GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED
VISAKHAPATNAM

N.I.T. & TABLE OF CONTENTS

Name of the Work:

Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram, Shantiashramam and Town kotta road and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP of Greater Visakhapatnam Municipal Corporation" under Smart City Mission"

Tender Notice No: GVSCCL/Projects/31(Sewerage)/2017-18, dated 16.2.2018

Managing Director
Greater Visakhapatnam Smart City Corporation Limited
C/o Greater Visakhapatnam Municipal Corporation,
Room No.306, Asilmetta Junction, Visakhapatnam – 530003
Andhra Pradesh, India
E-mail: visakhapatnamsmartcity@gmail.com
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OFFICE OF THE MANAGING DIRECTOR
GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED

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OFFICE OF THE MANAGING DIRECTOR
GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED

NOTICE INVITING TENDERS

'e' Procurement Notice

NIT No._ GVSCCL/Projects/31(Sewerage)/2017-18, dated 16.2.2018

Name of the Work:

Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram,Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP ofGreater Visakhapatnam Municipal Corporation" under Smart City Mission.

Managing Director, Greater Visakhapatnam Smart City Corporation Limited under the control of Municipal Administration and Urban Development Department (MA & UD), Government of Andhra Pradesh (G.O.A.P) invites proposals from eligible bidders for the above work under Engineering, Procurement, Construction (EPC) system.

a) **Scope of Work:** The scope of work includes Design, Construction, Testing, Commissioning and Operation & Maintenance of sewerage network and house sewer connections including retrofitting of pumping stations at Pandurangapuram, Shantiashram and Town kotta road and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP for Visakhapatnam Municipal Corporation" under Smart City Mission

b) **Salient components of the Scheme:**

	1.1.0: The bidder should conduct ETS Survey, Investigate, design, execution, Commissioning of Sewerage network including house sewer Connections for both the ABD area and Jalaripeta of Greater Visakhapatnam Municipal Corporation with the following parameters : ABD area: • Population as per 2011 Census : 65,532 • Base year to be taken as 2018 • The Prospective Population (2033) – 78,091 • The ultimate population (2048) – 83,623 Jalaripeta: • Population as per 2011 Census : 20,651 • Base year to be taken as 2018 • The ultimate population (2048) – 37,982 The bidder has to do ETS Survey, Investigation, Design, Build, Commissioning, operation and maintenance of the entire system including Defect Liability Period of 2 years. 1.1.2: The bidder should design the sewer network	The EPC Agency shall conduct detailed investigation and come up with detailed designs and Drawings which shall be approved by the Engineer-Incharge within the overall objectives of the scheme. The designs and drawings shall be done using state of the art software for Civil, Structural and Hydraulic engineering and the best practices shall be followed in compatible with BIS/ CPHEEO/ GoI Directives/ NEC/ ISO etc.

	as per CPHEEO manual and relevant IS codes using standard software packages for network modeling and designs. 1.1.3: The designs and plans (L-sections as well as layout plan) of all the components under the above scheme, shall indicate all the salient features such as details of ground levels, HGL, invert levels of the pipes, size and material of the pipes. These shall be prepared and got approved by the Engineer-In charge 1.1.4: The Sewer network shall be designed for ultimate requirement for the 2048 as per CPHEEO manual and relevant IS codes 1.1.5: The entire scheme should be completed and commissioned in 12 months. Sewerage Network: 1.1.6: The bidder should conduct ETS Survey, Investigate, design, execution, Commissioning of Sewerage network including house sewer Connections for both the ABD area and Jalaripeta of Greater Visakhapatnam the guidelines as specified in the CPHEEO/ manuals shall be followed while designing the sewerage network with all necessary valves in place as per standards. **House Sewer Connections:** 1.1.7: The bidder should carry out detailed survey of entire ABD area under Greater Visakhapatnam Municipal Corporation area for identifying House Holds not having house sewer connection to the existing network. The contractor shall submit the details to GVMC. The bidder shall connect house connections to the proposed Sewer network Contractor shall disconnect the old house sewerage connection once the proposed sewer network becomes operational. **Auxiliary items:** 1.1.8: Road Restoration of trenches should be provided with M30 Design mix (Minimum Cement Content not less than 380 Kgs) concrete over crusher dust cushion as per department designs wherever necessary. All the surplus excavated earth of each item is to be conveyed and leveled as directed by the Engineer in charge. 1.1.9: All Railway Crossings, R&B, NH & NHAI Road crossings by trench less technology as per the departmental specifications and approved drawings with suitable size casing pipe and carrying pipe as per approved drawings. 1.1.10:The bidder should hand over scheme after successful completion of work in consultation with Engineer – in – Charge and as per directions of the	If there is any conflict of specifications, the competent authorities' decision shall be final and binding on the EPC Agency.

<table>
<tr><td></td><td>department with detailed summary of Completed work &as built drawings.
1.1.11: All Statutory charges payable to line Departments like Railways, APTRANSCO, R&B, NH & NHAI will be borne by the department except electrical inspectorate Charges. All approvals required for execution of work shall be taken up by contractor.
1.1.12: The bidder has to make arrangements for traffic Management & Safety Management during the execution as required.</td><td></td></tr>
<tr><td>1.2</td><td>Design, Procurement, Laying, Joining, testing and commissioning of various sizes of SN-8DWC HDPE, including necessary barricading and hording at work site, including CC / BT, WBM road cutting, earth work, refilling the trenches after laying, jointing and testing, road restoration. All necessary works for integration of the existing Sewer network with the new system as per design requirement are to be carried out. Road restoration should be provided with cement concrete M30 grade concrete,crusher dust bedding shall be provided as per approved drawings.
<table>
<tr><td colspan="2">DI K7 with high alumina cement (HAC) lining</td></tr>
<tr><td>400mm dia</td><td>Not less than 177 m</td></tr>
<tr><td>500 mm dia</td><td>Not less than 420 m</td></tr>
<tr><td>600 mm dia</td><td>Not less than 399 m</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">DWC HDPE SN 8</td></tr>
<tr><td>150 mm dia</td><td>Not less than 8466m</td></tr>
<tr><td>170 mm dia</td><td>Not less than 4173 m</td></tr>
<tr><td>200 mm dia</td><td>Not less than 2130m</td></tr>
<tr><td>250 mm dia</td><td>Not less than 289m</td></tr>
<tr><td>300 mm dia</td><td>Not less than 445 m</td></tr>
<tr><td>400 mm dia</td><td>Not less than 601m</td></tr>
</table>
Note: The above lengths/ diameters are only indicative and are subject to change depending on the detailed designs and drawings to be approved by the competent authority but within the overall percentage break-up mentioned in the document and the BoQs to be submitted by the EPC Agency based on approved designs.</td><td></td></tr>
<tr><td>1.3</td><td>Construction of Circular manhole chambers of different dia constructed with Fly ash Bricks (in CSSR Bldgs 2017-18) as per Drawings for required Depth including Earth work excavation in any type of soils , in which M7.5Cement Concrete using 40mm size Hard Granite Metal from approved Quarry Machine Mixing, laying to a thickness of</td><td></td></tr>
</table>

	150mm and Brick Masonry with Cement Mortar 1:4 as per given design and thickness to the required height and top for 560mm dia., with a slope of 30mm to 50mm in the channel along with sewer line over the M7.5 Mix Concrete with Cement Concrete M15 mix using 12mm size Hard Granite metal machine crushed as per Departmental drawings, Plastering with S.R. Cement Mortar 1:3 20mm thick to inside of the Circular Man Hole and 12mm thick to the outer side chamber supply and fixing of Pre cast VRCC M30 Concrete Man holes including cost and conveyance of all materials for civil works, laying bedblock cover slab with RCC M20 grade design mix using sulfate resistant cement for all cement works, including cost and fabrication of steel, cost and conveyance and fixing of fiber reinforced manhole covers and frames of EHD 35 with clear opening of 560mm dia. as per IS 12592 part-I and II, cost, conveyance and fixing of encapsulated iron steps as per specifications, benching, channeling, finishing smooth with a coat of cement, refilling with excavated earth (other than stones, boulders, other decomposable materials which does not allow proper consolidation) complying with the standard specification for filling the foundations using required quantity of water for proper consolidation and rolling with handroller, all labour charge, disposal of surplus, bailing of water etc., complete as directed by the engineer incharge.	
	900mm dia. with required depths	Not less than 293 Nos.
	1200 mm dia. with required depths	Not less than 249Nos.
	1500 mm dia. with required depths	Not less than 94Nos.
1.4	Design, Procurement, Laying, Joining, testing of 110mm dia(House sewer connection) UPVC 4 Kg/Sqcm and 6 kg/cm2 including cost and conveyance and labour charges complete with necessary fittings, BT/CC road Cutting, Earth Work for Laying Pipeline in Road Crossings, laying and Jointing of Pipeline	Not less than 3017 Nos House sewer connections using 110mm dia-Not less than23952m160mmdia-Not less than 6074m
1.5	Road Restoration All the trenches shall be properly restored as per IRC/MoRTH specifications and the quantities given under are only indicative but not exhaustive. The detailed drawings shall be submitted by the EPC Agency which will be approved by the competent authority based on which the quantities have to be arrived and they shall be in conformity with the IRC/MoRTH Specifications but within the overall percentage breakup mentioned in the document and the following quantities are only indicative but not exhaustive.	

