details in the EPC Agreements. The Authority’s Engineer shall co-ordinate the supervision teams, to ensure that the technical policies are correctly and consistently implemented on all the road sections.
- d. The Consultant shall discharge his duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- e. The Consultant shall review/ verify and accord approval through “No objection” for the designs and drawings proposed by the Contractor for various works.
- f. The Consultant 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 Consultant in notifying to 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.

- g. The Consultant 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 as may be decided by Client. The Authority's Engineer shall take prior approval of Authority before issuing Provisional Completion Certification and Completion Certificate. The proposal submitted to Client shall also include the name of the authorized representative along with the authorization letter and power of attorney.
- h. The Consultant shall perform the duties and exercise the authority in accordance with the provisions of EPC agreement, but subject to obtaining prior written approval of the Client before determining:
  - i. any Time Extension;
  - ii. any additional cost to be paid by the Client to the Contractor;
  - iii. the Termination Payment; or
  - iv. any other matter which is not specified in (i), (ii) or (iii) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,00,000/- (Rs. Five lakhs).
- i. The Consultant 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 Consultant **within 10 (ten) days** of the beginning of every month.
- j. The Consultant shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Client's prior approval in accordance with the provisions of **Clause 18.2**.
- k. The Consultant shall ensure that road safety measures are properly incorporated in the design and drawing and duly implemented during construction. The Consultant shall conduct road safety audit in the design phase, during construction and ensure all road safety measures are properly implemented by the Contractor. Further the Consultant shall submit road safety compliance report as per the TOR.
- l. The Consultant shall aid and advise the Client on any proposal for Change of Scope under Article 13.
- m. In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the EPC Agreement, the Consultant shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.
- n. The Consultant shall maintain a daily project diary which shall record all events pertaining to the administration and execution of the Contract.
- o. The Consultant shall prepare specific engineering reports when required which shall include an analysis of problem encountered and solution proposed.

- p. The Consultant shall carry out any other duties relevant to the project agreed during contract negotiation.
- q. The Consultant shall ensure implementation of Environment Management Plan (EMP) included in the EPC agreement and shall submit compliance/ progress/ monitoring report as given in the EMP.
- r. The Consultant shall prepare 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.
- s. Issue payment certificates as stipulated in the EPC agreement.
- t. The Consultant shall assist the Client in preparation of documents required for dispute resolution procedures as given in the EPC agreement. The Consultant shall prepare draft replies to the Dispute Resolution Board, Arbitration Tribunal etc.

#### **4.2 Construction Period**

- a. During the Construction Period, the Consultant 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 Consultant), characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of **Clause 10.1.6**. The Consultant 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 upto 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.
- b. The Consultant shall review any revised Design and Drawings sent to it by the Contractor and furnish its comments **within 10 (ten) days of receiving such Drawings**.
- c. The Consultant shall review and accord approval through No objection the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within **a period of 21 (twenty-one) days stating the modifications**, if any, required thereto.
- d. The Consultant 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**.

- e. The Consultant 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**.
- f. The Consultant 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**.
- g. The Consultant 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 Consultant shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.
- h. The Consultant shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Consultant may require.
- i. For determining that the Works conform to Specifications and Standards, the Consultant 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 Practice for quality assurance. For purposes of this **Paragraph 4.9**, 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 issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.
- j. The Consultant shall test **check 100 (hundred) percent** of the quantity and number of tests prescribed for each category or type of test for quality control by the Contractor.
- k. The timing of tests referred to in **Paragraph 4.9**, and the criteria for acceptance/ rejection of their results shall be determined by the Consultant in accordance with the Quality Control Manuals. 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.
- l. In the event that results of any tests conducted under **Clause 11.10** establish any Defects or deficiencies in the Works, the Consultant shall require the Contractor to carry out remedial measures including redoing the same.
- m. The Consultant 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** shall apply.

