SUBSECTION 1: GENERAL REQUIREMENTS

4.1 Contract Site – Mira Bhayandar city in Thane District of State of Maharashtra

Mira Bhayandar which is part of Thane district is located at the northern threshold of greater Mumbai. This area which has been identified as one of the growth centers around Mumbai is well connected with the metropolis by suburban commuter rail and Mumbai Ahmadabad National Highway.

Mira Bhayandar area is located on the north-western periphery of Mumbai under Thane district and is located between 18°2'N – 20°20'N latitude and 0° 25'E – 73° 44'E longitude

Mira Bhayandar Municipal Corporation with an area of 79 sq km served by Western Railway suburban service has a significant growth potential. Due to close proximity to Brihan Mumbai, the Mira Bhayandar Municipal Corporation is experiencing very rapid urban growth. With prohibitive land prices in Mumbai low and middle income households are shifting to the Mira Bhayandar. Thus, it presently serves as a growing dormitory town to the Mumbai city.

4.1.1 DESCRIPTION OF THE WORKS

4.1.1.1 Background and Objective of the Project

At present septic tank latrines are being used for all new constructions. Provision of septic tank had been made compulsory by the municipal Corporation. The main roads of the city are provided with open gutters for collecting and carrying sullage water from individual houses. The length of pucca gutter is 18,288 m and length of open gutters is 10243m.

No Existing Sewerage scheme for City except for 4 residential Complexes

There is Increase in quantum of water supply due to commissioning of augmentation scheme.

Present System of disposal comprises of septic tanks and effluent disposal in surface gutters and nallas lead to pollution and unhealthy conditions.

High proportion of sulphates present in Industrial waste for which treatment is essential.

The domestic sewage bears large amount of suspended solids, of various origin. The direct discharge into inland water destroys the aquatic flora and fauna. There arises a need for a sewage treatment plant.

4.1.2 SCOPE OF WORK

The detailed scope of work for the Contract has been described in Subsection 2 followed by further technical details of different components in the subsequent Subsections.

4.1.3 TRIAL RUN OF THE SYSTEM

After execution of the works the Contractor shall make trial runs of the individual components. A continuous operation of the component for a period of 7 days to the satisfaction of the Employer's Representative will be deemed to demonstrate satisfactory completion of trial run for the individual component. The cost of

electricity, chemicals and other consumables for operation and maintenance of the System during the

period of this trial run will be borne by the Contractor. The costs towards the Contractor's Representative and other operating personnel during the said period of trial run, along with cost of tools and spare parts, which are

required for operation and maintenance of the plant and equipment during the trial run period shall also be borne by the Contractor and shall be included in Contract Price. In the event that the System or any of the facilities do not satisfactorily achieve the required performance standards during this period, the trial run period shall be extended until such time as the Contractor has satisfactorily rectified any deficiencies as may be necessary to satisfy the performance requirements, at the risk and cost of the Contractor.

4.1.4 COMMISSIONING OF THE SYSTEM

On completion of the Trial Run, commissioning of the System shall be done by the Contractor. The total time allotted for commissioning of the full system is 60 days. The commissioning of the system shall be considered as fully achieved after the full system has run continuously for a period of 15 days without any breakdown to the satisfaction of Employer's Representative. If continuous run is not achieved fully to the satisfaction of Employer's Representative, the Contractor has to do the needful to achieve the same at his cost. All the costs thereof, including the cost of staff, maintenance, and any other consumables for operation and maintenance of the system during the period of commissioning except for the chemicals used and electricity consumed during the commissioning period shall be borne by the Contractor. The cost of the consumable chemicals and electricity will be borne by the Employer.

4.1.5 OPERATION AND MAINTENANCE

The Contractor shall be responsible for operation and maintenance of the System for the period specified in the Appendix to Bid, and as described in this section 4. Notwithstanding the above, the Contractor will be required to rectify any deficiencies which are attributable to defects in the workmanship or quality of materials, Plant or equipment during the Contract Period, as described in Clause 12 of Section 2, Conditions of Contract.