	Not less than 4289 Cum Crusher dust filling 200mm thick Not less than 3217 Cum M30 grade concrete 150mm thick	
1.6	a)Supply and delivery of Submergible pumps(energy efficiency) with cable pipe , suction and discharge pipes , fittings, installation ,laying ,jointing fixing of electromechanical components including replacement of existing pipes and pumps with labor charges . 21kw pump at@53lps and 20 meter head-2 No's 42kw pump at@125lps and 20 meter head-2 No's 125kw pump at@313 lps and 20 meter head-1 No's b)Mechanical coarse screen of 1.2mx1.5mx0.5m c) Supply ,delivery ,laying termination of single core copper flexible cable from junction box to starter panel including pvc pipe of 16 sq mm-120m and 70sq mm-30m length d) Control panels suitable for the above pumps-3No's	For 9 MLD sewage pumping station@ pandurangapuram
1.7	Supply and delivery of Submergible pumps(energy efficiency) with cable pipe , suction and discharge pipes , fittings, installation ,laying ,jointing fixing of electromechanical components including replacement of existing pipes and pumps with labor charges . a)28kw pump at@112 lps and 15 meter head-2 No's 55kw pump at@222lps and 15 meter head-2 No's 55kw pump at@556 lps and 15 meter head-1 No's b) Supply of DG set 320KVA outdoor c) Supply ,delivery ,laying termination of single core copper flexible cable from junction box to starter panel including pvc pipe of 16 sq mm-120m and 95sq mm-30m length d) Control panels suitable for the above pumps-3No's	For 16 MLD sewage pumping station@Shanti ashram

1.8	Supply and delivery of Submergible pumps(energy efficiency) with cable pipe , suction and discharge pipes , fittings, installation ,laying ,jointing fixing of electromechanical components including replacement of existing pipes and pumps with labor charges . a)57kw pump at@264 lps and 15meter head-2 No's 114kw pump at@528ps and 15 meter head-2 No's 290kw pump at@660 lps and 14 meter head-1 No's b)Mechanical coarse screen of 1.5mx1.5mx0.8m c) Supply ,delivery ,laying termination of single core copper flexible cable from junction box to starter panel including pvc pipe of 16 sq mm-120m and 95sq mm-30m length d) Control panels suitable for the above pumps-3No's	For 38 MLD sewage pumping station @Town kotta road
1.9	Complete SCADA system for monitoring and controlling the pumping stations 9mld,16 mld and 38 mld	3 No's
	Upgradartion of STP- 38 MLD	
	Upgradation of 38 MLD STP by Designing, constructing, hydraulic testing, commissioning and giving satisfactorily trials of 38 MLD STP of suitable components as per technology requirements to treat Sewage and can be accommodated in existing available land with suitable Treatment Units as per the CPHEEO guidelines and CPCB norms relevant IS codes etc. necessary piping work with required valves, gates, Laboratory Equipment, complete as turnkey job with all involved additional Civil, electrical, Instrumentation and mechanical works as per detailed specifications to achieve the effluent discharge standards: pH 6.5 - 8.5, BOD < 10mg/lit, COD < 50mg/lit, TSS < 10mg/lit, TN < 10mg/lit, TP < 2mg/lit, NH_4N < 5mg/lit, FC < 100 MPN / 100 ml to get recyclable quality of water for Industrial/ agricultural purposes. The Coagulant Dosing System shall be provided as an optional/ backup. The plant should be completely automated with PLC controlled SCADA operating system with sensors, probes to measure BOD,COD,TSS,PH and ammonia at inlet an outlet, TSS meter, portable D.O meter, main control cabinet and communication module including determining quantitative and	

	qualitative parameters of influent and effluent etc., complete Designing, providing and constructing administrative building, office cum laboratory including stores.	
1.10	Supply of Dia. 63mmx1000mm Silicon Fine Bubble Tubular Diffusers with SS Nipple of Model SFT-100-SILICON in the Aeration Tank(60mx42.5mx5m) 2800 -Nos	38 MLD STP
1.11	Supply ofTwin Lobe Air Blower with All Accessories of 5750 cum/hr,0.6 kg/cm2(Without Motor). 6 -Nos	38 MLD STP
1.12	Supply of Motors of 180 HP /1440 RPM for Twinlobe Blower 6 -Nos	38 MLD STP
	Supply of Bio-Swirl media for two Aeration tanks (60mx42.5mx5m)-440cum	38 MLD STP
1.13	Supply of Grit Removal System to suit tank size of 6.5 M x 6.5 M x 0.9 M SWD + 0.5 M FB all parts in SS 316 with 400mm dia Screw classifier with Electro Mechanical Overload alarm assembly,1.5 KW geared motor and chain drive with chain guard for grits collection mechanism,Grits washing 400 mm Ø Screw Classifier mechanism in SS316 Screw construction with 1.5 KW geared motor complete and Organic Return Pump with SS316 Shaft and Impeller & 0.75 KW motor. 2-Nos	38 MLD STP
1.14	Designing, providing & constructing in RCC (M-30) Anoxic tanks(28mx18.55mx5.5m) with central partition wall-1-No	38 MLD STP
1.15	Supply of 7.5 HP Trition Process Mixer for Anoxic Tank 6-Nos	38 MLD STP
1.16	Supply of Recirculation pumps from Aeration to Anoxic tank 6-Nos	38 MLD STP
1.17	Designing, providing Disc filter and associate civil structure .as per specifications1-No	38 MLD STP
1.18	Supply of Centrifuge for average flow (38 MLD) 1-No	38 MLD STP
1.19	Supply of RAS (return sludge) non clog horizontal centrifugal pumps of 500 cum/hr and 10m head 2-Nos	38 MLD STP
1.20	Supply of Agitator in the sludge sump 2-Nos	38 MLD STP
1.21	Supply of Centrifuge feed pump capacity (12 cum/hr)with motor 7.5 HP and operating pressure of 1.5 bar 2-Nos	38 MLD STP

1.22	Supply of motor for Centrifuge with VFD and 18.5 KW motor 2-Nos	38 MLD STP
1.23	Supply of Open channel flow meter Ultrasonic)with transmitter flow sensor for 19 MLD flow 2-Nos	38 MLD STP
1.24	Supply of Chlorinator with chlorine dosing of 5 ppm with Vacuum type wall Mounted chlorinator 10 Kg/hr consists of vacuum regulator control valve assembly, flow meter assembly, Water/Chlorine Pressure gauges, ejector assembly with mixing chamber all Wall mounting accessories, annealed copper coil 2 mtr long with end fitting cylinder/tonner Key 1 No. Ammonia Solution Ammonia Tourch 1 No including booster pumps of 10cum/hr, chlorine detector, Tonner, supervision and installation 1 -Job	38 MLD STP
1.25	Providing PLC scada system ,instrumentation and Miscellaneous works (Cleaning, Repair and overhauling of electromechanical units) 1 -Job	38 MLD STP
1.26	Supply of DG set 630KVA outdoor	38 MLD STP
1.27	Lab equipment for Treatment plant	38 MLD STP
1.28	Supply ,testing and commissioning of Drive control panel (185 KW-VFD)with 630 amps Capacity for Air blowers	38 MLD STP
1.29	Supply delivery and termination of common 11kv, 630A, 25KA VCB at 38 MLD 1000kVA and 750kVA transformers	38 MLD STP
1.30	Supply of 300 sqmm 3.5 core aluminum armed cable	38 MLD STP
	Upgradartion of STP- 25 MLD	
	Retrofitting of 25 MLD STP by Designing, constructing, hydraulic testing, commissioning and giving satisfactorily trials of 25 MLD STP of suitable components as per technology requirements to treat Sewage and can be accommodated in existing available land with suitable Treatment Units as per the CPHEEO guidelines and CPCB norms and relevant IS codes etc. necessary piping work with required valves, gates, Laboratory Equipment, complete as turnkey job with all involved additional Civil, electrical, Instrumentation and mechanical works as per detailed specifications to achieve the effluent discharge standards: pH 6.5 - 8.5, BOD <	