- n. In the event that the Contractor fails to achieve any of the Project Milestones, the Consultant shall undertake a review of the progress of construction and identify potential delays, if any. If the Consultant shall determine that completion of the Project Highway is not feasible within the time specified in the 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 Consultant shall review the same and send its comments to the Client and the Contractor forthwith.
- o. The Consultant shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to **Clause 12.4**.
- p. Consultant may recommend to the Client 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 Consultant shall inspect such remedial measures forthwith and make a report to the Client recommending whether or not the suspension hereunder may be revoked.
- q. In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Consultant to inspect such works, the Consultant 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.
- r. The Consultant shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this **Paragraph 4.18** and all matters incidental thereto, the Consultant shall act under and in accordance with the provisions of **Article 12 and Schedule-K**.
- s. The Consultant is solely responsible to ensure quality of construction to the standards and specifications.
- t. The Consultant shall also submit various reports to the requirement of World Bank and also attend World Bank inspections/ mission meetings to appraise the project status to the World Bank.
- u. The Consultant shall also submit reports to the Government/ Client in the required format as and when requested.
- v. The Consultant shall provide clarifications / replies to the observations made, from time to time by the Auditor.

#### **4.3 Maintenance Period**

The EPC Contractor shall maintain the **road for 5 years** as stipulated in the EPC agreement. The Consultant shall supervise maintenance works in the initial period of one year and develop a system to prepare the Department Engineers to handle the maintenance supervision in the next four years.

- a. The Consultant shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.
- b. The Consultant 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.
- c. The Consultant 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 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.
- d. In respect of any defect or deficiency referred to in **Paragraph 3 of Schedule-E**, the Consultant 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.
- e. The Consultant 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 Consultant 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**.

#### **4.4 Determination of costs and time**

- a. The Consultant shall determine the costs, and/or their reasonableness, that are required to be determined by it under the EPC Agreement.
- b. The Consultant shall determine the period of Time Extension that is required to be determined by it under the EPC Agreement.
- c. The Consultant shall consult each Party in every case of determination in accordance with the provisions of **Clause 18.5**.

#### **4.5 Payments**

- a. The Consultant shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Consultant in accordance with the provisions of **Clause 10.2.4 (d)**.
- b. Consultant shall –
  - i. **within 10 (ten) days** of receipt of the Stage Payment Statement from the Contractor pursuant to **Clause 19.4**, determine the amount due to the Contractor and recommend



the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and

- ii. **within 15 (fifteen) days** of the receipt of the Stage Payment Statement referred to in **Clause 19.4**, 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**.
- c. The Consultant shall, **within 15 (fifteen) days** of receipt of the Monthly Maintenance Statement from the Contractor pursuant to **Clause 19.6**, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.
- d. The Consultant 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**.

#### **4.6 Other duties and functions**

The Consultant shall perform all other duties and functions as specified in the EPC Agreement.

#### **4.7 Miscellaneous**

- a. A copy of all communications, comments, instructions, Drawings or Documents sent by the Consultant to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Consultant thereon, shall be furnished by the Consultant to the Client forthwith.
- b. The Consultant 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 Consultant shall obtain a complete set of as-built Drawings, **in 2 (two) hard copies 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 Consultant, 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 Consultant shall inform the Client and the Contractor of any event of Contractor's Default within one week of its occurrence.

#### **5. Training**

5.1 The Consultant shall organize training programme for the **Client's Engineers (10 persons minimum)** at **Gandhinagar / Lunawada** for 3 days in the areas of construction supervision, quality assurance, modern technologies, construction methods, contract management and project monitoring. Further, training shall also include improvement of communication skills and personality development including site orientation programme. The Consultant shall make all necessary arrangements for conducting training which shall include venue, faculty, training material, refreshments etc.

## 6. Location of Offices, Key Personnel, Sub-key Personnel and Support Staff

### Location of Offices

It is proposed that EPC-04 contract will be supervised and managed by the Consultant. The **Team Leader office** will be tentatively located at **Lunawada**.

The **Resident Engineer offices** will be located as mentioned below:

Contract	Managed by	Tentative Location
EPC-04	Resident Engineer	Lunawada

During maintenance period, the Consultant will operate from this office and for that purpose its office will be located at Lunawada.