4.1.6 FACILITIES, DETAILS AND DATA MADE AVAILABLE BY EMPLOYER

4.1.6.1 Facilities to Contractor

Spaces and accommodation: The Contractor will be allowed to use the spaces available with the Employer after permission of the Employer's Representative. The Contractor will be free to use them for establishing his offices, laboratories, staff quarters, storage spaces and pipe line factory or workshop as long as they do not interfere with the layout of the works to be carried out under the Project.

The Contractor will also be permitted to use the skeleton constructions available on these spaces for his use after permission from the Employer's Representative.

There may be some encroachments on some of these spaces and buildings which may take some time in clearance, for which the Employer will not be held responsible. The prospective bidders are advised to familiarize themselves with the existing situation and make their own evaluation/assessment before submitting the bid. All the buildings to be handed over by the Employer will be handed over on as "as-is, where-is" basis.

The Contractor will be responsible to arrange and pay for whatever modifications the structures may require for his use and also for providing necessary facilities like access road, water, sanitation and electricity. He will be responsible to maintain a clean and healthy environment at the locations taken by him and will be responsible for conduct of his personnel there.

The Contractor will have to hand over the spaces and structures in a clean and intact condition at the end of the Contract or at an intermediate stage when they may be required by the Employer's Representative on demand after one month notice.

There shall be no charge for the use of such space or structures. The Employer however does not undertake to provide any further space or accommodation that the Contractor may require to fulfill his contractual responsibilities. The Contractor will be responsible to arrange the same at his own cost. The Employer may assist the Contractor in making his arrangements by giving suitable recommendation letters.

4.1.7 CONSTRUCTION DOCUMENTS

The Contractor shall supply to the Employer's Representative 3 (three) copies each of the initial design calculations for the process and sizing of all components of the System including architectural, structural, mechanical, electrical and instrumentation equipment, supported by flow diagrams and general arrangement drawings for approval. It is a matter of high priority that the

Contractor ensures the submission and finalization of such designs and drawings in the stipulated time schedules as elaborated elsewhere. It is the intention of the Employer to ensure that the approval of such submissions is made expeditiously and in time. The Contractor is therefore required to setup his design office in Mira Bhayandar (fully equipped and staffed) to enable continuous submission, interaction and timely clearances. The Employer intends to keep a team of experts available constantly during the initial six months to review and comment/approve the submissions expeditiously.

The Employer shall arrange to send observations if necessary within 14 (fourteen) days of submission of the design and drawings for modifications to the Contractor. The Contractor shall incorporate all necessary comments of the Employer's Representative in the above design and drawings, if any, and shall re-submit further 3 (three) copies each of the revised design and drawings within 14 (fourteen) days for final approval of the Employer's Representative. The Contractor shall thereafter submit 6 (six) copies each of the approved design and 6 (six) copies each of the approved drawings together with one copy each of the reproducible tracings. This ensures approval of the final design/drawing within one month of first submission. If the submissions require more then one round of revision on account of incomplete compliance from Contractor, the delay will be on account of the Contractor. If new observations are given by the Employer's Representative, the Contractor will be entitled to take an additional 14 day period for compliance.

Further design calculations and drawings shall be submitted in sequence as per a schedule to be drawn and agreed upon mutually, immediately after submission of the general arrangement drawings. For each component of the System, and for the System as-a-whole, these documents shall cover:

- Process design, system design and layout of the sewage collection system, including the pumping stations, sewage treatment plant, sewerline works, power system works, buildings, roads and related facilities including making provision for future expansions to meet the ultimate design capacity.
- Site Plans.
- Layout Plans.
- Architectural Drawings/Renderings.
- Foundation Plans.
- sewer Plans and L-sections.
- Detailed structural design and good for execution drawings pertaining to all components of the System.
- Drawings showing the size, position and other necessary details of all mechanical and electrical equipment and fixtures.
- Wiring diagrams, pressure control and motor control gear particulars.
- Details of foundations, position of openings, etc., for the pumps, motors, starting cubicles, LT/HT panels, etc.
- Power systems including sub stations/ switch yard and associated drawings (e.g. single line diagram, GA and sections, etc.)
- Route survey, tower spotting, geo-technical survey, foundation design for different soil types, lattice tower structure design
- Elementary diagram and manufacturers' shop and part drawings for each equipment.
- Services like internal illumination and ventilation, building water supply, sanitation and plumbing, service roads, landscaping, area lighting, etc.

