

**RAJKOT IRRIGATION DIVISION - RAJKOT
BHADAR-1 IRRIGATION SCHEME**

NAME OF WORK :-

**Supplying, Installation, Testing, Commissioning Operation and Mainnance of Real Time Structural Health Monitoring Instrument System at
Bhadar-1 dam Site.**

**BILL OF QUANTITIES (SCHEDULE - B)
(A) Percentage Rate Tender**

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
1	Supplying, installing, testing, and commissioning of an Automatic Total Station, integrated for real-time monitoring and live data acquisition, with 0.5 arc second angular accuracy, 0.1 arcsecond least count, reflectorless distance range ≥ 1000 m, distance with prism ≥ 4000 m, auto-lock with prism up to 2500 m, RS-232 communication, USBHos/ Device ports, laser/inbuilt optical plummet, single-side keyboard, supplied with all standard accessories, and compatible prism for 140–600 m measurement with ± 0.1 mm accuracy, complete in all respects as directed by the Engineer-in-Charge	1.00	No	4100000.00	Rupees: Fourty One Lac Only.	4100000.00
2	Providing and fixing Circular Prism suitable for use with Total Station of 0.5" angular accuracy, capable of accurate distance measurement in the range of 140 m to 600 m, with measurement accuracy of ± 0.1 mm, complete with prism holder, mounting arrangement, and all accessories, as per specifications and direction of Engineer-in-Charge.	46.00	No	18000.00	Rupees: Eighteen Thousand Only.	828000.00
3	Providing, installing and commissioning permanent Ground Control Point (GCP) Settlement Marker comprising MS base plate (250x250x5 mm conforming to IS 2062), GI riser pipe 25 mm dia (medium class as per IS 1239), sand filling (clean river sand, loose), optional PVC/GI outer casing (min 100 mm dia), precast concrete cover (M20, 500x500x50 mm with central hole), MS/GI reference cap, and painting in black & white checkerboard pattern using weather-resistant enamel paint, complete with excavation, installation, alignment, and all materials, labour, tools, and accessories, suitable for survey works using Total Station / drone survey, complete as per specifications and direction of Engineer-in-Charge.	100.00	No	10000.00	Rupees: Ten Thousand Only.	1000000.00

Item No.	Description of Item (with brief specification and reference to book) (specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
4	Conducting detailed topographic and elevation survey for Settlement Markers by establishing and transferring precise Reduced Levels (RLs) from the approved permanent benchmark at dam site using Total Station, including necessary traverse survey, closure error adjustment, control point verification, checking of horizontal and vertical accuracy, recording of coordinates/elevations, preparation of field observations, and all allied works required for ensuring accurate reference elevation of settlement markers, complete in all respects as per site conditions and as directed by the Engineer-in-Charge.	100.00	No	3000.00	Rupees: Three Thousand Only.	300000.00
5	Supplying, installing, testing, and commissioning of a mechanical flow measuring device (V-Notch & rectangular weir) for measuring low flow seepage in dams. The device shall have a notch angle of 22.5°, 45°, 60°, or 90° depending on discharge range, a stainless steel SS-304 / SS-316 plate with thickness of 3–5 mm, and be suitable for measurement ranges of approximately 0–100 L/s depending on notch angle. The weir shall have ±1% full-scale reading accuracy, operate under 5–100% humidity, temperature –20°C to +60°C, and provide corrosion protection through anti-corrosion finish. Complete in all respects as directed by the Engineer-in-Charge.	14.00	No	21500.00	Rupees: Twenty One Thousand Five Hundred Only.	301000.00
6	Supplying, installing, testing, and commissioning of a Wireless MEMS Triaxial Tilt meter, integrated for real-time monitoring, with ±10 °C operating range, Tilt Range ±90°, 0001°/0.00175 mm/m resolution, ±0.1% F.S. Repeatability ±0.0005° (±0.0087 mm/m), insulated enclosure, Mounting stainless steel IP68/NEMA-4X enclosure, lightning protection, complete with mounting supports, cables, accessories, and full manuals in English, complete in all respects as directed by the Engineer-in- Charge.	2.00	No	85000.00	Rupees: Eighty Five Thousand Only.	170000.00