### (A) Construction Period:

The Consultant shall provide **key personnel** for EPC-04 contract as detailed below as a minimum:

Description	Quantity	Input	Man month	Total Man Month
Key Personnel				
Team Leader	1	Continuous	18	18
Resident Engineer	1	Continuous	18	18
Senior Quality & Material Engineer	1	Continuous	18	18
Senior Bridge Engineer	1	Continuous	18	18
Cost & Contract Engineer	1	Intermittent	9	9
Pavement Specialist	1	Intermittent	4	4
Senior Highway Design Engineer	1	Intermittent	4	4
Senior Bridge Design Engineer	1	Intermittent	4	4
Geotechnical Engineer	1	Intermittent	4	4
Senior Environmental Engineer	1	Intermittent	4	4
Senior Road Safety Engineer	1	Intermittent	4	4
Training Specialist	1	Intermittent	1	1
<b>Total Key personnel</b>				<b>106</b>

The Consultant shall provide **sub-key personnel** as detailed below as a minimum:

Work contract	Description	Quantity	Input	Man month	Total Man Month
	Sub-Key Personnel				
EPC-04	Field Engineer – Roads	1	Continuous	18	18
	Field Engineer – Bridges	1	Continuous	18	18
	Quantity Surveyor	1	Continuous	18	18
	Survey Engineer	1	Continuous	18	18
	Material Engineer	1	Continuous	18	18
	Lab Technician	1	Continuous	18	18
	Environmental & Safety Officer	1	Continuous	18	18
<b>Sub-Total</b>					<b>126</b>
<b>Total Sub-key personnel</b>					<b>232</b>

**(B) Maintenance Period:**

The Consultant shall provide key personnel & sub-key personnel for EPC-04 contract as detailed below as a minimum:

Work contract	Description	Quantity	Input	Man month	Total Man Month
	Key-Personnel & Sub-Key Personnel				
EPC-04	Resident Engineer	1	Continuous	12	12
	Field Engineer – Roads	1	Continuous	6	6
	Field Engineer – Bridges	1	Intermittent	3	3
	Quantity Surveyor	1	Intermittent	3	3
	<b>Total Key &amp; Sub-key personnel</b>				

**Note:**

1. At this stage, the Client does not indicate any limit of number of projects in hand for the positions having intermittent input. However, the Consultant shall ensure deployment of key personnel (intermittent) based on the Contractor's work programme and progress of work such that progress of works is never hampered.
2. Project experience of similar nature of works shall be considered as similar assignment experience for key personnel.
3. Inputs of Senior Highway Design Engineer and Senior Bridge Design Engineer shall be high in initial phase when designs and drawings shall be required to be reviewed in short timeframe. Consultants shall take a note of this requirement and field CVs accordingly.

**7. Qualification & Experience requirements for Key personnel and Sub-key personnel (which will be used for evaluating the Key Personnel/Experts as per Data Sheet 21.1 of the ITC)**

S. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar assignment	WB,ADB, other MF assignments	Description
1.	Team Leader	B.E Civil (Master degree Preferable) or equivalent	20 years	15 years	10 years	3 years	Thorough experience in supervision and management of major highway projects is essential. 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; knowledge of international 'best practices' and modern highway construction technology is essential. The candidate must have proven record of having worked as Team Leader for construction supervision and management of at least TWO large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway projects. Should have experience in various contracts modes and experience in developed countries is preferable.
2.	Resident Engineer	B.E Civil (Master degree Preferable) or equivalent	15 years	10 years	7 years	3 years	Thorough experience in supervision and management of major highway projects is essential. Knowledge of international 'best practices' and modern highway construction technology is essential. Should have experience in various contracts modes. Experience of at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) EPC

S. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar assignment	WB,ADB, other MF assignments	Description
							contract in similar position is a must.
3.	Senior Quality & Material Engineer	B.E Civil and Master degree in Geo-tech/Material /Highway Engineering or equivalent	15 years	10 years	7 years	3 years	Thorough experience in quality control, quality assurance, various testing methods and construction methodologies. Familiar with national/ international codes and best practices. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
4.	Senior Bridge Engineer	B.E. Civil and Master degree in Structural / Bridge Engineering or equivalent	15 years	10 years	7 years	3 years	Knowledge of various nationally/internationally accepted design codes & construction methodologies and familiarity with international 'best practices' is essential. The candidate must have the experience of planning & monitoring geotechnical and hydraulic investigations for the bridges and interpreting the findings thereof. Must have worked on similar position on at least ONE large (involving at least two major bridges with deep foundations and pre/post stressed concrete superstructure) highway/bridge project.
5.	Cost & Contract Engineer	B.E Civil (Master degree Preferable) or equivalent	20 years	15 years	10 years	3 years	Thorough experience in contract management, dispute/ litigation management, cost control, handling variations and should have handled various types of contracts. Experience in FIDIC contracts, EPC contracts including EPC and

S. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar assignment	WB,ADB, other MF assignments	Description
							turnkey contract modes. Candidate must have proven record as Cost & Contract Engineer. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
6.	Pavement Specialist	B.E. Civil and Master degree in Highway/Pavement/Geotech/Material Engineering or equivalent	15 years	10 years	7 years	3 years	Thorough knowledge and experience in pavement design, analyzing various types of pavements, knowledge of international best practices. Experience in pavement and subgrade investigations and designing appropriate cost effective pavements. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
7.	Senior Highway Design Engineer	B.E. Civil and Master degree in Highway Engineering or equivalent	15 years	10 years	7 years	3 years	Thorough experience in highway design, analyzing various types of geometry, knowledge of international best practices. Experience in software based highway designing is a must. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
8.	Senior Bridge Design Engineer	B.E. Civil and Master degree in	15 years	10 years	7 years	3 years	Knowledge of various nationally/internationally accepted design codes & construction methodologies and familiarity with

S. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar assignment	WB,ADB, other MF assignments	Description
		Structural / Bridge Engineering or equivalent					international 'best practices' is essential. The candidate must have capability to design bridges with various alternative materials and structural arrangements. Experience in software based design is a must. The candidate must have the experience of planning & monitoring geotechnical and hydraulic investigations for the bridges and interpreting the findings thereof. Must have worked on similar position on at least ONE large (involving at least two major bridges with deep foundations and pre/post stressed concrete superstructure) highway/bridge project.
9.	Geotechnical Engineer	B.E. Civil and Master degree in Soil Mechanics & Foundation/ Geotechnical Engineering or equivalent	15 years	10 years	7 years	3 years	Candidate must have thorough knowledge of geotechnical investigations, planning, surveys, interpretation of reports, sound knowledge in soil & foundations, working out of bearing capacity for structure foundations, Software based slope stability analysis. Thorough knowledge of national and international codes, various types of foundations, designs etc. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
10.	Senior	M.E. in	15 years	10 years	7 years	3 years	Candidate must have full knowledge of the

S. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar assignment	WB,ADB, other MF assignments	Description
	Environmental Engineer	Environmental Engineering/ Science or equivalent					World Bank guidelines, procedures and operational policies/directives. Experience of working as environmental expert in similar funded project in essential. The candidate must have the experience of preparing environmental management plans and supervising & monitoring implementation experience thereof. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
11.	Senior Road Safety Engineer	B.E. Civil and specialized in Road Safety or equivalent	15 years	10 years	7 years	3 years	Experience in road safety audit in design, during implementation and post construction. Experience in preparing and implementing road safety arrangement plan and should have knowledge of IRAP star rating. He should be thorough with relevant national and international safety codes and international 'best practices'. Must have worked on similar position on at least ONE large (50 km 2-lane or 25 km 4-lane or 20 km 6-lane or of INR.2000 million) highway project.
12.	Training Specialist	B.E. Civil and Master degree in Engineering	20 years	15 years	7 years	3 years	Candidate must have thorough knowledge in the highway engineering sector and conducted various training programmes for Engineers in the highway sector in the area of project



S. No.	Position	Education Qualification	General Experience	Experience in the Sector	Similar assignment	WB,ADB, other MF assignments	Description
		or equivalent					preparation, supervision, contract and project management, litigation management, contracts of different modes including PPP contracts, FIDIC conditions of contract, etc.
13.	Field Engineer-Road, Field Engineer-Bridges, Quantity Surveyor, Survey Engineer, Material Engineer, Lab Technician, Environmental & Safety Officer, Electrical Engineer	B.E. Civil or equivalent or Diploma in Civil Engineering	8 years for Degree or 12 years for Diploma	5 years for Degree or 8 years for Diploma	3 years for Degree or 5 years for Diploma	NA	The candidate as per his position shall be thorough with relevant sections of MORTH Specifications and other IRC and IS codes. He shall have experience of supervising the works of highway of similar nature. He shall be familiar with relevant tests, test frequencies and test results. He shall be familiar with Request For Inspection (RFI), measurement of works, Level book, progress reporting, other relevant works.