- Any other design and drawings required to comply with the Employer's Requirements as described in this Section 4.

- The documents and drawings shall be in sufficient detail for review of the Employer's Representative. The scale of the drawing has to be chosen accordingly in coordination with the Employer's Representative. The drawings shall be of standardized sizes as instructed by the Employer's Representative and shall contain the following basic information in the title block:

a) Project name

b) Name and number of the Contract

c) Contractor's name

d) Number and title of the drawing

e) Date and scale

f) Draftsman's name

g) Name of the designer and draftsperson responsible

h) Revision Number (R0 for drawing submitted initially and R1, R2, etc., for drawings submitted subsequently).

A blank space 90 x 50 mm shall be provided immediately above the title block for the approval stamp. If required in the document elsewhere, the detailed design and the execution drawings shall be submitted only after verification by an institute approved by the Employer. The Contractor shall be responsible for preparation of working drawings and the construction documents for works, as specified in the Contract.

4.1.8 QUALITY ASSURANCE

Contractor shall prepare detailed plan for this Contract for Quality Assurance and Quality Control and get it approved from the Employer's Representative. The Contractor shall deploy adequate number of suitable experts whose sole responsibility shall be to strictly implement the QA/QC plan and conduct necessary tests to ensure highest quality standard. All other measures that the Contractor may feel necessary or as may be directed by the Employer's Representative or his representative shall be followed.

Subsection 13 of this Section 4 gives details of the proposed Quality Assurance and Quality Control scheme proposed to be followed in the Project. It covers the inspections of construction material, manufacture and supply of equipment and of the works carried out.

4.1.9 SAFETY ASSURANCE

The Contractor will take all measures required to maintain highest safety standards on the site. The measures taken will include all but will not be limited to the relevant provisions of the Indian Standards. The Contractor will prepare a safety plan for the project and have it approved from the Employer's Representative. The Contractor shall deploy a safety officer on each important site to ensure compliance.

4.1.10 OPERATION AND MAINTENANCE MANUAL

The Contractor, before commencement of the Tests on Completion, shall submit 6 (six) copies of the operation and maintenance manuals for the sewer line, sewage treatment plant and pump stations in the English language, containing descriptions, illustrations, sketches, drawings, sectional drawings, sectional arrangement view and manufacturer's parts numbers to enable the connections, functions, operation and maintenance of all components of the complete System to be easily followed and for all parts to be easily identified to facilitate ordering of the replacement parts. Exploded views of the items/ works where appropriate shall be used for clarity. The Contractor shall provide the contact address and telephone number (Hotline) in the manual.

The operation manual shall also include the following:

- Technical data of all equipment and their performance.
- Instructions for servicing and overhauling.
- Particulars of lubricating oil and grease to be used, also alternative indigenous commercial lubricating oils suitable for use.

- Performance curves for all units regarding efficiency loading and output.

- Performance curves for the motors.
- List of tools mounted on wall panels.
- List of spares provided in the spare box.
- Spare parts list, with manufacturer's part numbers.
- Operator's log.
- List of the photographs of the plant and machinery as fabricated by the manufacturer.

The maintenance manual shall also include the following:

- Procedures for maintenance.
- Preventive maintenance procedures for all the equipment.
- Emergency maintenance management of the plant and equipment.

4.1.11 HOT LINE

During the Contract Period the Contractor has to maintain a 'Hotline' for trouble shooting purposes through which the operators can be contacted in case of problems.

4.1.12 TESTS ON COMPLETION OF WORK

The Contractor shall carry out the tests on completion before taking over as stipulated in Sub-section 14 of this Section 4.

4.1.13 FAILURE TO PASS TESTS AFTER COMPLETION

The performance criteria, as specified in this Section 4, are the minimum acceptable criteria, below which the works failing to pass tests after completion shall be rejected.

4.1.14 TRAINING OF EMPLOYER'S PERSONNEL

The Contractor shall be responsible to provide practical training on all aspects of the operation, maintenance and repair of the Plant, equipment and facilities to all personnel selected by the Employer who will ultimately be responsible for the operation, maintenance and repair of the Plant and its facilities. For this purpose the Contractor shall provide a comprehensive training program for the Employer's personnel during the entire period of the trial run and commissioning, and for as long thereafter as may be reasonably required to ensure that the designated personnel are adequately trained to take up their responsibilities. The Contractor has to provide a full time trainer who is skilled in training and who is familiar with all the normal and special operational conditions of the mechanical, electro-mechanical, electrical, instrumentation and control equipment of the Work.