	10mg/lit, COD < 50mg/lit, TSS < 10mg/lit, TN < 10mg/lit, TP < 2mg/lit, NH_4N < 5mg/lit, FC < 100 MPN / 100 ml to get recyclable quality of water for Industrial/ agricultural purposes. The Coagulant Dosing System shall be provided as an optional/ backup. The plant should be completely automated with PLC controlled SCADA operating system with sensors, probes to measure BOD,COD,TSS,PH and ammonia at inlet an outlet, TSS meter, portable D.O meter, main control cabinet and communication module determining quantitative and qualitative parameters of influent and effluent etc., complete Designing, providing and constructing administrative building, office cum laboratory including stores.	
1.31	Manufacture, supply & delivery of Centrifugally cast (spun) Ductile Iron pressure pipes for sewage with Double G Flanged ends confirming to I.S.: 8329/2000 in standard working lengths of 5 meters and 1000mm dia. for classification K-9 suitable for Flanged Joints,bends with (HAC) cement mortar lining inside the pipes with outside Zinc coating. Rates are including Transportation and ST , civil and mechanical cost etc,. complete.: 1-No	25 MLD STP
1.32	Supply of surface jet Aerator units to supply SOR @ 40 kg/hr and 1.8 KgO2/KWH : 8-Nos	25 MLD STP
1.33	Grit removal system to be provided in collection mechanism by converting it into fixed half bridge with centre mechanism fitted with centre cage and rake arm. - Additional supporting pillars to support mechanism - 2 nos of Screw classifier with SS 316 of minimum 400mm dia - 2 nos of Organic Return pump - Collection bin of 1000 Ltr :1-No.	25 MLD STP
	Designing, providing & constructing in RCC (M-30) Anoxic tanks(23mx23mx4.5m) with central partition wall-1-No	25 MLD STP
	Supply of 7.5 HP Trition Process Mixer for Anoxic Tank 4-Nos	25 MLD STP
	Supply of Recirculation pumps from Aeration to Anoxic tank 4-Nos	25 MLD STP
	Designing, providing Disc filter and associate civil structure .as per specifications 1-No	25 MLD STP
	Design and Construction cost of Filter press building as per specifications 1-No	25 MLD STP
1.34	Sludge Dewatering Unit:Combi unit of Belt thickener with Belt Filter press To suit the sludge flow rate of 30 M3/ hr capacity with Belt Filter Press, allied accessories, Poly preparation and dosing unit. -	25 MLD STP

<table>
<tr><td></td><td>Complete automated : 1-No.</td><td></td></tr>
<tr><td>1.34</td><td>Supply of RAS (return sludge) non clog horizontal centrifugal pumps of 500 cum/hr and 10m head:
1-No.</td><td>25 MLD STP</td></tr>
<tr><td>1.35</td><td>Supply of Chlorinator with chlorine dosing of 5 ppm with Vacuum type wall Mounted chlorinator 10 Kg/hr consists of vacuum regulator control valve assembly, flow meter assembly, Water/Chlorine Pressure gauges, ejector assembly with mixing chamber all Wall mounting accessories, annealed copper coil 2 mtr long with end fitting cylinder/tonner Key 1 No. Ammonia Solution Ammonia Tourch 1 No including booster pumps of 10cum/hr, chlorine detector, Tonner, super vision and installation
1-Job</td><td>25 MLD STP</td></tr>
<tr><td>1.36</td><td>Civil structural modification for revamping of existing Collection mechanism to Grit removal system
1-Job</td><td>25 MLD STP</td></tr>
<tr><td>1.37</td><td>Providing PLC scada system ,instrumentation and Miscellaneous works (Cleaning, Repair and overhauling of electromechanical units)
1 -Job</td><td>25 MLD STP</td></tr>
<tr><td>1.38</td><td>Supply of DG set 500KV and 500kv transformer</td><td>25 MLD STP</td></tr>
<tr><td>1.39</td><td>Lab equipment for Treatment plant</td><td>25 MLD STP</td></tr>
<tr><td>1.40</td><td>Supply and delivery of Vehicles for Operation and maintenance of sewerage system (Capital work)
<table>
<tr><td>Supply and delivery high pressure jet cleaner (Muljet Min 14 lpm)</td><td>1No</td></tr>
<tr><td>Supply and delivery of Jetting cum Suction machine(9000lit capacity)</td><td>1No</td></tr>
<tr><td>Supply and delivery of Jet Rodding machine- 6000lit capacity</td><td>1No</td></tr>
<tr><td>Supply and delivery of De-Silting machine mounted on 3 wheeler auto</td><td>2No.s</td></tr>
<tr><td>Supply and delivery of rodding machine-100 rods</td><td>1No</td></tr>
</table></td><td></td></tr>
<tr><td>1.42</td><td>Operation and maintenance of sewerage system i.e manpower supply, repairs and maintenance of electro mechanical equipment and oils and repairs of vehicles etc for 7 years (excluding power charges &oils for DG sets)</td><td>9mld,16mld 38 mld pumping stations, ABD area sewer network and 25 mld,38 MLD STPs</td></tr>
</table>

Sl. No.	Description of the Component	Indicative Quantity	Unit
	Part - II Schedule – A		
	GST	**540.39**	
	Seignoriage Charges	**15.00**	

Note: 1. Quantities indicated in the Table above are indicative and need to be confirmed by Contractor through a SIP.

2. All components of implementation of SIP are to be understood including commissioning and duly approved by Engineer / PMC.

3. These are minimum quantities which needs to be provided by the contractor.

The interested bidders may download the tender schedules documents from the e-procurement website www.ap.eprocurement.gov.in from _____ @ **09.00 PM**. The field data can be had from the office of the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED, C/o GVMC on any working day before bid submission closing date i.e.,_____ @ **03.30 PM**.

II) NIT DETAILS :

1.	Department Name	**GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED**
2.	Circle / Division Name	GREATER VISAKHAPATNAM MUNICIPAL CORPORATION
3.	Tender Number	
4.	Name of work	Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram, Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP ofGreater Visakhapatnam Municipal Corporation" under Smart City Mission.
5.	Internal Bench Mark Value	5413.19Lakhs
6.	Period of Contract	Design and Construction - 24 months
7.	Form of Contract	EPC
8.	Tender Type	Open
9.	Tender Category	Works
10	EMD / Bid Security	**54,13,190 /-** (INR) (1% of IBM value)
11.	EMD / Bid Security Payable to	Managing Director, Greater Visakhapatnam Smart City Corporation Limited
12.	Tender Fee	APTS
13.	Tender Fee Payable to	APTS
14.	Process Fee	Rs. 25000 + Service Tax (INR)
15.	Process Fee Payable to	M/s APTS
16.	Bid document downloading starting	_____ : 09.00 PM
17.	Bid document downloading ending	_____: 02.00 PM
18.	Pre-Bid Meeting Date	_____ : 04.00 PM
19.	Bid submission closing Date (online)	_____ : 03.30 PM
20.	Pre-Qualification / Technical bid opening date (Qualification and Eligibility stage)	_____ : 04.00 PM
21.	Price Bid Opening Date (Financial Bid Stage)	_____ : 05.00 PM
22.	Place of Price Bid Opening	Managing Director, Greater Visakhapatnam Smart City Corporation Limited O/O Greater Visakhapatnam Municipal Corporation Room No. 306, Aslimetta Junction, Visakhapatnam – 530003, Andhra Pradesh, India

23.	Officer Inviting Bids/ Contact Person	Managing Director, Greater Visakhapatnam Smart City Corporation Limited
24.	Address / E-mail ID	Managing Director, Greater Visakhapatnam Smart City Corporation Limited c/o Greater Visakhapatnam Municipal Corporation Room No. 306, Aslimetta Junction, Visakhapatnam – 530003, Andhra Pradesh, India
25.	Contact Details/Telephone, Fax	0891- 2746300
26.	**Eligibility Criteria :**	The Eligibility criteria of the bidder for the project: **A) General Requirements** 1. Period of Completion: Design & construction - 24 months (Inclusive of Monsoon Period). 2. The bidder should furnish EMD of Rs 54,13,190/- in the shape of online payment or irrevocable bank guarantee in favor of the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED issued by Indian Nationalized/ Scheduled banks valid for six months. 3 Civil Contractors/ Contracting firm having registration with Government of Andhra Pradesh in appropriate eligible class as per the G.O.Ms.No.94, I & CAD (PW-COD) Dept. Dt. 01.07.2003 or equivalent registration in state/central government departments /undertakings are only eligible. 4. Bids from Joint Venture not allowed. 5. The bidder who have applied for / availed Corporate Debt Restructing (CDR) or SDR in the last five (5) financial years are not eligible to participate in the bid. In this regards to this clause, a certificate issued by the "Registered Charted Accountant" in the current financial year shall be uploaded by the bidder. 6. The bids are limited to those individuals, firms, companies, who meet the following qualification and the eligibility requirements.

