Vertical load data for pumps and motors are inclusive of impart factor subject to confirmation of the Pump Manufacturer during final design. The cost in this regard shall be included in the lump sum offer by the Tenderer and no additional claim will be entertained in future due to variation in load data, if any.

The floor slab is to be designed for the worst loading conditions that the floor will be subjected due to the equipment to be housed and may be put anywhere on this floor. The floor slab should be so designed as to withstand such loads.

The floor supporting M. S. suspenders / Cable trays are to be designed for a concentrated static load of 200 Kg. at any point. The Cable Trenches wherever provided shall be absolutely free from any obstruction so as to allow the Cables to be lowered in the trenches from top only during laying. The space inside any beam and column.

Live load in Battery Room operator's Room and Store	500 Kg./Sq.m.
Load of M. S. Chequered Plates	500 Kg./Sq.m.
For trench covers over opening in Floor	500 Kg./Sq.m.
Loading from 5.00 M. T. Hand Operated (H.O.T.) Overhead Crane	As per Crane Manufacturer's Specifications

The Unloading Bay is to be designed for 18 M. T. full truck load.

While designing the side walls of the Clear Water Reservoir and pump house a surcharge of 500 Kg./Sq.m. is to be taken into consideration.

The tenderer has to design in such a way that the permissible limit of vibrations of Rotodynamic Equipments shall be within the limit as specified in IS:11724-1985.

The R. P.M. of pump Motor set may be 750 R. P.M. Sync, subject to confirmation award of equipment contract.

N. B. For calculating earth pressure on the walls of Reservoir / Pump house, the worth value among co-efficient of active earth pressure (Ka) and that of Earth pressure at rest (Ko) is to be considered. Standard backfill materials with conservative soil data are to be considered. No extra claims are to be entertained in this regard.

4.2 Level and Other Salient Information (Successful bidders to specify)

A. Levels in Meters

B. Difference in Height / Clearance

C. Minimum Length, Slopes etc.

Out of the above list, the figures marked with "Astericks" are mandatory requirements whereas the others are suggestive only.

A. Levels in Meters (to be fixed by successful bidders)

Sl No.	Description	Meters
1. *	Finished ground level	
2.	Clear Water Reservoir Floor Level	

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3. * Clear Water Slump Level (Flat Portion)

4. * Minimum Water Level in Sump

5. Maximum Top Water Level in Clear Water Reservoir

6. Motor Floor Level

7. Catwalk / Inspection Gallery Level

8. Top of Concrete level for Clear Water Reservoir

9. Bottom of H. T. O. Crane Hook

10. Top of Crane Rail over Crane Girder

11. Unloading Platform Level

B. Difference in Height, SWD and Head Room in Building and Structure (Successful bidder to specify)

1. Side Water Depth (SWD) in clear Water Reservoir

2. Free Board in Clear Water Reservoir / Clear Water Sump soffit of Slab / Beam

C. Minimum Length, Slope, Clearance etc.

1. Minimum Length along direction of Flow near pump sump (slope portion)

2. Maximum slope from clear water Reservoir to Sump

3. Minimum length of the flat Sump Along the direction of flow

4.3 Special Notes on Horizontal Centrifugal in Horizontal Execution Pump Foundation Design

4.3.1 Foundation system for support of Rotary machines such as Horizontal Pumps shall strictly comply with the requirements of Code IS:2974 (Part-IV)-1979. The Rotary Machine support system require careful study of the foundation system with due consideration of vibration characteristics. For satisfactory design and construction, the following precautions need be taken with careful dynamic analysis of machine foundation and its supporting structures:

i. The natural frequency of the Foundation System shall be analyzed and the mass of the Foundation System shall be considerably larger than the mass of the whole machine.

ii. Dynamic Analysis due to insufficient clearance between impeller and causing of Pumps should be checked and frequency out of this type of vibration need to be made as per relevant IS Code.

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iii. Dynamic Response check of the block foundation may be carried out as per relevant IS Code.

iv. Permissible amplitude of Vibration of displacement as per IS Code 2974 (Part-IV), Clause 5.4 Page No. is to be calculated and the design will be checked accordingly.

v. Permissible stresses in Soil / Concrete be suitably as per IS Code.

vi. Natural frequency of Foundation System shall be such as will avoid resonance with the Operating Speed of the Machine. The natural frequency of the foundation system should not be within +20% of the operating of the machine.

vii. The foundation system shall be so dimensioned that the resultant force due to mass of the machine and mass of the Foundation passes through the Centre of gravity of the base area of the Foundation.

4.3.2 The Tenderer is requirement to submit a "Technical Write-up" with relevant details of Foundation System along with the Part-I of this Tender. This would help the Department to fix up the accepted Parametric Norms of the foundation System that would finally be adopted in the design and construction of the Building and Structures after award of the contract.