The Contractor shall submit separately, as a part of his technical proposal, details of his proposed training program, the facilities required, and the qualifications, experience and responsibilities of the training personnel to be provided. All costs for the Contractor's personnel and the training facilities required for the training, and any incidental training expenses, shall be included in the Contract Price. All costs of the Employer's personnel shall be borne by the Employer.

In addition, the Contractor has to provide refresher training to Employer's designated staff or advanced training during the Contract period. The objective of training is to pass on lessons learnt during O&M period and to pass on knowledge and skills to operate and maintain the system independently. The training costs, transport, accommodation and per diem of the trainers shall be borne by the Contractor.

The full program shall be drawn out by the Contractor and got approved from the Employer's Representative.

Important Inputs Required From Contractor

4.1.14.1 Field Offices

The Contractor will be required to set up necessary number of field offices for supervision of the works. He should establish at least two offices in the Project area within 14 days and they may be further increased as the work proceeds.

4.1.14.2 Design Office in Mira Bhyandar

The Employer requires a high level of input for the initial investigation and design phase and requires the Contractor to be prepared with all necessary inputs so as to not lose time at the beginning of the Contract in these activities including approval of various designs and drawings. It is expected that the Contractor will

mobilize the necessary manpower and equipment of desired expertise and base them at Mira Bhyandar (preferably near MBMC office) immediately after receipt of the Letter to Proceed (but not later then 14 days) issued to him.

The Contractor should make the office functional in this period. The office will have required furniture, computers, printers, plotters and other office requirements. It shall have design team of qualified personnel for preparing and submitting the necessary design and drawings for all activities. The office shall also have a conference room for discussions and reviews.

4.1.14.3 Topographical Survey and Soil Investigation Agency

The Contractor is required to reconfirm the topographical surveys and soil investigations provided by the Employer in the tender document. He should be ready with the qualified agencies he intends to use for the purpose and ensure that the work starts within a fortnight of the Letter to Proceed. He shall also conduct additional investigations as are normally necessary to ensure full and satisfactory designs and safety. It is expected that the surveys will be carried out with Total Stations and necessary software will be used for creating the required drawings.

4.1.14.4 Field Laboratories

The Contractor will be required to establish a field laboratory suitably equipped to carry out tests as stipulated in the QA/AC Manual, including all specialized equipment which will be required for testing the material and equipment being supplied under the Contract. Suitable trained laboratory staff will have to be posted with full facility of computerized record keeping. The minimum equipment to be provided in the laboratory shall be as listed in Section 4. Additional equipment as may be deemed necessary may be added to the same in due course on requirement of the Employer/Contractor.

In addition to the equipment in the laboratory, the Contractor will also provide field testing equipment as directed by the Employer's Representative on the various sites where work is in progress.

4.1.14.5 Supervisory Staff for Contractor

The Employer lays great importance on the quality and authority delegated to the Contractor's key staff deployed in the field to execute and supervise the works. The Contractor is required to ensure deployment of qualified and experienced staff in sufficient numbers on site to ensure quality. The general requirement shall be as below:

4.1.14.5.1 Contract Manager

He shall be person deployed by the Contractor as an overall in-charge for the Contract and shall be deployed with head quarter in Mira Bhyandar. He shall be delegated with Power of Attorney to sign on behalf of the Contractor on all issues related to Contract and payments. He should be a senior level (Director/Vice President) staff member.

4.1.14.5.2 Senior Managers

There shall be at least one Senior Manager for each of the major components of the Contract viz. collection system work ,Pumping Stations, Sewage Treatment Plant. The Senior Manger shall have minimum following qualifications:

- Education: B.E. (relevant discipline)

- Experience: Minimum 15 years of general field supervision of Contracts and minimum 8 ye experience in supervision in construction/erection of similar works.