B)Technical Requirements :

The Bidder should have executed the following minimum Quantities in any one financial year during the last ten Financial Years ending with 31-03-2017.

1. Should have completed minimum of 4275 RMT length of sewerage Pipe lines with 150mm diameter and above
2. The bidder must have executed and completed the Sewage Treatment Plants (STP) with proven technology (except waste stabilization ponds technology) meeting the then effluent discharge standards along with performance reports for a period of 1 year (one year) issued by the client for a total capacity of 5.0 MLD in any one financial year during the last ten Financial Years ending with 31-03-2017.

In case of Technology supplier/ provider:

a) As the work requires technology up gradation for STP, if the bidder is not a technology supplier /provider, the bidder must enter Memorandum of Understanding (MoU) with the technology supplier / provider for design/ performance guarantee along with the performance credentials of the offered process, its design philosophy and process with calculations, drawing, layout, hydraulic flow diagram, process flow diagram, P&I diagram, O&M manuals, control philosophy etc.

The technology provider/ supplier must have a registered office in India.

The technology provider/ supplier shall have experience in providing the technology for Sewage Treatment Plants (STP) with a capacity of at least 5.0 MLD in India which shall be in successful operation for a continuous period of (2) two years in the last (5) five years as on last date of bid submission with effluent characteristics satisfying CPCB norms issued during that period.

b)` with the technology supplier /provider shall be submitted on Rs. 100/- non judicial stamp paper duly notarized and signed by the respective authorized representatives clearly stating the terms & conditions of the MoU. Such MOU should be valid till the project completion period (i.e. completion of O&M period) and it shall not be amended or modified without prior consent from the department during the period of performance of contract; the department shall not allow such change. Also, the MoU between the technology supplier / provider/ contractor shall be made part of the bid and contract. The contractor and technology supplier / provider shall be jointly and severally responsible for the performance of the plant. The process design & drawings shall be vetted and signed by the technology supplier / provider also.

e) In case a technology provider is not required for the proposed technology, the bidder shall fulfill the conditions mentioned in clause above in support of the track record of providing the technology on their own, and also submit CVs/ Credentials of the designer for the proposed STP works.

f) Experience for minimum quantities mentioned above relating to the works executed in the central / any state govt./UT/PSUs/ Municipalities shall be considered only if certified by an officer not below the rank of Executive Engineer and countersigned by an officer not below the rank of Superintending Engineer.

Note: Proportionate Quantities will be considered at the time of evaluation

The bidder should enclose experience certificates in support of technical criteria / requirement issued by the Engineer – In - charge of the State / Central Government departments / Undertakings, not below the rank of Executive Engineer or Equivalent and countersigned by the next higher authority not below the rank of Superintending Engineer or equivalent

	C. Financial Requirement 1) The bidder as a prime contractor should have Satisfactorily Completed Similar Nature of Works of value not less than Rs.1353.30 in any one financial year during the last ten financial years ending with 2016-17. The value will be update by giving 10% simple weight age per year to bring them to 2017-18 price level. 2) The bidder should produce liquid asset / credit facilities / Solvency certificate from any Indian Nationalized / Scheduled Banks of value not less than Rs. 676.65 3) The bidder's average net worth for the last 3 financial years shall not be less than Rs. 1353.30 Lakhs In this regard certificate issued by Chartered Accountant in the current financial year shall be uploaded by the bidder. 4) The bidder who has applied for/ availed "Corporate Debt Restructuring" (CDR) or " Strategic Debt Restructuring" (SDR) in the last Five (5) financial years are not eligible to participate in the bid. In regards to this clause, a certificate issued by the Chartered Accountant in the current financial year shall be uploaded by the bidder. 5) Bids from Joint Ventures not allowed. 6) The Assessed available Bid capacity as per formula (2AN-B) should be greater than internal Bench mark value assessed by the Department. Where, A= Maximum Value of Civil Engineering works executed in any one financial year during the last ten financial years (updated 2017-18 price level) taking into account the completed as well as works in progress. N= Number of years prescribed for completion of the works for which tenders are invited. B= Value of existing commitments and ongoing works to be completed during the period of completion of the project for which tenders are invited. 7) The bidder should furnish the availability (either owned or leased) of following key and critical equipment required for the work. a. Pipe layer – 2 Nos. b. JCB / Hitachi - 1 Nos. c. Mini Excavator for trenching – 2 Nos. d. Vibrators – 2 Nos. e. Pan Vibrators – 2 Nos. f. Water Tanker – 1 Nos. g. Trucks/Tractor / Tippers – 2 Nos. h. Concrete Hopper miller – 2 Nos. i. Mini Smooth wheeled Roller (3 to 5 T) – 1 Nos. k. Pneumatic Pumps for Hydro test – 2 Nos. l. Hydraulic Testing Equipment for pipes – 1 Nos. 8) The bidder should furnish the availability of following key personnel as per bid document
	General Terms & Conditions :
	1. The details and certificates are to be furnished as per the pro-forma available in the tender schedules.
	2. The bidder should have the key and critical equipment (either owned or leased as mentioned in the tender document).
	3. The bidder is subjected to be disqualified and liable for black listing and forfeiture of EMD, if he is found to have misled or furnished false information in the forms statements / certificates submitted in proof of qualification requirements.
	4. Even while execution of the work, if found that the contractor had produced false / fake certificates of experience he will be liable for black listing and the contract will be liable for termination and liable for forfeiture of EMD and all the amounts due to him.
	5. Bidders shall submit a declaration without any reservation what so ever that the submitted eligibility and qualification details, technical and financial bid are without any deviations and are strictly in conformity with the documents issued by the employer.
	6. Declaration should be given for the credentials submitted by the bidder.

	7. The employer reserves the right to relax the conditions and required for eligibility of the bidders in the public interest. The Bidder(s) shall not have any right to question the decision taken by the employer in this regard.
	8. The bidder(s) shall submit a written power of attorney authorizing the signatory of the bid to commit for the bidder.
	9. The bidder should furnish the Income Tax Pan and submission of latest Income Tax return along with proof of receipt.
	10. GST will be adopted time to time as per instructions of Government of Andhra Pradesh and IBM will be modified.
	11. The bidder should furnish the Govt. of AP GST/VAT Registration Certificate and Latest Govt. of AP GST/VAT Clearance certificate.
	Special Conditions :
	1) Tenders with an excess of more than **5%** over the internal benchmark value arrived by the department shall be summarily rejected.
	2) In respect of tenders beyond 25% less than internal benchmark arrived by the department, a Bank Guarantee or Demand Draft for the difference between the tendered amount and 75% of internal benchmark value should be furnished at the time of agreement as additional security deposit.
	3) Government reserves the right to cancel/alter the bid conditions at any time.

III) Procedure for Submission of Bids:-

a) Intending bidders can contact office of the Managing Director, Greater Visakhapatnam Municipal Corporation. for any clarifications, information on any working day during working hours.

b) The bidder would be required to register on the e-procurement market place www.eprocurement.gov.in or https://tender.ap.eprocurement.gov.in and submit their bids online. The department will not accept any bid submitted in the paper form. Bidders are requested to submit the bid in two stages
Stage – I : Eligibility and Technical Bid Stage
Stage – II : Financial Bid Stage

c) The first stage will cover the qualifications eligibility details and the technical bid. The bidder shall upload documents in support of the above. The bidder shall submit price bid online under second stage which may include proposals for financing to cover part of the scope of the work as per bid documents before the bid submission closing date.

d) The detail procedure for bid submission is described in the bid documents

e) Bidders shall submit a declaration without any reservation whatsoever that the submitted eligibility and qualification details, Techno-Commercial bid and financial bid are without any deviations and are strictly in conformity with the documents issued by the Employer.

f) Declaration should be given by the bidder for the correctness of the credentials submitted by him.

g) The Bidders shall sign on the documents (such as EMD, transaction fee payable at APTS uploaded by him, owing responsibility for their correctness/authenticity. The documents without signature of the bidder will be considered as invalid documents and the same will not be considered in evaluation of the bid.