5. ARRANGEMENT OF ROOF TREATMENT: EARTH FILL VENTILATING SYSTEM

5.1 It is proposed that the Clear Water Reservoirs top at the pumping stations shall have minimum 450 mm thick compacted earth fill as shown in the Tender Scheme Drawing.

5.2 The provision for saturated earth load on the roof slab shall be considered in the design of roof slab of the Clear Water reservoir by the Tenderer. The actual earth fill work is also included in the Scope of this Tender.

5.3 The R. C. C. Roof Slab of the Clear Water Reservoir shall be protected with water proofing treatment as per direction of the Engineer.

6. DESIGN DRAWING AND OTHER INFORMATION TO BE SUBMITTED BY THE CONTRACTOR (SUCCESSFUL TENDERER)

6.1 On the award of the Contract, Contractor shall submit to the Engineer, Guwahati Metropolitan Development Authority detailed design and drawings of different structures phase wise keeping pace with the work programme.

If called upon, the Contractor shall also submit relevant books and other references which have been referred to or used in the design. Such books and other references will be returned to the Contractor when done with. Secrecy in regard to details of design of structures, materials and equipments etc. shall not be considered by the Contractor in the name of "Trade Secret" for not furnishing the requirement details asked for by the Engineer. The design and drawings shall be subject to modifications at no extra cost, if found necessary and such modifications shall not vitiate the contract. Similarly, any additional new drawings as found necessary shall be submitted by the Contractor and the drawings shall form part of the Contract Drawings.

Notwithstanding what has been stated above the Contractor shall be responsible for the correctness and soundness of the design and if any provisions are found inadequate or faulty necessary modification will have to be carried out at any stage upto the expiry of the guarantee period.

The Contractor will not be permitted to commence the Actual Work at site unless detailed design and working drawings are approved by the Engineer. Four copies of the approved design and six copies of the approved drawings are to be furnished by the Contractor free of cost for use by the Employer during execution of the work. Any additional copies of same drawings, if required, should also be submitted by the Contractor free of cost at the request of the Employer.

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A tentative work programme in Network Diagram using CPM technique is required to be submitted by the successful tenderer within a fortnight from the date of issue of workorder. The drawings from foundation onward will have to be submitted by the successful tenderer successively as per the work programme to be approved by the Engineer. Adequate resources are to be mobilized during execution of the work, for which no extra payment shall be made.

6.2 **Completion of Drawings and Other Documents to be submitted by the Contractor**

The Contractor shall submit within one month after the completion of all construction works the followings drawings and documents free of cost.

a) Six copies of all approved completion drawings. These drawings shall be on black and white prints of thick paper. These drawings are to be submitted in a presentable form as directed by the Engineer. In addition to this, CD/DVD's with folders of these drawings drawn in Auto CAD are to be submitted as soft copies.

b) Four copies of final designs in properly bound form as directed by the Engineer.

c) Four copies of detailed specification and schedules of the completed works of all machines, equipments and accessories as per inventory shall be submitted.

6.3 **Release of Security Deposit (Retention Money)**

The Security Deposit (Retention Money) shall not be released until all the above mentioned Completion Drawings and Documents are submitted by the Contractor and after the fulfillment of the criteria mentioned in Detailed Notice Inviting Tender.

7. SPECIFICATION OF FULL BORE ELECTROMAGNETIC FLOWMETER

7.1 Full bore electromagnetic flow meters should be designed , manufactured and calibrated according to internationally accepted ISO standards having bi-directional flow measurement and totalisation facility and total measuring accuracy should be +/-0.5% of measured value. The manufacturer should have a ISO 9001 certification.

7.2 The change in the water demand will result in variation of line pressure. The full bore magnetic flow meters should perform within the required accuracy limit of +/-0.5% of measured value without being affected by variation in the line pressure.

7.3 The flow sensor lengths should be strictly according to ISO lengths. This is a standardization according to ISO norms which helps the customer to have one to one replacement of flow meter of any manufacturer.

7.4 **Direct volume comparison calibration method should be used to calibrate these meters. The overall accuracy of the calibration rig should be at least five times better than the accuracy of the full bore electromagnetic flow meter. This is in accordance with ISO norms. The calibration rig should have accreditation by an independent agency with traceability to national and international standards. VENDOR should have this kind of facility in India or they have to show the three point Wet calibration at their principal's works in any country or any other flow calibration rig accredited by National & International standard free of cost. Third party inspection is also applicable for the calibration works.**

7.5 The flow transmitter cum converter should be wall mounted type with 2 line back-lit LCD display for indication of actual flow rate, forward & reverse flow direction, sum total flow indication and status indications. The transmitter housing should be Die-Cast Aluminum with glass window.

