

KARACHI WATER & SEWERAGE BOARD

TABLE OF CONTENTS

VOLUME-II (1)

EMPLOYER'S REQUIREMENTS FOR MECHANICAL & ELECTRICAL WORKS

Chapter-01: General Requirements

Chapter-02: Mechanical & Electrical Plants

Chapter-03: General Testing, Inspection, Commissioning and Training

Chapter-04: Mechanical Works

Chapter-05: Electrical Works

Chapter-06: Painting and Protection

Chapter-07: Work Items

Chapter-08: Schedule of Guarantees

VOLUME-II (2)

EMPLOYER'S REQUIREMENTS FOR CIVIL WORKS

Chapter 09: Civil Works - Scope of Work

Chapter 10: Civil Works - Employers Requirements

KARACHI WATER & SEWERAGE BOARD

TABLE OF CONTENTS

VOLUME-II (2)

EMPLOYER'S REQUIREMENTS FOR CIVIL WORKS

Chapter 09: Civil Works - Scope of Work

Chapter 10: Civil Works - Employers Requirements

EMPLOYER'S REQUIREMENT FOR CIVIL WORKS

CHAPTER 09 CIVIL WORKS - SCOPE OF WORK

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CIVIL WORKS - SCOPE OF WORK

TABLE OF CONTENTS

9.1 General introduction	1
9.2 General Description of the Project	2
9.3 Design and planning of the works	2
9.4 General description of Civil Works (scope of work)	3
9.5 Construction of the permanent works	4
9.6 Pump house at basement level and suction channel	5
9.7 Chambers	5
9.8 K-Electric sub-station	5
9.11 Access road and parking areas:	5
9.12 Site development:	5
9.13 Provision of camp and office facilities	6
9.14 Temporary site installations	6
9.15 Temporary facilities to be handed over to the Employer	6
9.16 Power and water supply for construction	6
9.17 Health and Safety	6
9.18 Quality assurance / quality control	6
9.19 Environmental Compliance	6
9.20 Training Programme	7
9.21 Setting out of works	7

CHAPTER 9

CIVIL WORKS - SCOPE OF WORK

9.1 General introduction

This section lays out the requirements of the Employer regarding the Civil Works for the project. The final arrangement of the works shall be developed and construction by the Contractor to best exploit the local physical conditions while maintaining the fitness for purpose inherent in the outline requirements. Nonetheless contractor is responsible to substantiate these requirements to ensure complete functional performance of Pumping Station and Fulfillment of his obligations under this Contract.

The Employer's Requirements have been prepared in consideration of the Conditions of Contract for EPC/ Turnkey Project.

The Contractor will be responsible for all aspects of design and construction of the Project in accordance with the Employer's Requirements, design criteria and specifications furnished herein, and in accordance with additional and supplementary design criteria and specifications prepared by the Contractor and accepted by the Employer.

The scope of the Works will include, but not limited to:

1. Preparation of all detailed design criteria, design analysis, design calculations, design detailing, construction specification, detailed construction drawings and quality control procedures, necessary for the complete construction of the project together with O&M Manuals, and as built record drawings.
2. Additional Site Investigations, survey as necessary to develop a fully functional design for Pumping Station.
3. The drafting of and adherence to a construction schedule sufficient to meet the requirements of the Project.

Major Civil Works Include:

- a. Screen chamber
- b. Suction well
- c. Pump house building with associated facilities
- d. Flow meter chamber and valve Chambers
- e. K - Electric Sub – station
- f. Car park, road and walkways

External development works including landscaping

- a. All temporary works required to construct the Project, including offices for the Employer and laboratory buildings complete with furnishing and equipment's.
- b. Provision and maintenance of vehicles for the Employer's staff.
- c. Conceptual Drawings of the Project are given in Volume-III of this Tender Document.

9.2 General Description of the Project

Site location

The Project is located in general in the vicinity of Pump Station Buildings completed at Gharo. The conceptual Drawings are attached in Volume III showing the location of the project and guide line plan.

Site access

The Access to the site of the project is through Paved Road from National Highway to Gharo Pumping Station.

Climatic data

The Contactor shall take account of the climatic conditions at the Site of the Works. The following information is provided as a guide to the climatic condition likely to be encountered on the site to assist the Contractor, but this shall not relieve him of his responsibility under the Contract.

a. Monthly average temperatures:

- (1) Maximum 35 °C
- (2) Minimum 18 °C

b. External temperatures

- 47 °C in June
- 2 °C in January

c. Annual average rainfall

192 mm per year, the majority falling in the monsoon months of July and August. On average there are 10 rainy days per year. Storm intensities can be high with storm totals reaching 200mm, with normal durations of 1 to 2 days.

d. Monthly Average Relative Humidity

- (1) Maximum = 90%
- (2) Minimum = 40%

The climatic data given above are based on limited records and their accuracy cannot therefore be guaranteed.