1. For registration and online bid submission bidders may contact HELPDESK of M/s. APTS Ltd, Hyderabad, on https://tender.apeprocurement.gov.in

i).Submission of Hard copies The following orders are applicable as per G.O. Ms. No.174, I & CAD (PW Reforms) Dept., Dt : 01-09-2008.

i. Submission of original hard copies of the uploaded scan copies of BG towards EMD by participating bidders to the tender inviting authority before opening of the price bid is dispensed forthwith.

ii. All the bidders shall invariably upload the scanned copies of BG in the e-procurement system and this will be the primary requirement to consider the bid as responsive.

iii. The department will carry out the technical bid evaluation solely based on the uploaded certificates / documents, BG towards EMD in the e-procurement system and open the price bids of the responsive bidders after approval from the competent authority as per rules in force.

iv. The Department will notify the successful bidder for submission of original hard copies of all uploaded documents, BG towards EMD prior to entering into agreement.

v. The successful bidder shall invariably furnish the original BG certificates / documents of the uploaded scanned copies to the tender Inviting Authority before entering into agreement either personally or through courier or post and the receipt of the same with in the stipulated date shall be the responsibility of the successful bidder. The department will not take any responsibility for any delay in receipt/non-receipt of original BG towards EMD, certificates / Documents, from the successful bidder before the stipulated time. On receipt of the documents, the Department will ensure the genuinity of the BG towards EMD and all other certificates/documents uploaded by the bidder in e-procurement system in support of the qualification criteria before concluding the agreement.

vi. If any successful bidder fails to submit the original hard copies of the uploaded certificates / Documents, BG towards EMD with in the stipulated time or if any variation is noticed between the uploaded documents and the hard copies submitted by the bidder, the successful bidder will be suspended from participating in the tender on e-procurement platform for a period of 3 (three) years. The e-procurement system would de-active the use ID of such defaulting successful bidder based on the trigger/recommendation by the Tender Inviting Authority in the system. Besides this, the department shall invoke all processes of law including criminal prosecution of such defaulting bidder as an act of extreme deterrence to avoid delay in the tender process for execution of all development schemes taken up by the Government. The information to this extent will be displayed in the e-procurement platform website.

vii. As per G.O.Ms.No.8 of IT, Electronics & Communication Dept., Dt.08-05-2016 EMD should be paid through online / BG in favour of Managing Director, Greater Visakhapatnam Smart City Corporation Limited only.

j. Deactivation of Bidders:

The bidder (L1) found defaulting in submission of hard copies of original BG for EMD /Transaction fee to the Tender Inviting Authority on or before the tender stipulated time before concluding the agreement will be suspended / disqualified from participating in tenders on eProcurement platform for a period of 12 months from date of bid submission as per G.O Ms No 245 I&CAD Dept. dated 30-12-2005 and GO Ms No 155 I&CAD Dept. dated 23-08-2006 besides forfeiture of EMD. Other conditions as per tender document are applicable.

k. Payment Of Transaction Fee and EMD:

It is mandatory for all the participating bidders to pay electronically the Transaction fee to M/s APTS Ltd, Hyderabad, through "Payment Gateway Service on E-Procurement platform". The Electronic Payment Gateway accepts all Master and Visa cards issued by any bank and Direct Debit facility / Net Banking of ICICI Bank, HDFC to facilitate the transaction. This is in compliance as per G.O Ms No 13 IT & C Dept, dated 5-7-2006. A service tax of 15 % + Bank Charges for Credit Card Transaction of 1.85% on the transaction Amount payable to APTS Shall be applicable.

l. Tender Document:

The bidder is requested to download the tender document and read all the terms and conditions mentioned in the tender Document and seek clarification if in doubt from the Tender Inviting Authority. Any offline bid submission clause in the tender document shall not be considered.

The bidder has to keep track of any changes by viewing the addendum / Corrigendum's issued by the Tender Inviting Authority on time-to- time basis in the E-Procurement platform. The Department calling for tenders shall not be responsible for any claims/problems arising out of this.

2. Bid Submission Acknowledgement:

The user should complete all the processes and steps required for bid submission. The successful bid submission can be ascertained once acknowledgement is given by the system through bid submission number after completing all the process and steps. GoAP and M/s. APTS is not responsible for incomplete bid submission by users. Users may also note that the incomplete bids will not be saved by the system and are not available for the Tender Inviting Authority for processing.

3. Scope of The Project:

3.1 The scope of work includes Design, Construction, Testing, Commissioning and Operation & Maintenance of sewerage network and house sewer connections including retrofitting of pumping stations at Pandurangapuram, Shantiashram and Town kotta road and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP for Visakhapatnam Municipal Corporation" under Smart City Mission.

3.2 Appropriate state of the art construction procedure & technologies shall be adopted for providing Sewerage system and various alternatives shall be explored for providing best possible solutions at every stage of construction of the MH, pipe laying, , approaches, crossing etc., and the proposed sewer network shall be compatible with existing system and necessary interconnection should be done in order to make it compatible with the proposed system.

3.3 Design Features of the Proposed Sewerage system

3.3.1 The Bidder shall conduct Topographic survey and establish Permanent Bench Marks at regular intervals with reference to GTS/DGPS in order to execute the work. The EPC Agency shall submit the Designs and Drawings duly taking into account & compatible with the existing sewerage system.

3.3.2 After approval of the Drawings and Designs by the competent authority, the EPC Agency shall submit detailed estimate along with BoQs based on the approved drawings which will be approved by the Engineer-Incharge based on which the execution shall be done. As per the provisions of EPC system, this shall form the basis of payment within the overall % break up mentioned in the document.

The project shall be executed, completed and commissioned within the period of completion including 2 years Defects Liability period (DLP) after completion of construction and commissioning of the project, in compliance with the key Performance Indicators specified.

3.3.3 The bidder shall conduct survey for each door to door to access the requirements of HSCs , to be provided where ever the existing distribution network available and also on the proposed distribution network as per the nodal plan and designs and as per direction of departmental Engineer- in-charge including Geo-Tagging. He shall also identify the unauthorized connections and report the same to the ULB.

3.3.4 It shall be expressly understood by the EPC Agency that the Drawings and details appended at the time of bidding are only indicative but not exhaustive

4.0 Deliverables of the Scheme:

	4.1.0: The bidder should conduct ETS Survey, Investigate, design, execution, Commissioning of Sewerage network including house sewer Connections for both the ABD area and Jalaripeta of Greater Visakhapatnam Municipal Corporation with the following parameters : ABD area: • Population as per 2011 Census : 65,532 • Base year to be taken as 2018 • The Prospective Population (2033) – 78,091 • The ultimate population (2048) – 83,623 Jalaripeta: • Population as per 2011 Census : 20,651 • Base year to be taken as 2018 • The ultimate population (2048) – 37,982 The bidder has to do ETS Survey, Investigation, Design, Build, Commissioning, operation and maintenance of the entire system including Defect Liability Period of 2 years. 4.1.2: The bidder should design the sewer network as per CPHEEO manual and relevant IS codes using standard software packages for network modeling and designs. 4.1.3: The designs and plans (L-sections as well as layout plan) of all the components under the above scheme, shall indicate all the salient features such as details of ground levels, HGL, invert levels of the pipes, size and material of the pipes. These shall be prepared and got approved by the Engineer-In charge 4.1.4: The Sewer network shall be designed for ultimate requirement for the 2048 as per CPHEEO manual and relevant IS codes 4.1.5: The entire scheme should be completed and commissioned in 24 months. Sewerage Network: 4.1.6: The bidder should conduct ETS Survey, Investigate, design, execution, Commissioning of Sewerage network including house sewer Connections for both the ABD area and Jalaripeta of Greater Visakhapatnam the guidelines as specified in the CPHEEO/ manuals shall be followed while designing the sewerage network	The EPC Agency shall conduct detailed investigation and come up with detailed designs and Drawings which shall be approved by the Engineer-Incharge within the overall objectives of the scheme. The designs and drawings shall be done using state of the art software for Civil, Structural and Hydraulic engineering and the best practices shall be followed in compatible with BIS/ CPHEEO/ GoI Directives/ NEC/ ISO etc. If there is any conflict of specifications, the competent authorities' decision shall be final and binding on the EPC Agency.