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7.6 The protection category for the sensor should be IP68 & the protection category for the transmitter should be IP 65.

7.7 Grounding Rings are to be provided on both sides and grounding electrode will not be acceptable

7.8 The converter cum transmitter should be fully programmable from the front facia. The programming should be user friendly, self prompting menu driven. The programming should be possible through state of the art 3 key keypad.

7.9 The flow sensors will be mounted in the field and will be subjected to all environmental conditions. At some locations flow sensors will be installed in underground chambers. There is a possibility of the flow sensors being submerged in the water. Thus to avoid ingress of water in the sensor housing, sensor has to be of fully welded construction.

7.10 *At times the submersion of sensor causes corrosion/erosion of the sensor housing and ingress of water in the flow sensor. Therefore the sensor housing and the connection / junction box should be of SS 304. The protection category for the sensor is IP 68.*

7.11 The transmitter will have one scalable pulse outputs, one current output, one status output.

7.12 The transmitter has adjustable field frequency, up to 25 Hz to ensure maximum accuracy and high speed response for pulsating flows.

7.13 It should be possible to have a separation between the flow sensor and the signal converter / transmitter upto a max. of 200mtrs. without the need for any signal boosters.

8.0 GENERAL SPECIFICATION OF FULL BORE ELECTROMAGNETIC FLOWMETER OF FORBES MARSHALL/ENDRESS HAUSER

OPERATING CONDITIONS		
SERVICE		RAW WATER
OPERATING TEMPERATURE		Ambient
OPERATING PRESSURE		0 - 10 kg/cm^2 (g)
PRODUCT CONFIGURATION		FLOW HEAD AND TRANSMITTER
SENSOR (FLOWHEAD)		
MAKE		REPUTED MAKE
TYPE		PULSE DC EXCITATION
SYSTEM		SEPARATE WITH CABLE OUTPUT
POWER SUPPLY		240V AC, 50 Hz
LINER MATERIAL		HARD RUBBER
TUBE		SS 304
COIL HOUSING		SS 304 WITH FULLY WELDED CONSTRUCTION
ELECTRODE MATERIAL (WETTED PART)		SS 316
END CONNECTION MATERIAL (NON WETTED PARTS)		CS
END CONNECTION TYPE/RATING		FLANGED TO PN 10
CONNECTION / JUNCTION BOX		SS 304
EARTHING		GROUNDING RING (GROUNDING ELECTRODE NOT ACCEPTABLE)

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PROTECTION CLASS		IP 68
CABLE GLAND		½" NPT DOUBLE COMPRESSION Ni PLATED BRASS
ACCURACY		±0.5% OF MV INCLUSIVE OF LINEARITY, REPEATABILITY, PRESSURE EFFECTS AND HYSTERSIS
MARKING		FLOW DIRECTION WITH ARROW, SIZE, SERIAL NO. & MAKE
TRANSMITTER (CONVERTOR)		
MODEL		VENDOR SPECIFY
TYPE		MICROPROCESSOR BASED & MODULAR
MOUNTING		SEPARATED
DISPLAY LANGUAGE		ENGLISH
DISPLAY		TWO LINE BACK LIT LCD FOR INDICATION OF ACTUAL FLOWRATE, FORWARD, REVERSE AND SUM TOTALISER
COMMUNICATION		PC INTERFACE
RELAYS		INBUILT – 2 RELAYS
COIL DRIVE CURRENT & FREQUENCY		±125 mA PULSED DC WITH SELECTABLE EXCITATION FREQUENCY UPTO 25 HZ, TO IMPROVE SIGNAL – TO – NOISE RATIO AND HIGH SPEED RESPONSE / SIGNAL CONVERSION TO OVERCOME NOISES
CURRENT OUTPUT		ONE CURRENT OUTPUT 4 – 20mA
PROTECTION CATEGORY		IP-65
ENCLOSURE		DIE CAST ALUMINIUM WITH POLYURETHANE FINISH WITH GLASS WINDOW
PROGRAMMING		FROM FRONT FACIA THROUGH KEYPAD / OPTICAL PIN PROGRAMMING. PROGRAMMING SHOULD BE DONE WITHOUT OPENING OF DISPLAY COVER.
POWER SUPPLY		230 V AC, 50 HZ
MOUNTING		WALL MOUNTED
POWER FAILURE MODE		PROVISION OF RAM / PROM TO STORE PARAMETER ENTERED AND MEASURED FLOW DATA DURING POWER FAILURE
CABLE LENGTH		UPTO 200 METERS.
TERMINAL		SHOCK – HAZARD – PROTECTED PUSH LOCK TERMINAL
ERROR IDENTIFICATION		0/3.6/22 mA
INTERCHANGEABILITY		FULLY INTERCHANGEABLE WITH ALL THE FLOW SENSORS