4.1.14.5.3 Supervisory Staff

There shall be supervisory staff with following minimum qualifications deployed in sufficient numbers to ensure day to day quality supervision of the work:

- Education: B.E. in relevant discipline with minimum 8 years experience in relevant field or Diploma Holder in relevant discipline with 12 years field experience in relevant field.

Minimum number of supervisor staff to be deployed:

Table 4.1.2 - Minimum Supervisory Staff

S. No.	Works	Minimum Supervisory Staff
1	**Pumping Station (each)**	
	Civil	2
	Electrical	1
	Mechanical	2
	Instrumentation	1
	Safety Engineer	1
	QA/QC Engineer	1
2	**Sewage Treatment Plant**	
	Civil	4
	Electrical	1
	Mechanical	1
	Instrumentation	1
	Safety Engineer	1
	QA/QC Engineer	1
3	**Collection system Work**	
	Laying (Each zone)	4
	Testing	2
	Safety Engineer (Each zone)	2
	QA/QC Engineer (Each zone)	2
4	**Miscellaneous Works**	
	Each active site	2
	Safety Engineer	1
	QA/QC Engineer	1

The Contract Manager and Senior Manager will be deployed after approval of their CVs by the Employer. Initially the CVs of key personnel to be deployed will be submitted in the bid.

The staff as mentioned above shall be maintained when the works on the relevant field are being actively carried out.

The Contractor will be expected to arrange and maintain a fleet of experienced workers and foremen and other support staff as required on sites in sufficient numbers.

4.1.14.6 Transport Facilities for the Inspection Staff of the Employer

The Contractor will provide for local transport facilities for the supervision staff engaged by the Employer within the Project area. No extra cost will be paid for the same.

4.1.14.7 Minimum Construction Equipment to be Brought by Contractor on Site

The Contractor is required to assign minimum equipment on site for ensuring quality and timely progress of works. The minimum equipment, including but not limited to the equipment described in the list enclosed at the end of this Subsection, shall be mobilized by the Contractor on site in working condition and used. The Contractor should submit the equipment mobilization program in the bid schedules.

4.1.15 HANDING OVER OF SITE TO CONTRACTOR

It will be ensured that the Contractor does not have any hindrance in progress of work on account of availability of site for construction. The Employer will make the sites available to the Contractor so that he shall in general have space available with him to carry out works for at least the next three months unhindered as per the approved work plan. In the event that some local obstruction/objection arises which would impede the progress of the Works in any one area, the Contractor will be required to redeploy his resources to other unaffected areas in order to maintain the progress of work so that the overall completion of the whole of the Works is not affected.

4.1.16 COMPLETENESS OF THE OFFER

The Contractor shall be fully responsible to ensure that the whole of the Works, including each individual component, is designed and constructed in a manner so that the System as a whole operates as a fully integrated system which is capable of achieving the required output in an efficient and economical manner, and to include all plant, equipment and accessories required for the safe and satisfactory operation of the facilities. To achieve this, the Contractor shall ensure that each individual component performs in a manner which is complimentary to that of all other components. Any accessories which are not specifically mentioned in the specifications, but which are usual or necessary for completion of the Works and successful performance of the System and facilities shall be provided by the successful Bidder within the tendered cost. The Contractor shall, to the maximum extent practical and feasible, endeavor to standardize on the manufacture and supply of plant and equipment so as to minimize the operation and maintenance requirements. The Contractor shall ensure that his designs are "maintenance-friendly" and that all items of plant and equipment are designed and installed in a manner which will facilitate routine and periodic maintenance operations.

Particulars regarding the performance requirements and the detailed scope of the Works are elaborated in the Section 4, Employer's Requirements.

4.1.17 TIME FOR COMPLETION

The whole of the Work, including mobilization, reconnaissance, survey, sub-soil investigations, design, manufacturing, transportation, construction, installation, trial runs, testing and commissioning is to be completed within the scheduled Time for Completion as set out in the Appendix to Tender. The duration of the Trial Run, test and the Commissioning Period is 90 days; both periods are included within the scheduled time for completion. The physical completion of the System and facilities shall be achieved before commissioning. Commissioning of the System will be deemed to be completed after the System has been operated trouble free for 15 working days; any intervening breakdown period will not be considered as a part of this period.

