

## Terms of Reference for Project Management Consultant (PMC)

### A. BACKGROUND

1. The Government of Sindh has applied a loan from the Asian Development Bank (ADB), and part of the loan will be used for the project management consultancy service of the Sindh Provincial Roads Improvement Project (the Project). The project will rehabilitate following provincial highways in Sindh:

Road Section	Length (km)
Thull to Kandhkot	44
Sheranpur to Ratodero	36
Khyber to Sanghar	63
Sanghar to Mirpurkhas	64
TM Khan to Badin	67
Digri to Naukot	54
Total	328

2. The Works & Services Department (WSD) of Sindh will be implementing agency for the Project, and a Project Management Unit (PMU) was established with a head of the Project Director (Client's representative). A consultant service (the Consultant) will be recruited to provide services for design review and construction supervision of these road sections to be rehabilitated and reconstructed under the Project.

3. The Consultants will be responsible to serve as the Engineer within the context of the conditions of the construction contracts and will be required to nominate Resident Engineers for the contract(s) that will be a full-time resident in the area or located in the proximity of project area. In addition to the primary role, the Consultants will assist the client (PMU WSD) in the efficient administration and implementation of the subprojects, support and strengthen it in its tasks, monitor progress, financial management, social and environmental safeguards and gender mainstreaming in the project. The Consultant will report to the PD appointed by WSD. The Consultant will work under the overall guidance, coordination and directions of the Project Director.

### B. OBJECTIVES

4. The overall objectives of these Terms of Reference are to:

- a. Ensure that the detailed engineering design is reviewed, and updated if required, in accordance with the specified parameters/ standards and best international practices prior to implementation of civil works contracts.
- b. Ensure that high quality construction is achieved in time within budget and that all work is carried out in full compliance with the approved engineering designs, technical specifications, agreed work schedule, and within the terms and conditions of all other contract documents and sound engineering practices;
- c. Demonstrate the efficacy of contract administration and supervision by independent external agencies;
- d. Monitor and evaluate the implementation of environmental management plan, resettlement plan and other social safeguard measures by the contractor and client.
- e. Promote technology transfer and the introduction of modern Contract Administration practices within WSD.

## C. SCOPE OF SERVICES

### 5. General Duties and Responsibilities of the Consultants.

- a. The Consultants will carry out a critical review of the detailed engineering design prior to the commencement of works to identify anomalies or omissions that constitutes inconsistency in the design and completeness of works. This review will be carried out immediately after the services commence and will be completed within 6 weeks. On completion of the review, the Consultant will prepare a report, setting out all findings and recommendations for correcting any defects or omissions identified. Notwithstanding these, the Consultant will immediately inform the employer of any defect or omission that may have a substantial impact on the Project at the time the defect or omission is uncovered.
- b. Civil works will be carried out based on the MDB FIDIC June 2010<sup>1</sup> contract. The consultant will administer the civil work's contracts, make engineering decisions, be responsible for quality assurance, provide general guidance and furnish timely responses to the contractors in all matters relating to the civil works, and ensure that all clauses of the contract agreement between the civil works contractors and PMU are respected.
- c. The consultant will advise PMU on all matters relating to the efficient and successful execution of the civil works contracts, and will act at all times to protect the interests of the project and will take all reasonable steps to keep the construction costs to a minimum, consistent with sound economic and engineering practices; and will prepare a "Contract Administration and Construction Supervision Manual" outlining routines and standard operating procedures to be applied in contract administration and construction supervision, based on sound internationally recognized practice.

6. **Design Review.** The Consultant will review and validate on ground, the detailed engineering design including the design reports, design calculations and design drawings. Thereafter the Design Review Consultants will bear the professional liability for the accuracy of the design, which will be covered under this contract. The design review and ground validation shall include but not limited to the following tasks;

- a. Review & ensure that the design meets all the standards & parameters specified in the Terms of Reference for Design Consultants, WSD specifications, and best international practices.
- b. Review & ensure that the geometric alignment particularly the horizontal curve and vertical profile for provincial highways as well as service road, meets the minimum specified criterion.
- c. Review & ensure that a cost effective embankment height, has been adopted throughout the alignment, based on the required capacity of soil, depth of water table and drainage pattern of the surrounding area.
- d. Review & ensure that the pavement is most efficient and cost effective; design has been carried out on the basis of traffic studies conducted by the Design Consultant, strength/ CBR of the proposed pavement materials, the calculated EASLES, and prescribed design life.
- e. Review and ensure that the design parameters, calculation, location and layout of hydraulic & other traffic engineering structures to include bridges, flyovers, underpasses and culverts, on the basis of hydrology report, geotechnical investigations, soil analysis, drainage pattern, and site conditions, ensuring that safe and cost effective designs are adopted.