9.3 Design and planning of the works

General

The Contractor shall perform engineering services pertinent to planning and design of the work in accordance with accepted Standards. In addition, the Contractor shall establish & submit to Employer a Quality Control / Quality Assurance program to verify that the Work performed by the Contractor is in accordance with & fully meets the requirement of the Contract.

Design

All Design shall be performed in accordance with the requirement given in the following Section, Basic Design Criteria. The Design of the Works shall be performed during a Detailed Design phase. The Design responsibility of the Contractor shall be as follows:

- a. The Contractor shall carry out the Detailed Design and construction drawings of the Permanent Works to be performed under this Contract and the site investigations deemed necessary for the Design.
- b. The Contactor shall prepare the Detailed Design and construction drawings of necessary Temporary and Permanent Works to be performed under this Contract
- c. The Contractor shall prepare Construction Method Statements and an Implementation Plan, and
- d. The Contractor shall prepare the detailed design and Shop Drawings of the components of the project and equipment to be installed under this Contract.

The activities to be performed under the Detailed Design are outlined below:

- a. Geological and geotechnical investigations;
- b. Topographic investigations;
- c. Expansion and clarification of design criteria and parameters;
- d. Summary of all tests and investigation planned to be carried out in connection with the Detailed Design;
- e. Design Memorandum;
- f. Detailed Design;
- g. Construction Drawings;
- h. Civil Shop Drawings;
- i. Manufacture's Shop Drawings to the extent necessary for Employer's design review and operation and maintenance;
 - a. Plan of the methods of achieving the Construction Requirements;
 - b. Report on construction methods to be used for all major works;
 - c. Procurement plan for major equipment;
 - d. Layout drawings for all temporary works;
 - e. Principal items of construction planned to be used;
 - f. Detailed information of site offices and camp facilities;
 - g. Quality Control and Quality Assurance procedures for Construction;
 - h. Plan for disposal of spoil material;
 - i. Environmental Management Plan Including measures for rehabilitation of work areas;
 - j. Construction Security, Health and Safety plans; and
 - k. Basic outlines of the Operation and Maintenance Manuals, and proposed Training Program.
- a. Description of each structure
- b. Design criteria
- c. Review of assumptions and design procedures, adopted design criteria, loads and load cases used
- d. Codes and books referred
- e. Short description of each method of analysis, computer programs used etc.
- f. Structure analysis by using latest versions of SAP – 2000, ETAB, SAFE, STAAD or any other.
- g. Calculations and principal results of the detailed design analyses

- h. Detailed design drawings and specifications for construction and
- i. Civil and manufacture's shop drawings.

9.4 General description of Civil Works (scope of work)

The principal elements of the Civil Works are:

- a. Provision of Materials;
- b. Provision of Services;
- c. Provision of Temporary Works;
- d. Construction of Permanent Works;
- e. Demobilization, site rehabilitation, clean up mitigation in accordance with national and local regulations of all environment impacts form construction, and disposal of excess materials and debris.

For each structure of the project, the Contractor shall prepare Detailed Design documentation to include as a minimum:

The descriptions given in the document are outline descriptions only. Such descriptions do not include or give full details of all materials or other items to be supplied or all works and services to be executed by the Contractor in order to fulfill its obligations under the Contract.

9.5 Construction of the permanent works **General**

The Permanent Works to be performed by the Contractor are described below;

Inlet works

The inlet and screen chambers and suction well shall be R.C.C structure having fair face finish. The design shall conform to the standard codes and requirements as given out under the relevant items.

Pump House at Ground floor level:

- (1) The ground floor shall have the following facilities:
 - Motor hall
 - PLC/SCADA control room
 - Transformer room
 - Panel room
 - Toilets
- (2) A separate Office Accommodation of 250sqm. as per conceptual drawing is to be provided having following facilities:
 - a) 3 Nos. rooms for officers.
 - b) One conference room.
 - c) Control / Battery room.
 - d) Kitchen
 - e) Toilet block.
 - f) Office furniture as per employer's requirements.
- (3) R.C.C columns shall be fair face finish and provided with corbel for gentry crane.

- (4) R.C.C floor / slab with openings for lowering the pumps etc. shall have removable covers of aluminum alloy chequered plate of non-slip pattern min. 4.5 mm thick.
- (5) Cable trenches / pits shall have fair face finish and provided with aluminum alloy chequered plate steel plate covers/flooring of non-slip pattern. The plate shall be minimum 4.5 mm thick.
- (6) The height of the building shall be enough to accommodate the designed motors and pumps and overhead crane.
- (7) Finish to the exterior surface of the building shall be as detailed under relevant clauses & as directed by the Engineer.
- (8) Plinth protection shall be provided around the building with a semi-circular cement concrete lined drain.
- (9) Sun – shades shall be provided to the Windows and Ventilators to match external architecture.
- (10) Windows and ventilators shall be provided with galvanized steel wire mesh of 20 mm square.
- (11) Windows shall be sliding type
- (12) Windows / ventilator in the office will be provided with double glazing
- (13) Windows in the motor hall shall be provided with mechanism for opening
- (14) Proper drainage arrangements from the building shall be provided.
- (15) Plumbing works shall be complete using uPVC-100 pipe and fixtures of the best quality available preferably Masters.