4.1.18 MILESTONES

The Employer wishes to ensure consistent prorata progress on all components of the Contract during the entire Contract period. The key milestones set out in Table 4.1.3, or such other Milestones as may be proposed by the Contractor and agreed by the Employer at the time of bidding, are proposed

to be adopted for periodic review of the progress of various components. These milestones will be the stag when the decisions regarding any delay in the implementation will be taken with a view towards application of the provisions of Clause 8.0 of the Conditions of Contract.

Table 4.1.3 - Milestone Chart

Sl. No.	Work Description	Time from Date of Notice to Proceed (months)						
		3 mos.	6 mos.	9 mos.	15 mos.	21 mos.	27 mos.	30 mos.
1	**Mobilization:**							
	Establish design office	100%						
	Establish site offices	100%						
	Set up laboratory	100%						
	Site surveys and investigations	100%						
	Finalization of work plan	100%						
2	**Planning and Design:**	(3)	(6)	(9)	(15)	(21)	(27)	(30)
	Process design	100%						
	Site Plans	100%						
	Equipment Selection	50%	100%					
	Layout Plans	75%	100%					
	Foundation Plans	75%	100%					
	Architectural Drawings	25%	100%					
	Structural Designs and drawings	15%	100%					
	Mechanical Drawings	25%	100%					
	Electrical Drawings	25%	100%					
	Pipeline Plan and Section	50%	100%					
	Access Road and Structures	50%	100%					
	Power Transmission Line	25%	100%					
	Instrumentation	25%	100%					
	Miscellaneous Details	10%	80%	100%				
3	**Pump Houses:**	(3)	(6)	(9)	(15)	(21)	(27)	(30)
	Mobilize construction equipment	Start	100%					
	Orders for plant and equipment		Start	100%				
	Civil works (including reservoirs)		Start	10%	50%	95%	100%	
	Receipt of plant and equipment			Start	10%	80%	100%	
	Erection of plant and equipment					Start	100%	
	Mechanical and electrical installation					Start	100%	
	Trial run and commissioning						Start	100%

Sl. No.	Work Description	Time from Date of Notice to Proceed (months)						
		3 mos.	6 mos.	9 mos.	15 mos.	21 mos.	27 mos.	30 mos.
4	**Sewage Treatment Plant:**	(3)	(6)	(9)	(15)	(21)	(27)	(30)
	Mobilize construction equipment	Start	100%					
	Place orders for plant and equipment		Start	100%				
	Civil works:		Start	30%	50%	100%		
	Other Buildings			Start	50%	80%	100%	
	Receipt of plant and equipment		start	50%	100%			
	Erection of plant and equipment					Start	100%	
	Mechanical and electrical installation					Start	100%	
	Outfall sewers				start	50%	100%	
	Trial run and commissioning						Start	100%
5.	**Collection system**	(3)	(6)	(9)	(15)	(21)	(27)	(30)
	Mobilize construction equipment	Start	100%					
	Place orders for valves and specials	Start	100%					
	Supply of valves and specials		Start	25%	80%	100%		
	supply pipe		Start	10%	40%	75%	100%	
	Laying and jointing pipeline		Start	5%	30%	65%	100%	
	Sectional testing			Start	20%	55%	100%	
	run and commissioning Trial						Start	100%

4.1.19 SEWAGE TREATMENT PLANT PROCESSES

The Contractor shall clearly describe, in his Technical Proposal, the process that he is offering, and the Contractor's Price Proposal shall be for the process that he has described.

Table 4.1.4 - Minimum Equipment to be Mobilized by Contractor on Site

S.No	Description of Equipment	Capacity/Type	Minimum Number to be Mobilized
A	**Excavation, Transportation, Handling and Erection**		
1	Dozer	250 HP	4
2	JCB		6
3	Crawler crane		4
4	Crane – 10 T Hydra		8
5	Excavators	0.9 m^3	15
6	Tipping Trucks		20
7	Licensed Blasting Facility		6
8	20 T , 3 axle trailers		20
9	Rock Breaker with Excavators		5
10	Ripper		10
11	Compressors		10
12	Tripods and Chain Pulley Blocks		20
13	Dewatering Pumps		40
	Concreting		

1	Concrete Mixers	10/7 and 14/10 Cft	20
2	Needle Vibrators		40
3	Plate Vibrators for Bedding		20