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<sup>1</sup> <http://www.adb.org/sites/default/files/FIDIC-GCC-Construction.pdf>

- f. Review and ensure that the design of road side drainage and cross drainage structure has been carried out as per the site requirement and flow patterns/ calculations of run off.
- g. Review and ensure that the design, lay out & requirement of retaining walls, breast walls , other retaining structures, and slop stability/ slide control measures as per the geotechnical requirement and site conditions.
- h. Review and ensure that the requirement of intersections, underpasses, overhead bridges, Entry/ Exits, and all other highway related works have been included in the design.
- i. Verify a highway safety audit to ensure that all traffic signs, pavement marking, and pavement studs have been provided in the design as per the requirement. Also check those work zone safety requirements proposed are in accordance with best international practices.
- j. Review and ensure that the Bill of Quantities vis-à-vis the proposed design for pavement and structures are accurate up to a tolerance of 5%.

7. **Contract Administration & Construction Supervision.** The Consultant while supervising construction works will make all necessary arrangements for quality control and implementation of the works. The task of the Consultant will include but not be limited to:

- 1) Give Notice to contractor to commence works.
- 2) Assure submission and advise PMU on the adequacy of the Contractors' insurance policies, performance bonds, and advance payment guarantees.
- 3) Review and approve the Contractor's work programs and progress schedules ensuring that the Contractors have incorporated/ followed the most effective and expeditious methodology of carrying out the works; and advise the Contractors in setting up a computerized project control system for reporting physical and financial progress as well as the forecasts, if included in the bids and/or if demanded later on by the PMU. Subsequently, closely monitor the construction progress on regular basis to determine whether it is proceeding in accordance with the approved work program.
- 4) Provide advance advice to PMU concerning the Schedule of handing over of sites, and possible delays due to lack of possession with a view to assure that the Contractors are given Possession of Site in accordance with the agreed work programs.
- 5) Assess minimum construction equipment, plant and machinery requirements, by type and specification, and monitor, keep and regularly update a list of the Contractors' equipment, plant and machinery in order to keep a check on the Contractors' mobilization. Inspect and evaluate the Contractor's establishments including in particular the laboratory facilities to ensure compliance with the terms and conditions of the Contract Agreement.
- 6) Assure the receipt of and maintain as permanent records of all warranties required under terms and conditions of the Contract Agreement for materials including their source and equipment accepted and incorporated in the project.
- 7) Without relieving the Contractors of their obligations under the Contract, check and approve the contractors' Working Drawings, Method Statements and Temporary Works proposals;
- 8) Carry out any subsequent design changes, and expeditiously issue supplementary drawings, site instructions, variation orders and day work orders to avoid delay to the works and to ensure that the works are executed in accordance with Contract.