Item No.	Description of Item (with brief specification and reference to book specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
7	Supplying, installing, testing, and commissioning of an Infrared Camera SC-IT6420-HB V2, integrated for real-time monitoring and live data acquisition. The camera shall have a Vanadium Oxide Uncooled Focal Plane Microthermal infrared sensor with selectable resolutions of 256×192, 384×288, or 640×512, NETD ≤0.05°C @ F1.0 (256×192) and ≤0.04°C @ F1.0 (384×288 & 640×512). Spectral response shall be 8–14 μm with multiple lens options (3.2mm, 6mm, 7.5mm, 13mm, 25mm) and field of view as per lens selection. Visible light CMOS of 1/2.8" with 1920×1080 resolution, optional 4–6 mm lens, and 30 m light range. Temperature measurement shall cover -20°C to 180°C (First Gear) and 0–650°C (Second Gear) with ±2°C or ±2% accuracy, supporting 10 movable points, areas, and lines, emissivity correction, and unit adjustment (°C/°F). The system shall include high/low temperature alarms with I/O, H.264 video compression, optical 16X zoom, manual/auto corrections, image adjustment, flip/mirror/P.I.P, dual light fusion, color palette support, and OSD. Complete in all respects including calibration, testing, mounting, and documentation, as directed by the Engineer-in-Charge..	1.00	No	610000.00	Rupees: Six Lac Ten Thousand Only.	610000.00
8	Supplying, testing, and commissioning of portable Water Level Sounder (Electric Water Level Indicator) for accurate measurement of groundwater levels in boreholes, standpipe piezometers, and observation wells, complete with probe, graduated cable, reel, battery, and all accessories, as per specifications and as directed by the Engineer-in-Charge. Range: Up to 100 m / 200 m / 300 m Accuracy: ±5 mm or better Probe material: Stainless steel and ABS Markings : at 1 m interval with mm graduations.	4.00	No	21000.00	Rupees: Twenty One Thousand Only.	84000.00

Item No.	Description of Item (with brief specification and reference to book specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
9	Supplying, installing, testing, and commissioning of a Vibrating Wire Type Piezometer Measuring Instrument for dam instrumentation with an operating range of 0–10 Kg/cm ² (or as per dam owner's requirement), integrated for real-time monitoring and live data acquisition. The instrument shall have 1.5× range over-capacity with ±0.1% F.S. effect, ±0.1% F.S. accuracy, 0.025% F.S. resolution, SDI-12/RS 485/4–20 mA output, IP68 stainless steel enclosure, lightning protection, including sensor mounting support, signal cables and all required accessories, complete with integration to Real Time Monitoring System (RTMS) / data logger for continuous monitoring, data acquisition and transmission to central monitoring system, , complete in all respects as directed by the Engineer-in-Charge..	4.00	No	27000.00	Rupees: Twenty Seven Thousand Only.	108000.00
10	Supplying, installing, testing, and commissioning of a Multi-Point Vibrating Wire Piezometer for dam instrumentation with an operating range of 0–10 Kg/cm ² (or as per dam owner's requirement), integrated for real-time monitoring and live data acquisition. The instrument shall have 1.5 × range over-capacity with ±0.1% F.S. effect up to 150%, ±0.1% F.S. accuracy, 0.025% F.S. resolution, linearity <0.5% F.S., SDI-12/ RS 485 / 4–20 mA output compatible with data acquisition systems, lightning protection, operating humidity 5–100%, temperature range –20°C to +60°C, suitable for altitudes up to 2500 m, and stainless steel IP68 enclosure including sensor mounting support, signal cables and all required accessories, complete with integration to Real Time Monitoring System (RTMS) / data logger for continuous monitoring, data acquisition and transmission to central monitoring system, , complete in all respects as directed by the Engineer-in-Charge.	8.00	No	55000.00	Rupees: Fifty Five Thousand Only.	440000.00
11	100 mm Diameter Borehole Drilling in Earthen Embankment Dam as decided by Engineer-in-charge, including mobilization and demobilization charges of drilling machines, equipment, tools, tackles, and labour, complete as per site requirements and direction of Engineer-in-Charge. (up to 39 m depth)	190.00	Rmt	6750.00	Rupees: Six Thousand Seven Hundred Fifty Only.	1282500.00