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9.0 TECHNICAL SPECIFICATION OF LABORATORY EQUIPMENTS

9.1 pH Meter – Table Model (ACM – 340912-R/ Equipments :

Technical Specifications :		
pH/mV	:	
Range	:	0 to 14 pH o to +/- 1999mV
Accuracy	:	+/- 0.05 pH +/- 1 digit
Resolution	:	0.01 pH 1mV
Temp. Compensation	:	Automatic
Input Impedance	:	> 10 12 ohms
Probe	:	Combination pH electrode
Display	:	LED Seven Segment
Input	:	BNC
Temperature		
Range	:	0 to 100 0 C
Accuracy	:	+/- 1.0 0 C
Resolution	:	0.1 0 C
Input	:	Sterio socket
Probe	:	RTD sensor
Environmental Operating Conditions		
a) Operation	:	Indoor
b) Temperature	:	Ambient to 45°C
c) Relative Humidity	:	5 to 90% non-condensing
Power Requirement	:	230 Vac ± 10%, 50Hz

9.2 Weiber Digital Turbidity Meter (Acm-34096-R) :

Display : 31/2 Digit LED

Range 0 to 200, 0 to 1000 NTU

Sample System : 30mm Glass Tube

Light Source : 6v, 1 Amp Tungston Lamp

Detector : Photocell/ Photodiode

Power : 230 ± 10% d0 Hz

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9.3 Conductivity Meter Table Model (Acm-340913-R) :

Technical Specifications :		
Conductivity Measuring range	:	0.01mS/cm to 199.9mS/cm. (Depending on the cell used 0.1/1.0/10.0
Resolution	:	- 0.01 (displayed)
Accuracy	:	- 0.5%
Temperature range	:	O to 99.90 C
Resolution	:	0.1°C
Relative accuracy	:	+/- 0.2°C
Sensor	:	RTD PT 100
Temp. compensation	:	Automatic
Display	:	20 X 2 line backlighted LCD display
Keyboard	:	Alphanumeric splash waterproof polyester soft keys
Report format	:	(a) Report of selected conductivity readings (b) Calibration report (c) Data table and Graphs (optional)
Input	:	2 - Banana socket for conductivity electrode, 1-ATC-PT100
Output	:	Printer (Parallel) Autostand (optional)
Environmental Operating Conditions	:	(a) Operation : Indoor (b) Temperature : Ambient to 45°C (c) Relative humidity : 5 to 90% non-condensing
Power requirement	:	230 Vac ± 10%, 50Hz

9.4 Double Walled Water Bath (Acm-54001-Q) :

Temperature Control		
Temperature Sensitivity	± °C	0.5 or better
Spatial Deviation in Temperature	± °C	0.5 or better
Readability	°C	0.1
Temperature Range	°C	5 °C above ambient to 90 °C (Standard)
Temperature Sensor		PT-100
Temperature Controller		Solid state digital controller/PID optional
Display		LED/LCD
Adjustable alarm limits		Optional with PID controller only
Safety Thermostats		
Temperature variation adjustments		3 (with PID Controller only)
Temperature Sensors		PT-100

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Automatic temperature setting		Yes (with PID Controller only)
Adustable limits		Yes (with PID Controller only)
Shelves		
Standard		01
Internal Dimensions	Mm	Standard 300mm x 250mm x 100mm (6 holes) 8 ltr 355mm x 405mm x 100mm (12holes) 15 ltr
Power Consumption		
Nominal power	W	500-650
Nominal voltage	V	220-230 Volts, 50 Hz Single Phase
Frequency	Hz	50

9.5 **Weiber : B.O.D. Incubator (Acm-22061-I) Digital Mode I- 4cft capacity :**

Temperature Control		
Temperature variation (time)	± °C	0.5
Temperature deviation (spatial)	± °C	0.5
Readability/ Set ability	°C	0.5
Temperature range ***	°C	5 °C to 60 °C
Sensor thermocouple		Type K
Controller		Solid State digital Controller/PID optional
Display		LED/LCD
Adjustable alarm limits (visual and acoustic)		Optional
Safety thermostats		
Temperature variation (time)	± °C	3 (with PID controllers only)
Sensor thermocouple		Type K
Automatic setting		Yes (with PID Controller only)
Adjustable limits		Yes (with PID Controller only)
Light Control		
Readability/ Set ability	%	7% (optional feature)
Light intensity in the middle	Lux	As Desired (optional feature)
Light intensity in both sides	Lux	As Desired (optional feature)
Shelves		
Standard/ max		2-6 (depending on the internal size)