- 9) Without relieving the Contractors of their obligations under the Contract, review and approve the traffic management and safety plan, and ensure compliance such that the Works are carried out at all times in a safe and secure manner and damage or injury to persons or property is avoided.
- 10) Assure that the Contractors have all necessary data for setting out and check the Contractors setting out including staking the right-of-way limits, centerline, and grade and confirm permanent monuments in the construction area.
- 11) Inspect quarries and borrow pits, and crushing plants, and order tests of materials and ensure adherence to specifications, and approve the sources of materials.
- 12) Without relieving the Contractors of their obligations under the Contract, monitor the Contractors' laboratory testing, evaluate the Portland cement concrete and bituminous mixture designs prepared by the Contractors, and recommend improvements (if any) to ensure the desired performance, and accord approval thereof.
- 13) Assure quality of the works during construction, continuously inspect the soils and materials; construction operations and the works with regard to workmanship and compliance with the specifications; and carry out independent testing in the field and/or in the "Engineer/Project Manager" laboratory, and approve or disapprove and certify the works that conform with the specifications and maintain permanent records of results of all the tests made.
- 14) Give notice to Contractors of any defects and deficiencies, and issue instructions for the removal and substitution of the improper works, where provided under the contract. If required, order suspension of the work(s) and/or recommend to PMU other recourse available under the Contract.
- 15) Attend and make measurement and computation of quantities of the completed works, or any work which is about to be covered or put out of view before permanent work is placed thereon, and maintain permanent records of all such measurements, and keep the measurement books and records in safe custody.
- 16) undertake project performance monitoring and evaluation in accordance with the Project Framework and ADB's *Project Performance Management System (PPMS) Handbook* including the baseline data survey and the following annual survey and reporting up to project completion;
- 17) Monitor and appraise progress of the works, and maintain a day by day project diary which shall record all events pertaining to the administration of the contract, requests from and orders given to the Contractors, and any other information which may be at a later date be of assistance in resolving queries which may arise concerning execution of the works.
- 18) Issue monthly-consolidated progress reports on a format to be agreed with the PMU including payment estimates and comments on the Contractors' work programme, and advise PMU of any problems or potential problems which might arise and cause delay in implementation and recommend corrective action(s) to be taken.
- 19) Check the Contractor's periodic statement of the estimated value of work completed and certify that these statements clearly and accurately describe the value of work executed on the value of the quantities of the items in the "Bill of Quantities".
- 20) Issue the interim certificates to PMU for payment to the Contractors on the basis of "Measured Work Items", having regard to any contractual provisions for advance payment, variation of price, and exchange rate fluctuation etc. Certify the completion of the Activities/Works or parts thereof and process final payments to the Contractors.
- 21) Assist with interpretation of Contract Documents, explain and or reconcile any ambiguities and or discrepancies in the Contract Documents, and apply

various provisions of the contract documents; and provide PMU all relevant documentation needed for settling disputes (if any) with the Contractors, and make recommendations to PMU for resolving the Contractors' escalation claims, contract time extensions, variation orders, subletting, additional cost, rate and price fixing etc.

- 22) Advise PMU on need for effective liaison with local authorities, police, landowners, utility owners, the public and other organizations affected by the Works in order to minimize or avoid unnecessary delays or disputes.
- 23) Carry out the following duties related to environmental mitigation with particular reference to the technical requirements of sound environmental standards on the basis of ADB's *Environmental Guidelines for Selected Infrastructure Development Project (Highways & Roads)* during construction.
  - (i) prepare a site specific Environmental management Plan in accordance with Environmental management (ii) Frame work. Ensure that all the environmental mitigation measures required to be implemented are incorporated into the contract documents. (iii) the Contractors comply with all necessary requirements contained in the Environmental Framework and Environmental management Plan (iv) ensure that the day-to-day construction activities are carried out in an environmentally sound and sustainable manner; (iii) develop good practices construction guidelines to assist the Contractors and PMU staff in implementing the Framework; and (v) prepare and submit monthly progress report on the implementation 'Environmental management Plan (EMP) to PMU and ADB (vi) in the event of occurrence of any unexpected environmental impacts, to provide necessary mitigation measures.(vii) Prepare due diligence and environmental monitoring reports periodically as required by ADB/PMU.
- 24) HIV/AIDs and Human Trafficking. Monitor that the contractors comply and carry out required actions as provided in the respective contract documents, such as awareness and education of laborers and workers. Ensure that the contractor does not involve child labor for the execution of the civil works contracts in accordance with the provisions of the contract agreement
- 25) Jointly inspect with PMU the completed civil works, and assist in formal taking over and review and approve or prepare "as built" drawings and plans (as the case may be), and provide report(s) testifying to the satisfactory completion of the contracts.
- 26) Inspect the completed works periodically during the defect liability period within the term covering the Consultant's Agreement, prepare lists of deficiencies (if any), and carry out supervision of the remedial works, and issue the Defects Liability certificates after the rectification of notified defects by the Contractors.
- 27) Establish a comprehensive system of maintaining site records including site correspondence, inspection records, test data, site diaries, records of meetings, financial records, progress records etc.
- 28) Provide any other specialist services requested by PMU under conditions to be mutually agreed ensure that the construction methods as proposed by the contractor for carrying out the works are satisfactory, inspection of contractor's construction equipment; and safety of the works, property, personnel, and general public; the schedule of mitigation measures for adverse environmental impacts; and
- 29) Support the PMU to implement the resettlement plan including public consultation, verification of the resettlement compensation payment, and preparation of monitoring report.