**Note:**

1. For all positions, Master degree in the concerned specialization is preferable.
2. Age limit for key-personnel – 65 years
3. Age limit of sub-key personnel – 55 years

## **8. REPORTING REQUIREMENTS:**

### **8.1 Construction Supervision Manual**

The Engineer shall prepare a detailed construction supervision 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:

- What to inspect
- How to inspect (with flow charts detailing scheduling of tasks for inspection)
- Evolving effective Quality assurance measures for adoption
- Role of survey department in supervision - Role of supervision in laboratory testing
- Role of key professional & sub professional staff in supervision
- Procedure for inspection and approval of individual activities and parts of the works

### **8.2 Quality Assurance Plan**

The 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 elaborate manner.

### **8.3 Operation & Maintenance Manual**

The Engineer shall prepare Operation & Maintenance manual indicating the operating and maintenance requirements and indicators for evaluating and ensuring the quality of road etc.

### **8.4 Training Manual**

The 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:

- Inspection for supervision
- Survey techniques
- Laboratory test
- Accounting & Monitoring
- Quantity survey & other Engineering aspects
- Personality development

### **8.5 Monthly Reports**

The Engineer shall, no later than the eighth 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 or 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 to the contractor with reference to monthly certificates, of all claims for cost or time extensions and of actions required by government and parastatal agencies to permit unconstrained works

implementation. The reports shall be submitted in electronic format (Compact Disc) in addition to the hard copies.

### **8.6 Environmental Compliance Reports**

The Engineer shall prepare and submit compliance report on implementation of contract specific Environment Management Plan and also indicate any problems encountered, suggestions on improvement of EMP etc. The reports shall be submitted in electronic format (Compact Discs) in addition to the hard copies.

### **8.7 Road Safety Compliance Reports**

The 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 Consultant and also incorporate recommendations for improving road safety. The report shall also be submitted in electronic format (Compact Discs) in addition to the hard copies.

### **8.8 Quarterly and Periodic Reports**

The Engineer shall, by no later than the eighth working day after the end of each quarter, prepare a comprehensive report summarizing all activities under the services at the end of each quarter, and also at other times when considered warranted by either the Consultant or the Client because of delay of the construction works or because of the occurrence of technical or contractual difficulties. Such reports shall summarize not only the activities of the Consultant and its Representative but also the progress of the Contracts, all contract variations and change orders, the status of Contractors' 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) in addition to the hard copies.

### **8.9 Special Reports / Engineering Reports**

The Engineer shall prepare specific report, required in the event of particular or unforeseen circumstances. Such reports shall be prepared on as "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) in addition to the hard copies.

### **8.10 Final Completion Report**

The Consultant shall prepare a comprehensive Draft Final Completion Report for the each construction contract, which reaches a stage of substantial completion during the period of the services. These reports which must be submitted immediately after the issuance of completion certificate, 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. On approval of Draft Completion Report, the Consultant shall summarize and consolidate in a single Final Completion Report.

The reports shall also be submitted in electronic format (Compact Discs) in addition to the hard copies.

**Summary of the Reports and their number of copies to be provided is indicated below:**

S.No.	Description	No. of Copies
1.	Construction Supervision Manual	6
2.	Quality Assurance Plan	6
3.	Operation & Maintenance Manual	6
4.	Training Manual	6
5.	Monthly Reports	3
6.	Environmental Compliance Reports	3
7.	Road Safety Compliance Reports	3
8.	Quarterly and Periodic Reports	3
9.	Special Reports / Engineering Reports if any	3
10.	Final Completion Report	6

## **9. DATA, SERVICES AND FACILITIES**

### **(a) Facilities**

#### (i) Office Building:

The Office Building of appropriate sizes shall be arranged by the Consultant for the Team Leader's office and Resident Engineers' offices at the locations specified herein above at para-6.

#### (ii) Office Equipment:

All the office equipment shall be arranged by the Consultant.

#### (iii) Vehicles:

All vehicles required for the Consultant shall be arranged by the Consultant.

#### (iv) Accommodation:

All accommodation for key and sub-key professionals shall be arranged by the Consultant.

### **(b) Services & Data**

Copy of Detailed Project Report / Detailed Feasibility Report shall be provided by the Client, after commencement of services.