	with all necessary valves in place as per standards. House Sewer Connections: 4.1.7: The bidder should carry out detailed survey of entire ABD area under Greater Visakhapatnam Municipal Corporation area for identifying House Holds not having house sewer connection to the existing network. The contractor shall submit the details to GVMC. The bidder shall connect house connections to the proposed Sewer network Contractor shall disconnect the old house sewerage connection once the proposed sewer network becomes operational. Auxiliary items: 4.1.8: Road Restoration of trenches should be provided with M30 Design mix (Minimum Cement Content not less than 380 Kgs) concrete over crusher dust cushion as per department designs wherever necessary. All the surplus excavated earth of each item is to be conveyed and leveled as directed by the Engineer in charge. 4.1.9: All Railway Crossings, R&B, NH & NHAI Road crossings by trench less technology as per the departmental specifications and approved drawings with suitable size casing pipe and carrying pipe as per approved drawings. 4.1.10:The bidder should hand over scheme after successful completion of work in consultation with Engineer – in – Charge and as per directions of the department with detailed summary of Completed work &as built drawings. 4.1.11: All Statutory charges payable to line Departments like Railways, APTRANSCO, R&B, NH & NHAI will be borne by the department except electrical inspectorate Charges. All approvals required for execution of work shall be taken up by contractor. 4.1.12: The bidder has to make arrangements for traffic Management & Safety Management during the execution as required.	
4.2	Design, Procurement, Laying, Joining, testing and commissioning of various sizes of SN-8DWC HDPE, including necessary barricading and hording at work site, including CC / BT, WBM road cutting, earth work, refilling the trenches after laying, jointing and testing, road restoration. All necessary works for integration of the existing Sewer network with the new system as per design requirement are to be carried out. Road restoration should be provided with cement concrete M30 grade concrete,crusher dust bedding shall be provided as per	

	approved drawings. DI K7 with high alumina cement (HAC) lining 400mm dia — Not less than 177 m 500 mm dia — Not less than 420 m 600 mm dia — Not less than 399 m DWC HDPE SN 8 150 mm dia — Not less than 8466m 170 mm dia — Not less than 4173 m 200 mm dia — Not less than 2130m 250 mm dia — Not less than 289m 300 mm dia — Not less than 445 m 400 mm dia — Not less than 601m Note: The above lengths/ diameters are only indicative and are subject to change depending on the detailed designs and drawings to be approved by the competent authority but within the overall percentage break-up mentioned in the document and the BoQs to be submitted by the EPC Agency based on approved designs.	
4.3	Construction of Circular manhole chambers of different dia constructed with Fly ash Bricks (in CSSR Bldgs 2017-18) as per Drawings for required Depth including Earth work excavation in any type of soils , in which M7.5Cement Concrete using 40mm size Hard Granite Metal from approved Quarry Machine Mixing, laying to a thickness of 150mm and Brick Masonry with Cement Mortar 1:4 as per given design and thickness to the required height and top for 560mm dia., with a slope of 30mm to 50mm in the channel along with sewer line over the M7.5 Mix Concrete with Cement Concrete M15 mix using 12mm size Hard Granite metal machine crushed as per Departmental drawings, Plastering with S.R. Cement Mortar 1:3 20mm thick to inside of the Circular Man Hole and 12mm thick to the outer side chamber supply and fixing of Pre cast VRCC M30 Concrete Man holes including cost and conveyance of all materials for civil works, laying bedblock cover slab with RCC M20 grade design mix using sulfate resistant cement for all cement works, including cost and fabrication of steel, cost and conveyance and fixing of fiber reinforced manhole covers and frames of EHD 35 with clear opening of 560mm dia. as per IS 12592 part-I and II, cost, conveyance and fixing of encapsulated iron steps as per specifications, benching, channeling, finishing smooth with a coat of cement, refilling with excavated earth (other than stones, boulders, other decomposable materials which does not allow proper consolidation) complying with the standard specification for filling the foundations using required quantity of water for proper consolidation and rolling with handroller, all labour charge, disposal of surplus, bailing of water etc., complete as directed by the engineer incharge.	
	900mm dia. with required depths	Not less than 293 Nos.

	1200 mm dia. with required depths	Not less than 249Nos.
	1500 mm dia. with required depths	Not less than 94Nos.
4.4	Design, Procurement, Laying, Joining, testing of 110mm dia(House sewer connection) UPVC 4 Kg/Sqcm and 6 kg/cm2 including cost and conveyance and labour charges complete with necessary fittings, BT/CC road Cutting, Earth Work for Laying Pipeline in Road Crossings, laying and Jointing of Pipeline	Not less than 3017 Nos House sewer connections using 110mm dia-Not less than23952m160mmdia-Not less than 6074m
	Supply and erection of Sensors with power supply for monitoring of flood level in the manhole of sewerage system for jalaripeta and ABD sewer network	Not less than 45 nos.
4.5	Road Restoration All the trenches shall be properly restored as per IRC/MoRTH specifications and the quantities given under are only indicative but not exhaustive. The detailed drawings shall be submitted by the EPC Agency which will be approved by the competent authority based on which the quantities have to be arrived and they shall be in conformity with the IRC/MoRTH Specifications but within the overall percentage breakup mentioned in the document and the following quantities are only indicative but not exhaustive. Not less than 4289 Cum Crusher dust filling 200mm thick Not less than 3217 Cum M30 grade concrete 150mm thick	
4.6	a)Supply and delivery of Submersible pumps(energy efficiency) with cable pipe , suction and discharge pipes , fittings, installation ,laying ,jointing fixing of electromechanical components including replacement of existing pipes and pumps with labor charges . 21kw pump at@53lps and 20 meter head-2 No's 42kw pump at@125lps and 20 meter head-2 No's 125kw pump at@313 lps and 20 meter head-1 No's b)Mechanical coarse screen of 1.2mx1.5mx0.5m c) Supply ,delivery ,laying termination of single core copper flexible cable from junction box to starter panel including pvc pipe of 16 sq mm-120m and 70sq mm-30m length d) Control panels suitable for the above pumps-3No's	For 9 MLD sewage pumping station@ pandurangapuram
4.7	Supply and delivery of Submersible pumps(energy efficiency) with cable pipe , suction and discharge pipes , fittings, installation ,laying ,jointing fixing of electromechanical components including replacement of existing pipes and pumps with labor charges . a)28kw pump at@112 lps and 15 meter head-2 No's 55kw pump at@222lps and 15 meter head-2 No's 55kw pump at@556 lps and 15 meter head-1 No's b) Supply of DG set 320KVA outdoor c) Supply ,delivery ,laying termination of single core copper flexible cable from junction box to starter panel including pvc pipe of 16 sq mm-120m and 95sq mm-30m length d) Control panels suitable for the above pumps-3No's	For 16 MLD sewage pumping station@Shanti ashram

4.8	Supply and delivery of Submersible pumps(energy efficiency) with cable pipe , suction and discharge pipes , fittings, installation ,laying ,jointing fixing of electromechanical components including replacement of existing pipes and pumps with labor charges . a)57kw pump at@264 lps and 15meter head-2 No's 114kw pump at@528ps and 15 meter head-2 No's 290kw pump at@660 lps and 14 meter head-1 No's b)Mechanical coarse screen of 1.5mx1.5mx0.8m c) Supply ,delivery ,laying termination of single core copper flexible cable from junction box to starter panel including pvc pipe of 16 sq mm-120m and 95sq mm-30m length d) Control panels suitable for the above pumps-3No's	For 38 MLD sewage pumping station @Town kotta road
4.9	Complete SCADA system for monitoring and controlling the pumping stations 9mld,16 mld and 38 mld	3 No's
	Upgradartion of STP- 38 MLD	
	Upgradation of 38 MLD STP by Designing, constructing, hydraulic testing, commissioning and giving satisfactorily trials of 38 MLD STP of suitable components as per technology requirements to treat Sewage and can be accommodated in existing available land with suitable Treatment Units as per the CPHEEO guidelines and CPCB norms relevant IS codes etc. necessary piping work with required valves, gates, Laboratory Equipment, complete as turnkey job with all involved additional Civil, electrical, Instrumentation and mechanical works as per detailed specifications to achieve the effluent discharge standards: pH 6.5 - 8.5, BOD < 10mg/lit, COD < 50mg/lit, TSS < 10mg/lit, TN < 10mg/lit, TP < 2mg/lit, NH4N < 5mg/lit, FC < 100 MPN / 100 ml to get recyclable quality of water for Industrial/ agricultural purposes. The Coagulant Dosing System shall be provided as an optional/ backup. The plant should be completely automated with PLC controlled SCADA operating system with sensors, probes to measure BOD,COD,TSS,PH and ammonia at inlet an outlet, TSS meter, portable D.O meter, main control cabinet and communication module including determining quantitative and qualitative parameters of influent and effluent etc., complete Designing, providing and constructing administrative building, office cum laboratory including stores.	