#### D. STAFFING

The implementation period is 33 months excluding the defects notification period, which will be 12 months. There will be two "site supervision teams", for six contract packages. The staff for each package is expected to mobilize on the date of actual commencement of works by the contractors. The Team Leader of the Consultants is expected to be full time and mobilize approximately two months in advance of the commencement of the works in order to assist PMU with activities leading up to mobilization of the Contractors. The tentative team composition is as below:

Sr. No.	Experts	Key Position	Fulltime Employee
A)	<b>International Experts</b>		
1	Chief Resident Engineer (CRE)	Yes	Required
2	Contract Specialist	Yes	Preferred
3	Performance-based maintenance specialist	Yes	Preferred
4	Material Engineer	Yes	Required
5	Environmental Specialist	Yes	Preferred
B)	<b>National Experts</b>		
1	Deputy Team Leader/ SRE	Yes	Required
2	Resident Engineer	Yes	Required
3	Highway Engineers (ARE)	Yes	Required
4	Structure Engineers (ARE)	Yes	Preferred
5	Material Engineer	Yes	Required
6	Financial Analyst	Yes	Required
7	Environmental Specialist	Yes	Preferred
8	Survey Engineer	Yes	Preferred
9	Drainage Engineer	Yes	Preferred
10	Highway Design Engineer	Yes	Required
11	Structure Design Engineer	Yes	Preferred
12	Quantity Surveyors	Yes	Preferred
13	Contract Specialist	Yes	Preferred
14	Resettlement Specialist	Yes	Preferred
C)	<b>Design Review Experts (International)</b>		
1	Senior Highway Design Engineer (Team Leader for Design Review)	Yes	Required
2	Senior Structural Engineer	Yes	Required
3	Drainage/Geotechnical Engineer	Yes	Preferred

#### E. REPORTING & DOCUMENTS REQUIREMENTS

8. Reporting Requirements: The Consultant will prepare and submit to PMU five copies of each of the under mentioned reports. The format of these reports shall be mutually agreed with the PMU. One copy shall be sent directly to the Asian Development Bank together with softcopy;

- a. **Inception Report:** The Consultant will submit an Inception Report at within one Month after mobilization. This will contain full detail of the consultant's supervision, & contract administration methodology and staff plan with supporting CVs of professional staff and projected monthly billing.
- b. **Design Review Report.** The consultant will submit a detailed Design Review Report, under the guidance of team leader within three months, indicating any deficiencies / improvements required in the detailed design prepared by the Design consultant. The design review will ensure that the construction drawings carry all details necessary for executing the job and shall not result in claims of non BOQ items / additional associated costs.