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Dimensions w,d	mm	As per the individual model
Max load per shelf	Kg	20
Permitted total load	Kg	80 kg (Max Internal Size)
Power consumption		
Nominal power	W	950
Nominal Voltage	V	230, 1~
Frequency	Hz	50/60

9.6 Muffle Furnace (Acm-82301) 1.0KW rating, working temperature 900 °C :

Temperature Control		
Temperature variation (time)	± °C	5%
Temperature deviation (spatial)	± °C	5%
Readability/ Set ability	°C	0.5
Temperature range ***	°C	5 °C above ambient to 900/1200 °C
Sensor thermocouple		Type K
Controller		Solid State digital Controller/PID optional
Display		LED/LCD
Adjustable alarm limits (visual and acoustic)		Optional
Safety thermostats		
Temperature variation (time)	± °C	3 (with PID controllers only)
Sensor thermocouple		Type K
Automatic setting		Yes (with PID Controller only)
Adjustable limits		Yes (with PID Controller only)
Shelves		
Standard/ max		Nil
Dimensions w,d	mm	As per the individual model
Max load per shelf	Kg	Nil
Permitted total load	Kg	20 kg (Max Internal Size)
Power consumption		
Nominal power	W	1950
Nominal Voltage	V	230, 1~
Frequency	Hz	50/60

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9.7 **"WEIBER" Magnetic Stirrer With Hot plate :**

Type

Maximum Speed RPM : 1800
Stirring Capacity Ltrs : 5
Heating Capacity Watts : 500
Dimension (W x D x H) mm : 190 x 190 x 170
Stirring Paddle Ø x L mm : 10 x 50

Capacity : 500ml/ 1 litre

9.8 **Electronic Digital Balance :**

- Large LCD display for easy view
- Standard RS 232 interface
- Parts Counting & percent weighing
- Below balance weighty facility
- Die cast aluminium design for long term stability & accurate result
- Various weighing units like ct, gm, oz, mom, GN
- ISO-GLP compliance printouts (optional)

Capacity	**600 g**
Increment	**0.1 g**

9.9 **FLOCCULATOR (JAR TESTING APPARATUS) with six stirrers capacity 2 litre**

Flocculator consist of geared continuous run heavy duty 1/20 HP variable speed motor from 25 to 100 RPM with built in speed control. S.S. string rods are provided with adjustable spacers to adjust the depth of stirring paddles. The stirring shaft can be removed without disturbing other stirrers. This unit is supplied without beakers to work n 220/230 volts A.C.

9.10 **Weiber Heating Mantle (Model : Acm-87096Q) :**
Capacity : **500**ml, Wattage : **180** Watts, Voltage : **220/230** Volts AC Supply

10.0 **SPECIFICATION FOR CONSUMER METER**

1. **GENERAL**: This part applies to water meters intended for metering potable cold water with threaded end connections and of nominal sizes upto and including 50 mm. All water meters shall be good quality as per IS/ equivalent standards. Bidders may also choose for fluidic oscillation meters.

Actual size wise distribution can be made during execution. Approximate quantities are:

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Domestic Type (Multimag or Equivalent)
Class B 15 mm – 15725 nos
Class B 20 mm – 1884 nos

Commercial Type (Multimag or Equivalent)
Class B 25 mm – 292 nos
Class B 32 mm – 100 nos
Class B 40 mm – 100 nos

Industrial Type (Woltex or Equivalent)
With strainer NP10/ANSI B 16.5 - 50 mm – 700 nos
With strainer NP10/ANSI B 16.5 - 65 mm – 400 nos
With strainer NP10/ANSI B 16.5 - 80 mm – 287 nos
With strainer NP10/ANSI B 16.5 - 100 mm – 25 nos
With strainer NP10/ANSI B 16.5 - 125 mm – 4 nos
With strainer NP10/ANSI B 16.5 - 150 mm – 5 nos
With strainer NP10/ANSI B 16.5 - 200 mm – 4 nos

2. **TERMINOLOGY**:

i. **Nominal Pressure**: The internal pressure, expressed in Mpa corresponding to the maximum permissible working pressure

ii. **Flow Rate:** The volume of water passing through the water meter per unit of time; the volume being expressed in litre and the time in hours, minutes or second.

iii. **Flow Delivered**: The total volume of water which has passed through meter in a given time.

iv. **Maximum Flow Rate, Q max**: The highest flow rate at which the meter can function over limited periods without damage and without exceeding the maximum permissible errors and the maximum permissible value for loss of pressures, expressed in Kl/Hr.

v. **Nominal Flow Rate, Qn**: Half the maximum flow rate, Q max; expressed in kl/h. At the nominal flow rate Qn, the meter should be able to function in normal use, i.e. in continuous and intermittent operating conditions, without exceeding the maximum permissible error.

vi. **Minimum Flow Rate, Q min**: The lowest flow rate at which the meter is required to give indications within the prescribed maximum permissible error.

vii. **Pressure Loss**: The pressure loss caused due to the presence of the water meter in the pipe line.