Item No.	Description of Item (with brief specification and reference to book specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
12	Burden Tube pressure gauge Providing and installing pressure gauge for measurement range of 0-10 Kg/Sq or (As per requirement of Engineer-in-Charge), accuracy $\pm 0.1\%$ of full scale, over-range capacity up to 150% of rated range, suitable for operating temperature range from 0°C to +70°C, constructed with stainless steel/IP 68 wetted parts for corrosion resistance, complete with required mounting accessories, fittings, testing, calibration and commissioning, complete in all respects as per approved specifications and as directed by the Engineer-in-Charge.	2.00	No	25000.00	Rupees: Twenty Five Thousand Only.	50000.00
13	Cleaning and Drilling of Drainage Holes in Dam Gallery through Hard Rock/Concrete Layers r as per requirement of Engineer-in-Charge , including removal of choke materials, flushing, drilling operations, and disposal of debris, complete with mobilization and demobilization charges of drilling machines, compressors, equipment, tools, tackles, and labour, as per site conditions and direction of Engineer-in-Charge. (upto 16.15 m depth or)	20.00	Rmt	8500.00	Rupees: Eight Thousand Five Hundred Only.	170000.00
14	Supplying, installing, testing, and commissioning of a Wireless Data Logger (Gateway), integrated for real time monitoring and live data acquisition from all Vibrating Wire sensors, Tilt Meters, Water Level and Flow Sensors, Weather Station, and RS485 (Modbus) Digital Nodes, with onboard edge recording for 15 days, internal battery backup, LTE cellular radio with internal SIM slot, data transfer to Web DAS via wireless gateway powered by AC/DC, IP67 rated enclosure, operating -20°C to +60°C, integrated solar charging circuit with AC/DC charging, complete in all respects as directed by the Engineer-in-Charge.	1.00	No	310000.00	Rupees: Three Lac Ten Thousand Only.	310000.00

Item No.	Description of Item (with brief specification and reference to book specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
15	Supplying, installing, testing, and commissioning of Vibrating Wire Wireless Nodes, integrated for real-time monitoring and live data transmission to DAS via mesh network gateway, supporting 1 Vibrating Wire channel + 1 Thermistor channel (x 4) or (x 5), Flat Mesh v3 networking protocol, IEEE 802.15.4 standard, 2400–2485 MHz ISM band, 6.5 dBm maximum transmit power, 200–6000 Hz frequency range with 0.001 Hz resolution and ±0.02 Hz repeatability, thermistor measurement ±0.1°C accuracy, –40°C to +85°C range, powered by 3.6 V lithium thionyl chloride battery (19,000 mAh) with 10–15 years life, IP68 protection, complete in all respects as directed by the Engineer-in-Charge.	8.00	No	113000.00	Rupees: One Lac Thirteen Thousand Only.	904000.00
16	Supplying, installing, testing, and commissioning of Wireless Mesh Repeater Node for extension of communication range in Vibrating Wire Wireless Monitoring System, enabling reliable multi-hop data transmission between field nodes and Data Acquisition System (DAS) through mesh gateway, complete with all accessories, configuration, and commissioning, as per specifications and as directed by the Engineer-in-Charge.	1.00	No	80000.00	Rupees: Eighty Thousand Only.	80000.00