- c. **Monthly Contract Administration Reports:** The Consultant will, no later than the 10th of each month, prepare a narrative progress report summarizing:
- (i) Construction progress during the month and cumulative to date for each individual contract drawing specific attention to any major causes of delay (administrative, technical or financial) with details of remedial action taken or recommended to the Employer.
  - (ii) A comparison of actual and forecast expenditure both during the month and cumulative to date for each individual contract, and a record of the status of payment of the Contractors' monthly invoices, of all claims for cost or time extensions, and of actions required of PMU to permit unconstrained works implementation. The Consultant will also advise on the final estimated cost for each individual contract and draw attention to any major changes in the project budget including details of remedial action taken or recommended to the Employer.
  - (iii) Brief on all correspondence exchanged with the contractors particularly relating to contractual clauses, with financial and time implications.
  - (iv) Technical appreciation of any design or quality control problems for each individual contract including details of remedial action taken or recommended to the Employer.
  - (v) Status of compliance with the Environmental & Resettlement Plans.
- d. **Annual Management Information Report at the end of each Financial Year:** The Consultant will prepare a comprehensive report summarizing all activities under the services at the end of each Financial Year, and also at other times when considered warranted by either the Consultant or PMU because of delay of the construction works or because of the occurrence of technical or contractual difficulties. Such reports shall summarize not only activities of the Project Engineer/ Manager but also the progress of the Contracts including all contract variations and change orders, the status of the Contractor claims, and brief descriptions of the technical and contractual problems being encountered and other relevant information for each of the ongoing contracts.
- e. **Resettlement Monitoring Reports.** A quarterly report highlighting the progress on implementation of resettlement, documenting all activities including formal & informal consultation, gender issues, socio economic aspects, child labor, drug trafficking, hygiene, & safety and other social aspects
- f. **Technical Reports:** The Consultant will produce as necessary technical/ due diligence reports and position papers dealing with project matters during implementation.
- g. **Interim Contract Completion Reports:** The Consultant will prepare completion report for each contract within 30 days of issuance of Taking-over Certificate/Certification of Completion. This report shall summarize the implementation and financial history of the project. The defects list provided to the contractor and all outstanding claims pending resolution.
- h. **Final Project Completion Report:** The Consultant will prepare a comprehensive final Completion Report within 90 days after Issuance of the Taking Over Certificate of the last civil works contract. The

Consultant will prepare a comprehensive final Completion Report for the project including each of the contracts and shall summarize the method of construction, as built record showing the location and details of all works carried out, all defects and certification of the satisfactory correction of such defects for each of the construction contracts, the construction supervision performed, and recommendations for future projects of similar nature to be undertaken by PMU.

- i. **Project Documentary Report.** The Consultant has to make documentary of all major activities during constructions as well as that of completed project sections to be submitted towards the end of the project. These should also pertain;
  - a) Laying and compaction of various pavement layers
  - b) Operation of Asphalt and concrete Plants
  - c) Quarry sites and laboratory activities
  - d) Road after completion showing road furniture
  - e) Various important stages in construction of structures
  - f) Any other major activity involved requiring specific mention
- j. **Roughness Survey Report** .The roughness surveys will be carried out at substantial completion in coordination with WSD, before the end of the defect liability period. The consultant is required to submit his findings along with data in this report.
- k. **Revised PC-1.** The Consultant shall prepare the revised PC-1 of the project, before completion of the project, if required by incorporating all changes in the scope of work and, prepare completion report (PC-IV), at the completion of the project.

9. Documents & Manuals Required. The consultants will prepare following documents to be approved by the client for efficient contract administration & construction supervision.

- a. Contract Administration Manual
- b. Quality Control & assurance manual
- c. Laboratory Manual
- d. Environmental Monitoring Checklist
- e. Safeguard Monitoring Check list

#### F. TRAINING REQUIREMENT

10. The consultants will organize seminars and workshops, arranged every 6 months on the following subjects for WSD staff, consultants and contractors with a view to introduce best international practices and standards. Expertise (trainer) within the PMC recruited staff will be arranged for the following trainings. Each training topic will have 2 sessions, and each session will cover around 30-50 trainees. The consultant shall submit CVs for approval for each trainer prior to commence training.

- a. Project Management
- b. Contract administration
- c. Quality control and assurance.
- d. Role of the engineers and Engineer's representative.
- e. Preparation, monitoring & evaluation of work programs.
- f. Preparation and scrutiny of Interim Payment Certificates.
- g. Asphalt paving techniques.
- h. Environmental & Social Issues management.
- i. Field/Site visits of PMU concerned staff to inspect the road and bridge assets management in other developing or developed countries such as China, Japan, Malaysia, Singapore, UK, Australia, Germany etc.



**G. MISCELLANEOUS**

10. Facilities: The Construction Contractor shall provide, operate and maintain the following facilities for the exclusive use of the Consultants:

- a. Laboratory and Testing Equipment
- b. Site Office and Residential Accommodation (adequately furnished)
- c. Site Transport
- d. Survey Equipment

11. The Consultants are encouraged to familiarize with Construction Work before submitting their proposals. Draft bidding documents and the Environment Management Plans can be inspected at PMU.