3. **NOMINAL SIZES**:
Water meters shall be of the following nominal sizes; 15 mm, 20 mm, 25 mm, 40 mm and 50 mm. The nominal size of the water meter shall be denoted by the nominal bore of its end connections.

4 **CLASSES OF WATER METER**:
The water meters to be connected mainly of two types classified as Class A with strainer and Class B based on the maximum verification scale interval and metrological characteristics.

5 **MATERIALS AND MANUFACTURE**
(i) **General**: Water meters and their parts, especially parts coming in continuous contact with water shall be made of materials resistant to corrosion and shall be non- toxic and

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non-tainting. Use of dissimilar metals in contact under water shall be avoided [as for as possible] in order to minimize electrolytic corrosion

(ii) **Construction**: The meters shall be constructed in such a way as to
- give long service and guarantee against any fraud or tampering; and
- conform with the provisions of these rules.

(iii) **Body**: The body shall be free from all manufacturing and processing defects, such as blow-holes and spongy structure and shall not be repaired by plugging, welding or by the addition of materials. The internal shape of the body shall ensure smooth flow of water and easy dismantling.

(iv) **Connections**: The meter casing shall be fitted in the pipe line by means of two cylindrical nipples or tailpieces with connecting nuts which shall be provided with each meter. The internal diameter of the nipple where it connects the pipeline shall be equal to that corresponding to the nominal size of the meter.

(v) **Strainers**: Strainers shall be of a material which is not susceptible to electrolytic corrosion. They shall be of corrosion resistant materials. They shall be rigid, easy to remove and clean and shall be fitted on the inlet side of the water meter. It shall be possible to remove and clean the strainer in such a way as not to permit disturbing the registration box or tampering with it. The strainer shall have a total area of holes not less than twice the area of the nominal inlet bore of the pipe to which the meter is connected. However in the case of meters provided with internal strainer, involving opening of the registration box for cleaning, an additional external strainer shall be fitted on the inlet side satisfying the above requirements.

Dial: The dial shall be of vitreous enamel powder coated on copper or plastics ensuring indestructible marking and good legibility.

(vii) **Regulator**: Every meter shall be provided with a regulator. The regulator accessible from outside shall be operated by a key without dismantling the meter and not without breaking the seal. The internal regulating device shall not be accessible from outside.

(viii) **Location of Serial Number**: The serial number of the meter shall be clearly indicated on the screw cap or in any other suitable place.

(ix) **Frost Protection Device**: Meters liable to be damaged by frost when so ordered by the purchaser shall be protected with suitable frost protection device.

DATA SHEET FOR PRESSURE TRANSMITTER

Make	Siemens / Equivalent
Model	Sitrans P 300
Tag No.	As per Tag Sheet
Type	Smart, Microprocessor based
Measuring Range	As per enquiry
Communication Protocol	HART
Local Display	Provided
Range setting switches	Provided

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Calibration	Caliibration for given range will be done on site.
Engineering units	Programmable with display keys
Sensor	Piezo /Capacitance
% age Accuracy	0.075
Output	Two wire 4 - 20 mA, Linear
Power Supply	24 V DC
Load Resistance	Max. 600 Ω
Zero Elevation / Suppression	Provided
Self Diagnostics	Required
Humidity Limits	5 - 100% RH @40°C
Damping Parameter	Configurable
Electrical Connections	1/2" NPT
Process Connections	As per Tag Sheet
Diaphragm	Flush mount
Turn down ratio	.1:100
Housing	SS
Conform measurement cell	EHEDG approval

12.0 SPECIFICATION FOR COMPUTERISED DISTRIBUTION MANAGEMENT

This is a system to be developed for regular estimation of UFW and NRW. The system aims at Computerized information of flow and pressure at strategic locations. Regular updating of pipe network and its connections will make it easy for getting correct information at all times.

The main tasks are –

- Mapping of the pipe lines that will be laid showing
  - Important ground features of locations with respect to pipe line alignment
  - Pipe alignment every 50 ft interval reference, depth of pipe top
  - Information on pipes Size, M.O.C, Thickness
  - Location of valves and measuring devices
  - Location of connection & its details
  - Details of measuring devices
- Supply & installation of Flow & Pressure measuring devices with facility of data transfer to a central station through GSM (service provider may be Airtel, BSNL, Aircel, Reliance). Department will arrange power (230 V AC 50 Hz) at each data logger point from nearby source of schools,/ govt. building / street lamp post / private houses whichever is available.