4.10	Supply of Dia. 63mmx1000mm Silicon Fine Bubble Tubular Diffusers with SS Nipple of Model SFT-100-SILICON in the Aeration Tank(60mx42.5mx5m) 2800 -Nos	38 MLD STP
4.11	Supply of Twin Lobe Air Blower with All Accessories of 5750 cum/hr,0.6 kg/cm2(Without Motor). 6 -Nos	38 MLD STP
4.12	Supply of Motors of 180 HP /1440 RPM for Twinlobe Blower 6 -Nos	38 MLD STP
	Supply of Bio-Swirl media for two Aeration tanks (60mx42.5mx5m)-440cum	38 MLD STP
4.13	Supply of Grit Removal System to suit tank size of 6.5 M x 6.5 M x 0.9 M SWD + 0.5 M FB all parts in SS 316 with 400mm dia Screw classifier with Electro Mechanical Overload alarm assembly,1.5 KW geared motor and chain drive with chain guard for grits collection mechanism,Grits washing 400 mm Ø Screw Classifier mechanism in SS316 Screw construction with 1.5 KW geared motor complete and Organic Return Pump with SS316 Shaft and Impeller & 0.75 KW motor. 2-Nos	38 MLD STP
4.14	Designing, providing & constructing in RCC (M-30) Anoxic tanks(29.10mx18.55mx5.5m) with central partition wall-1-No	38 MLD STP
4.15	Supply of 7.5 HP Trition Process Mixer for Anoxic Tank 6-Nos	38 MLD STP
4.16	Supply of Recirculation pumps from Aeration to Anoxic tank 6-Nos	38 MLD STP
4.17	Designing, providing Disc filter and associate civil structure .as per specifications1-No	38 MLD STP
4.18	Supply of Centrifuge for average flow (38 MLD) 1-No	38 MLD STP
4.19	Supply of RAS (return sludge) non clog horizontal centrifugal pumps of 500 cum/hr and 10m head 2-Nos	38 MLD STP
4.20	Supply of Agitator in the sludge sump 2-Nos	38 MLD STP
4.21	Supply of Centrifuge feed pump capacity (12 cum/hr)with motor 7.5 HP and operating pressure of 1.5 bar 2-Nos	38 MLD STP
4.22	Supply of motor for Centrifuge with VFD and 18.5 KW motor 2-Nos	38 MLD STP
4.23	Supply of Open channel flow meter Ultrasonic)with transmitter flow sensor for 19 MLD flow 2-Nos	38 MLD STP

4.24	Supply of Chlorinator with chlorine dosing of 5 ppm with Vacuum type wall Mounted chlorinator 10 Kg/hr consists of vacuum regulator control valve assembly, flow meter assembly, Water/Chlorine Pressure gauges, ejector assembly with mixing chamber all Wall mounting accessories, annealed copper coil 2 mtr long with end fitting cylinder/tonner Key 1 No. Ammonia Solution Ammonia Tourch 1 No including booster pumps of 10cum/hr, chlorine detector, Tonner, supervision and installation 1 -Job	38 MLD STP
4.25	Providing PLC scada system ,instrumentation and Miscellaneous works (Cleaning, Repair and overhauling of electromechanical units) 1 -Job	38 MLD STP
4.26	Supply of DG set 630KVA outdoor	38 MLD STP
4.27	Lab equipment for Treatment plant	38 MLD STP
4.28	Supply ,testing and commissioning of Drive control panel (185 KW-VFD)with 630 amps Capacity for Air blowers	38 MLD STP
4.29	Supply delivery and termination of common 11kv, 630A, 25KA VCB at 38 MLD 1000kVA and 750kVA transformers	38 MLD STP
4.30	Supply of 300 sq mm 3.5 core aluminum armoured cable	38 MLD STP
	Upgradartion of STP- 25 MLD	
	Retrofitting of 25 MLD STP by Designing, constructing, hydraulic testing, commissioning and giving satisfactorily trials of 25 MLD STP of suitable components as per technology requirements to treat Sewage and can be accommodated in existing available land with suitable Treatment Units as per the CPHEEO guidelines and CPCB norms and relevant IS codes etc. necessary piping work with required valves, gates, Laboratory Equipment, complete as turnkey job with all involved additional Civil, electrical, Instrumentation and mechanical works as per detailed specifications to achieve the effluent discharge standards: pH 6.5 - 8.5, BOD < 10mg/lit, COD < 50mg/lit, TSS < 10mg/lit, TN < 10mg/lit, TP < 2mg/lit, NH4N < 5mg/lit, FC < 100 MPN / 100 ml to get recyclable quality of water for Industrial/ agricultural purposes. The Coagulant Dosing System shall be provided as an optional/ backup. The plant should be completely automated with PLC controlled SCADA operating system with sensors, probes to measure BOD,COD,TSS,PH and ammonia at inlet an outlet, TSS meter, portable D.O meter, main control cabinet and communication module determining quantitative and qualitative parameters of influent and effluent etc., complete Designing, providing and	

	constructing administrative building, office cum laboratory including stores.	
4.31	Manufacture, supply & delivery of Centrifugally cast (spun) Ductile Iron pressure pipes for sewage with Double G Flanged ends confirming to I.S.: 8329/2000 in standard working lengths of 5 meters and 1000mm dia. for classification K-9 suitable for Flanged Joints,bends with (HAC) cement mortar lining inside the pipes with outside Zinc coating. Rates are including Transportation and ST , civil and mechanical cost etc,. complete.: 1-No	25 MLD STP
4.32	Supply of surface jet Aerator units to supply SOR @ 40 kg/hr and 1.8 KgO2/KWH : 8-Nos	25 MLD STP
4.33	Grit removal system to be provided in collection mechanism by converting it into fixed half bridge with centre mechanism fitted with centre cage and rake arm. - Additional supporting pillars to support mechanism - 2 nos of Screw classifier with SS 316 of minimum 400mm dia - 2 nos of Organic Return pump - Collection bin of 1000 Ltr :1-No.	25 MLD STP
	Designing, providing & constructing in RCC (M-30) Anoxic tanks(23mx23mx4.5m) with central partition wall-1-No	25 MLD STP
	Supply of 7.5 HP Trition Process Mixer for Anoxic Tank 4-Nos	25 MLD STP
	Supply of Recirculation pumps from Aeration to Anoxic tank 4-Nos	25 MLD STP
	Designing, providing Disc filter and associate civil structure .as per specifications 1-No	25 MLD STP
	Design and Construction cost of Filter press building as per specifications 1-No	25 MLD STP
4.34	Sludge Dewatering Unit:Combi unit of Belt thickener with Belt Filter press To suit the sludge flow rate of 30 M3/ hr capacity with Belt Filter Press, allied accessories, Poly preparation and dosing unit. - Complete automated : 1-No.	25 MLD STP
4.35	Supply of RAS (return sludge) non clog horizontal centrifugal pumps of 500 cum/hr and 10m head: 1-No.	25 MLD STP
4.36	Supply of Chlorinator with chlorine dosing of 5 ppm with Vacuum type wall Mounted chlorinator 10 Kg/hr consists of vacuum regulator control valve assembly, flow meter assembly, Water/Chlorine Pressure gauges, ejector assembly with mixing chamber all Wall mounting accessories, annealed copper coil 2 mtr long with end fitting cylinder/tonner Key 1 No. Ammonia Solution Ammonia Tourch 1 No including booster pumps of 10cum/hr, chlorine detector, Tonner, super vision and installation 1-Job	25 MLD STP

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>4.37</td><td>Civil structural modification for revamping of existing Collection mechanism to Grit removal system
1-Job</td><td>25 MLD STP</td></tr>
<tr><td>4.38</td><td>Providing PLC scada system ,instrumentation and Miscellaneous works (Cleaning, Repair and overhauling of electromechanical units)
1 -Job</td><td>25 MLD STP</td></tr>
<tr><td>4.39</td><td>Supply of DG set 500KV and 500kv transformer</td><td>25 MLD STP</td></tr>
<tr><td>4.40</td><td>Lab equipment for Treatment plant</td><td>25 MLD STP</td></tr>
<tr><td>4.41</td><td>Supply and delivery of Vehicles for Operation and maintenance of sewerage system (Capital work)
<table>
<tr><td>Supply and delivery high pressure jet cleaner (Muljet Min 14 lpm)</td><td>1No</td></tr>
<tr><td>Supply and delivery of Jetting cum Suction machine(9000lit capacity)</td><td>1No</td></tr>
<tr><td>Supply and delivery of Jet Rodding machine- 6000lit capacity</td><td>1No</td></tr>
<tr><td>Supply and delivery of De-Silting machine mounted on 3 wheeler auto</td><td>2No.s</td></tr>
<tr><td>Supply and delivery of rodding machine-100 rods</td><td>1No</td></tr>
</table></td><td></td></tr>
<tr><td>4.42</td><td>Operation and maintenance of sewerage system i.e manpower supply, repairs and maintenance of electro mechanical equipment and oils and repairs of vehicles etc for 7 years (excluding power charges &oils for DG sets)</td><td>9mld,16mld 38 mld pumping stations, ABD area sewer network and 25 mld,38 MLD STPs</td></tr>
</table>

The above items/quantities are only "indicative" and it shall be expressly understood that the EPC agency shall furnish the detailed BoQ & Estimate based on approved designs and drawings as per provisions of the bid document/CPHEEO/BIS standards which shall form the basis of detailed % breakup of payment schedule within the overall component limits approved by EPC Committee-I and variations if any will be dealt with as per EPC guidelines mentioned.