9.6 Pump house at basement level and suction channel

The basement shall be an R.C.C structure having fair face finish. The design shall conform to the standard codes and requirement as given out under the relevant clauses.

9.7 Chambers

The chamber shall be R.C.C. fair face finish concrete and chamfered edges. The chamber shall be minimum 300 mm above the finished ground level. Where the chambers are covered, the covers shall be of heavy duty galvanized iron covers and frame.

9.8 K-Electric sub-station

The building shall be as per approved drawing of the K-Electric.

9.9 External Site Drainage

External site drainage shall be properly designed and provided with UPVC drainage pipes Road crossings and precast covers wherever required.

9.10 External Sewerage

External sewerage shall be properly designed and provided with UPVC pipes C.C. manholes of standard size into RCC septic tank and soak away as required.

9.11 Access road and parking areas:

Existing road / walkways where dismantled shall be restored to its original condition. New roads and parking areas shall be made as per drawings and should be of adequate dimensions. Cross drainage structures shall be RCC type & to be provided at suitable location along the alignment and elsewhere deemed necessary.

9.12 Site development:

Site development around the pump house and ancillary structure including culverts, leveling, grading, landscaping and grass & shrubs areas shall be minimum 500 sq. meters and as per approval of the Employer.

9.13 Provision of camp and office facilities

General

Provision of Office and Camp facilities shall be made by the Contractor. The Contractor shall design, install, operate, provide all consumable items, spares, replacements and fuel and shall maintain throughout the execution of the work office facilities required for the Works.

9.14 Temporary site installations

The Contractor shall design, install and maintain throughout the execution of the Works all temporary facilities required for the work.

On completion of the Project, the Contractor shall remove all temporary facilities, including their foundations that are not handed over to the Employer, and restore the area.

9.15 Temporary facilities to be handed over to the Employer

At the expiry of time of completion, selected temporary facilities or part of it, if and as described in Employer's Requirements, shall be handed over to the Employer in good, and serviceable conditions, so that these can be utilized by the Employer without any further treatment, renovation or repair.

9.16 Power and water supply for construction

The Contractor shall be responsible for the design and provision of temporary power supply for site during construction of the works.

The Contractor shall be responsible for the supply of potable water as well as disposal and treatment of wastewater and reuse. If water is supplied by the Employer, the cost thereof shall be deducted from contractor bills at the rate fixed by the Employer and which will be the commercial tariff.

9.17 Health and Safety

The Contractor shall be under an obligation to take all reasonable safety measures in relation to the type of services undertaken and shall conduct itself and all personnel assigned to the Work and perform the Work in such a way as to comply at all times with its obligation and duties under laws, regulation, rules, order and other enactments in force from time to time relating to health and safety matters, including the Employer's safety requirements.

9.18 Quality assurance / quality control

The Contractor will instigate a QA/QC programmed in accordance with the relevant Clause of the EPC Contract and section 2 of this volume.

9.19 Environmental Compliance

Reference is made to the environmental requirements given in:

- a. The law and Regulation of Government of Pakistan and Government of Sindh.
- b. Employer's Requirements for Environmental Protection given in this Volume.
- c. Sub-Clauses 4.18 [Protection of environment], 4.22 [Security of the Site], 4.23 [Contractors Operation at Site], 4.24 [Fossils], 6.6 [facilities for staff and Labour], 6.7 [Health and Safety], 7.3 [Inspection], 14.5 [Plant and Material Intended for the Works], 16.3 [Cessation of Work and Removal of Contractor Equipment] of General Condition of Contract and any other clause or sub-clause having any relevance to Environment.
- d. Local traditions and customs of Sindh.
- e. The Contractor shall within one month of receipt of Notice to Proceed, appoint an Environmental Inspector for the Works, whose broad responsibilities are to guide the construction personnel on environmental matters, to communicate and to make liaison with the Employer, Government of Sindh and local elders.
- f. The Contractor shall provide Environment Management Plan of the Site as defined in this Volume.

9.20 Training Programme

The Contractor shall provide a training program in operation and maintenance for the Employer's O&M personnel generally to meet the requirements stated in Volume II of Bid Documents.

9.21 Setting out of works

Setting out data such as BENCH MARK, DATUMS and original setting out points shall be provided by the Employer.