  The Flow meters (full bore type) will have two sensors, one for flow and the other for pressure, which will be connected to a data logger system and to be placed at site.

  Details of full bore flow meter are given in Clause 8.
- Creating consumer meter data base in oracle platform containing details of consumer connections.

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- Creating software for data transfer from Flow & Pressure monitoring sites.
- Provision of metering & billing software.
- Combining all these software in one package.
- Reporting format generation.
  Daily flows & pressure, monthly UFW & NRW & updating records of mapping.

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Name of Contractor

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SECTION - F

GENERAL SPECIFICATIONS OF WORKMANSHIP AND MATERIALS FOR CIVIL WORK

1. GENERAL

1.1 General Materials

1.1.1 All materials used in the permanent works shall be of the best quality of the kind and to the approval of the Engineer. Any material not covered by these Specifications, shall comply with the relevant latest Indian Standard Specifications (Referred to as IS as revised or modified up to the date one month prior to Tender date). British or American Standard Specifications shall be referred to in case any particular specification is not available in any of the aforesaid Specifications.

1.1.2 Samples of materials to be supplied and used, by the Contractor in the works shall be to the prior approval of the Engineer. For this purpose the Contractor shall furnish in advance representative samples in quantities and in the manner as directed by the Engineer for his approval. Materials brought to the Site, which in the opinion of the Engineer do not conform to the approved sample, shall, if so directed by him, be removed by the Contractor from the Site and replaced by the materials of approved quality.

1.1.3 In spite of approval of the Engineer of any materials brought to the site, he may subsequently reject the same if in his opinion the materials has since deteriorated due to long or defective storage or for any reason whatsoever and is thereby considered unfit for use in the permanent works. Any material thus rejected shall be immediately removed from the Site at Contractor's cost and expenses.

1.1.4 All materials brought to the Site shall be properly stored and guarded in the manner as directed by the Engineer and to his satisfaction.

1.1.5 The Engineer may carry out test of materials as he may decide. The Contractor shall, at his cost and expenses, for this purpose supply requisite materials and render such assistance to the Engineer as he may require. The cost of testing of the materials will have to borne by the contractor as per the provision of the tender document.

1.2 Workmanship

All works are to be carried out in proper workman like manner. Items of works not covered by these Specifications or by other tender documents shall be carried out as per best practice according to the direction of the Engineer and to his satisfaction. The relevant IS Specifications and in case of necessity British or American Standard Specifications shall be taken as guide for the purpose.

1.3 Works Included

The rates for all items, unless specifically stated otherwise in the Contract, must cover the cost of all materials, labour, tools, machinery, plant, pumps, explosives, scaffolding, staging strong props, bamboos, ropes, templates, pegs and all appliances and operations whatsoever necessary for efficient execution of work.

1.4 Ground Conditions

The Contractor is required to visit the site and ascertain local conditions, traffic restrictions, obstructions in the area and allow for extra expenses likely to be incurred due to any limitations whatsoever.

Quantities – The quantities set out in the Schedule of Prices are the estimated quantities of the work, but they are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfilment of his obligation under the Contract.

54. WORKS TO BE MEASURED

The engineer shall, except as otherwise stated, ascertain and determine by measurement the value in terms of the Contract of work done in accordance with the Contract. He shall, when he requires any part or parts of the works to be measured, give notice to the Contractor's authorized agent or representative, who shall forthwith attend or send a qualified agent to assist the Engineer or the Engineer's Representative in making such measurement, and shall furnish all particulars required by either of them. Should the Contractor not attend, or neglect or omit to send his agent on two consecutive occasions, then in the third occasion the measurement shall be made unilaterally by the Engineer which shall be taken to be the correct measurement of the work. For the purpose of measurement such permanent work as is to be measured by records and drawings at suitable intervals of such work and the Contractor, as and when called upon to do so in writing shall, within fourteen days, attend to examine and agree upon such records and drawings, with the Engineer's Representative and shall sign the same when so agreed. If the Contractor does not so attend to examine and agree upon such records and drawings on two consecutive occasions they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree with the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor shall, within fourteen days of such examination, lodge with the Engineer's Representative, for decision by the Engineer, a notice in writing giving details of the respects in which such records and drawings are claimed by him to be incorrect together with reasons thereof.

55. BILLS AND PAYMENTS

55.1 **Method of Measurement**: Except where any general or detailed description of the Work in bills of quantities or schedule of Works/items/quantities expressly shown to the contrary, bills of quantities shall be deemed to have been prepared and measurements shall be taken in accordance with the procedure set forth in the schedule of rates /specifications notwithstanding any provision in the relevant standard Method of Measurement or any general or local custom. In the case of items, which are not covered by the schedule of rates/ specifications, measurement shall be taken in accordance with the relevant Standard specifications published by PWD, Govt. of Assam and for the works not covered in this publication; measurements shall be taken as per the codes by Bureau of Indian standards.