Item No.	Description of Item (with brief specification and reference to book) (specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
17	Supplying, installing, testing, and commissioning of Server-Based and Cloud-Integrated Software for Data Logger, integrated for real-time monitoring, capable of acquiring, processing, filtering, storing, visualizing, and alarming geotechnical (Vibrating Wire and ModBUS), and hydro-meteorological sensor data, with SQL/Azure database storage, secure web interface with user/group access control, geo-referenced map and image visualization, customizable dashboards, interactive charts, complete in all respects as directed by the Engineer-in-Charge. Details Module Based Software for Geodetic, Hydromet and Geo-technical as below The software solution shall be capable of acquiring data from: 1. Dedicated Server based software for geodetic sensors data acquisition. 2. Cloud Based Geotechnical Sensors (Vibrating Wire and ModBUS). The cloud solution shall be capable of controlling and monitoring. The Geodetic module shall be capable of processing the geodetic data for base line data capture, adjustments and Cloud view module for Geodetic Deformation. Geodetic Web module and geotechnical Web module shall be of five year subscription.	1.00	No	1800000.00	Rupees: Eighteen Lac Only.	1800000.00
18	Supply of portable readout unit for vibrating wire and analogue/digital geotechnical instruments, complete with Bluetooth Low Energy (BLE) communication, mobile application compatibility, rechargeable battery, carrying bag, and all necessary accessories for field monitoring applications. The readout unit shall be compact, rugged, and suitable for outdoor use with minimum IP65 protection rating. The system shall support wireless communication with Android and iOS devices through a dedicated mobile application for sensor configuration, data acquisition, visualization, storage, and sharing. The unit shall be capable of reading vibrating wire instruments and displaying electrical as well as engineering values simultaneously with high accuracy and resolution. It shall also provide real-time graphical display and spectrum analysis of vibrating wire signals including peak value indication.	1.00	No	60000.00	Rupees: Sixty Thousand Only.	60000.00
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Item No.	Description of Item (with brief specification and reference to book specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
19	Providing, supplying, installing, and commissioning Desktop PC / Workstation for dam data acquisition with minimum 27" display (Full HD/4K), high-performance processor equivalent to Intel Core i9 14th Generation or higher, 16 GB DDR5 RAM (expandable to 64 GB), 1 TB NVMe SSD storage or higher, integrated/dedicated graphics, preloaded licensed OS Microsoft Windows Professional (latest version), and licensed Microsoft Office (latest version), complete with required ports (USB 3.0+, HDMI/VGA, LAN, audio, USB-C), connectivity (Ethernet, Wi-Fi, Bluetooth), accessories (keyboard, mouse, cables, power adapter), and integration of required data acquisition software, including installation, configuration, testing, and commissioning at site, with minimum 5-year comprehensive on-site warranty, complete as per specifications and direction of Engineer-in-Charge.	3.00	No	150000.00	Rupees: One Lac Fifty Thousand Only.	450000.00
20	Supply and Installation of Multi-Function Laser Printer with Wired and Wireless Connectivity, LaserJet Online UPS (5KVA) for data Retrieval and Processing system with a backup 24 hours for full load. Compatible Operating System Windows 11, Windows 10, Android, iOS, macOS 12 Monterey, macOS 13 Ventura, MacOS v14 Sonoma & Linux.	1.00	No	225000.00	Rupees: Two Lac Twenty Five Thousand Only.	225000.00
21	Providing, Supplying, Laying, Fixing, Testing and Commissioning of 4-Core Cable from Dam Instrument to Junction Box, including cable routing, protective conduits/trays wherever required, termination, ferruling, gland fixing, insulation, identification tags, clamps, connection accessories, and all allied materials, complete in all respects as per technical specifications and direction of Engineer-in-Charge.	100.00	Rmt	130.00	Rupees: One Hundred Thirty Only.	13000.00
22	Providing, Supplying, Laying, Fixing, Testing and Commissioning of 40-Core Cable from Dam Instrument to Junction Box, including cable routing, protective conduits/trays wherever required, termination, ferruling, gland fixing, insulation, identification tags, clamps, connection accessories, and all allied materials, complete in all respects as per technical specifications and direction of Engineer-in-Charge.	100.00	Rmt	1200.00	Rupees: One Thousand Two Hundred Only.	120000.00

Item No.	Description of Item (with brief specification and reference to bool specifications)	Quantity	Unit	Estimated Rate		Amount
				In Figure	In words	
1	2	3	4	5	6	7
23	Operation and Maintenance (O&M) of installed instruments, including repair, servicing, and to ensure continuous operation and accurate data output, for a period of 5 (five) years from the date of installation, including comprehensive piece-to-piece replacement of all defective components with all costs towards materials, spares, consumables, tools, tackles, labor, and transportation included, and also including training and capacity building of client personnel, submission of periodic analysis reports, and deployment of required manpower for the entire 5-year O&M period, complete in all respects.	1.00	No	5000000.00	Rupees: Fifty Lac Only.	5000000.00
24	LED Screen 55"	1.00	No	33466.00	Rupees: Thirty Three Thousand Four Hundred Sixty Six Only.	33466.00
25	civil or other work for above all item.	1.00	No	538950.00	Rupees: Five Lac Thirty Eight Thousand Nine Hundred Fifty Only.	538950.00
TOTAL Rs. :-						18977916.00
Rupees: One Carore Eighty Nine Lac Seventy Seven Thousand Nine Hundred Sixteen Only						

I/We are willing to carry out the work at % above/below percent (should be written in figure and words) of the estimated rates mentioned above. The amount of my/our tender works out as under:

*Estimated amount put to tender Rs.

Deduct : % below Rs.

Net : Rs.

In words : Rupees

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- 1 The Contractor shall exhibit a board with detailed specification and details of work as directed by the Engineer-In-Charge for which no extra payment shall be made.
 - 2 The labour cess will be deducted as per prevailing rules i.e. 1% of the work done.
 - 3 GST and Income tax TDS will be deducted at a source while making payments of bills
 - 4 In all R.C.C. Items in Rate Analysis Standard Cement Consumption has been taken as per Govt.G.R.:PRC-10/2017 Cement Consumption/16/C Date:11/05/2017 as stated in S.O.R. therefor in R.C.C. items where there is a change as per actual mix design the cost of difference of cement consumption have been deducted from the rate of original item at the rate of input rate mentioned in all the tender.

Signature of contractor.


Executive Engineer
Rajkot Irrigation Division
Rajkot