55.2 **Records and Measurement**: The Contractor shall submit to the Engineer the monthly statements of the estimated value of the work completed less than the cumulative amount certified previously. The monthly statements shall be in the bill form specified by the Engineer and it shall be submitted on or before the date instructed by the Engineer. These monthly bills shall be supported with detailed measurements for the gross quantity of the work done duly deducting the gross quantity mentioned in the previous bill. The Contractor is permitted to copy down the corrections in the bills paid as per the Engineers certification. Upon receipt of the bill and measurements by the Contractors, the Engineer shall, except as otherwise stated ascertain and determine by measurement the value in accordance with the contract of work done in accordance therewith. All items having a financial value shall be entered in measurement Book etc. as prescribed by the corporation so that a complete record is obtained of all the Works performed under the contract.

Measurements shall be taken jointly by the Engineer or his organisation representative and by the Contractor or his organisation representative. Before taking measurements of any work the Engineer or the person deputed by him for the purpose shall give a reasonable notice to the Contractor. If the Contractor fails to attend or send an organisation representative for measurement after such a notice or fails to countersign or the objection within a week from the

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date of measurement, then in any such event measurement taken by the Engineer or by the person deputed by him shall be taken to be correct measurements of the works and shall be binding on the Contractor.

The Contractor shall, without any extra charge, provide assistance with every appliance and other things necessary for measurements. Measurements shall be signed and dated by both parties each day (of taking measurement) on the site on completion of measurement.

55.3 **Payments of Bills and Other Claims**: The payment of bills and other claims arising out of the contract will be made by Account Payee Cheque drawn in the name of 'Contractor'.

55.4 **Full Provisions**: The rates inserted by the Development Authority against various items of Work detailed in various parts of scheduled shall be deemed to include every allowance necessary, without extra measurement or charge for meeting the requirement of various components/ parts of the contract documents (particular specifications, PWD of standard specifications, Assam schedule of rates, MOST specifications, BIS specifications, Special Conditions, preambles and notes to schedule of items description of schedule items which shall all be read together and any or of the following unless specifically provided for the contrary.

a) Compliance with all the conditions of contract including Scope of work, General Conditions of Contract, schedule of rates and Quantities, Particular Specifications, Drawings including Notes thereon, Specifications in standard Specifications of PWD of Assam and relevant Indian Standard Specifications wherever applicable. However, in case of any discrepancy between drawing and tender, the tender item and specification shall prevail. If there is discrepancy in tender specifications, the order of preference shall be 1st specification of Assam State PWD, MOST and lastly BIS.

b) All labour, materials, tool and plants, equipments and transport which may be required in preparation for and in the full and entire execution and completion of the Works including waste of materials, carriage and cartage, carrying in, return of empties, hoisting, setting, fixtures and fittings in position.

c) Local conditions: Nature of Works, local facilities for supply of labour and materials accessibility's to sites and all other matters effecting the execution and completion of the Works.

d) Duties etc: Payments of any Octroi, Terminal Tax, Sales Tax, Turnover Tax, Contract Sales Tax, Toll Tax, Ground Rent, Royalty, Environmental Cess, and Local Bodies Cess, Taxes or any duties on materials obtained for the Works and any duties in respect of patent rights.

e) Supervision: Competent supervision of the Work.

f) Labour: Reasonable terms and conditions of employment, liability to pay compensation, Wages as per statutory enactment's, temporary accommodation, sanitation, compliance with contract labour act 1970 (Regulation and Abolition).

g) Water: Provision of all water required including temporary plumbing and connection.

h) Temporary Work Shops, Stores, Offices, Labour Camps etc. Provisions of such structures required for efficient execution of the Works and removing and cleaning up site on completion of Works.

i) Precautions Against Risks: Precautions to prevent loss or damage from all or any risk, insurance of sheds or any temporary accommodation provided by the Development Authority watching and lighting, provisions pertaining to the General Conditions of Contract.

j) Notices, Fees etc.: Compliance with statutory provisions of regulations and/ or bye laws of any local authority and/ or any public service company or authority affected by the Works.

k) Setting the Works including all apparatus required.

l) Site Drainage: Removal of all water that may accumulate due to spring, sub soil water, flood/tides and any other causes on the site during the progress of the Work.

m) Execution of Work in Workmanlike manner, facilities for inspection etc.

n) Rectification of bad Work: Rectification and/ or removal and reconstruction of any Work which (as decided by the Engineer) has been executed with unsound or imperfect

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