The Internal Bench Mark of the above scope of work and deliverables shall be Rs 5413.19 Lakhs

5.0 The EPC Contractor to abide the following conditions:

5.1 The "Employer" is the Managing Director, Greater Visakhapatnam Smart City Corporation Limited i.e., the Agreement Concluding authority. "Engineer in Charge" is the "Executive Engineer" in charge of execution in terms of G.O. Ms.No.50 I&CAD, dt.02-03-2009.

5.2 Entrustment of the additional items contingent to the main work and within the scope of contract will be authorized by the "Employer" and the EPC agency shall be bound to execute such additional items at no extra cost to the employer and the cost of such items shall be deemed to have been included in the contract price quoted.

5.3 Entrustment of additional items of work contingent to main work and outside the scope of contract will be authorized by the employer with the prior approval of EPC- Committee: III in terms of GO Ms.217 MA&UD Dept. dt.11-11-2014.

5.4 In such cases where the approved designs result in "Substantial Reduction" in quantities of that component from the estimated quantities, the payment schedule will be adjusted to the actual quantities. Payment schedule will remain unchanged in case of increase in the quantities in a component as per Govt. Memo No.28569/M&MI (T-IV)/ 2012-1 dt. 20-12-2012 of Irrigation & CAD (PW) Dept.

5.5 The Competent authority for approval of designs is the Chief Engineer, GVMC or any other authority as specified by Government in terms of G.O.Ms.No.50, I&CAD dt.02-03-2009.

5.6 The EPC Agency shall carry out investigation, detailed layout, designs and drawings of all components of the work to be approved by competent departmental authority. The EPC Agency shall follow all the relevant CPHEEO manuals/BIS/GoI manuals/advisories etc. issued from time to time for various components of works. The EPC Agency shall furnish “detailed estimate” with BoQs prepared based on approved designs and drawings by competent authority as per G.O.Ms.No.50 I&CAD dt.02.03-2009.

5.7 The O&M of the work includes all the establishment costs including their statutory benefits, Machinery for O&M, Tools and Plant, manpower, Safety equipment, Repairs and maintenance of vehicles and the KPIs in the Water Supply System will be

closely monitored through the Citizen Charter complaint cell of the ULB and penalties will be levied accordingly for non-compliance of the KPIs as indicated in the table below.

5.8 The Internal Benchmark (IBM) of the scope of work and deliverables is arrived (Excluding reimbursable items) based on SoR of 2017-18 with Cement @ Rs.3882/- MT and Steel-Fe-415 @ Rs.32,100/- MT, Pig Iron Rs. 28,000/- per MT as on Oct 2017.

6.0Key Performance Indicators & Penalties

The contractor/EPC agency shall be subject to the following penalties for failure to carry out its operations as indicated below during "**O&M Period**" (7 years). The Key Performance Indicators (KPIs) are given in Annexure F Part III Performance Indicators. The KPIs will be monitored through the SCADA reports/ Citizen Charter of Greater Visakhapatnam Municipal Corporation and accordingly the EPC agency will be penalized for not complying with the KPIs. The O&M payments shall be derived based on the KPI achieved by Contractor as per Annexure F Part II & III.

Note: For all the Complaints, rectifications etc, the SCADA Report, citizen charter or on line complaint redressal System will be the basis for levying the penalties and also those observed and recorded by the Officers concerned.

7.0. PAYMENT SCHEDULE

Payment Schedule to be approved by EPC Committee:

(Percentage breakup of Components with respect to "IBM Value")

S. No	Description of Item	% of IBM Value
1	Survey, investigation and preparation of Designs, Drawings and reports of Sewerage System for Network ,House Sewer Connections, up gradation of STPs and replacement of	0.3%
2	Laying of Sewerage network in Jalaripeta and lifting station	11.1%
3	Laying of Sewerage network for the gap portions in ABD area	7.8%

4	Replacement of Sewerage gravity line from Durgalamma temple to the existing 38 MLD STP at Town Kotta Road.	2.5%
5	Replacement of pumps ,panel boards,cables etc to the 9 MLD Sewerage pumping station @pandurangapuram including scada system	2.1%
6	Replacement of pumps ,panel boards, cables etc to the 16 MLD Sewerage pumping station @ShanthiAshramam including scada system	2.6%
7	Replacement of pumps ,panel boards,cables etc to the 38 MLD Sewerage pumping station @ Town kotha road including scada system	3.4%
8	Upgradation of the existing 25MLD capacity sewerage treatment plant (STP) at Appughar as per CPCB norms including scada system	18.6%
9	Upgradation of the existing 38 MLD capacity sewerage treatment plant (STP)at Town kotta road as per CPCB norms including scada system	24.7%
10	Supply of vehicles for sewerage network maintenance in ABD area	2.1%
11	Operation and maintenance cost for 7 years including 2 years defect liability period for Manpower supply	14.72%
11a	1st year .. 11.91%	
11b	2nd year .. 12.63%	
11c	3rd year .. 13.39%	
11d	4 th year .. 14.19%	
11e	5 th year .. 15.04%	
11f	6 th year .. 15.94 %	
11g	7 th year .. 16.9%	
12	Operation and maintenance cost for 7 years including 2 years defect liability period for Electro mechanical and vehicles (excluding power charges and oils for DG sets)	10.07%
12a	1st year .. 11.91%	
12b	2nd year .. 12.63%	
12c	3rd year .. 13.39%	
11d	4 th year .. 14.19%	
11e	5 th year .. 15.04%	

11f	6 th year .. 15.94 %	
11g	7 th year .. 16.9%	

Note: The EPC agency shall furnish the detailed estimates, BoQs based on approved drawings as per provisions of the Deliverables. The above payment schedule can be sub divided into various sub-components with appropriate percentage break up as per the estimate & BoQs approved by the Dept. authorities but within the overall percentage break up of each component as approved by EPC Committee-I.

BIDDING DOCUMENT -VOLUME 1

SECTION	DESCRIPTION	PAGE NOS.
SECTION I:	Instruction to Bidders	
SECTION II:	General Conditions of Contract	
SECTION III:	Special Conditions Of the Contract	

Name of Work: Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram,Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP ofGreater Visakhapatnam Municipal Corporation" under Smart City Mission.

VOLUME – I

Section – 1 - Instruction to Bidders :

1. **Description of the Work:** Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram, Shantiashramam and Town kotta road and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP of Greater Visakhapatnam Municipal Corporation" under Smart City Mission"

2. **Source of funds**

Expenditure of this project will be met from Smart City Mission Funds.

Period of Completion :24 Months(inclusive of Monsoon Period)

3. **The eligibility criteria for the above EPC Tender is as follows:**

a. Civil Contractors/ Contracting firm having registration with Government of Andhra Pradesh in appropriate eligible class as per the G.O.Ms.No.94, I & CAD (PW-COD) Dept., Dt:01.07.2003 or equivalent registration from state/central government departments/undertakings are only eligible.

b. The bids are limited to those individuals, firms, companies, who meet the following qualification and the eligibility requirements.

B) Technical Requirements :

The Bidder should have executed the following minimum Quantities in any one financial year during the last ten Financial Years ending with 31-03-2017.

1. Should have completed minimum of 4275 RMT length of sewerage Pipe lines with 150mm diameter and above
2. The bidder must have executed and completed the Sewage Treatment Plants (STP) with proven technology (except waste stabilization ponds technology) meeting the then effluent discharge standards along with performance reports for a period of 1 year (one year) issued by the client for a total capacity of 5.0 MLD in any one financial year during the last ten Financial Years ending with 31-03-2017.

In case of Technology supplier/ provider:

a) As the work requires technology up gradation for STP, if the bidder is not a technology supplier /provider, the bidder must enter Memorandum of Understanding (MoU) with the technology supplier / provider for design/ performance guarantee along with the performance credentials of the offered process, its design philosophy and process with calculations, drawing, layout, hydraulic flow diagram, process flow diagram, P&I diagram, O&M manuals, control philosophy etc.

The technology provider/ supplier must have a registered office in India.

The technology provider/ supplier shall have experience in providing the technology for Sewage Treatment Plants (STP) with a capacity of at least 5.0 MLD in India which shall be in successful operation for a continuous period of (2) two years in the last (5) five years as on last date of bid submission with effluent characteristics satisfying CPCB norms issued during that period.

b)` with the technology supplier /provider shall be submitted on Rs. 100/- non judicial stamp paper duly notarized and signed by the respective authorized representatives clearly stating the terms & conditions of the MoU. Such MOU should be valid till the project completion period (i.e. completion of O&M period) and it shall not be amended or modified without prior consent from the department during the period of performance of contract; the department shall not allow such change. Also, the MoU between the technology supplier / provider/ contractor shall be made part of the bid and contract. The contractor and technology supplier / provider shall be jointly and severally responsible for the performance of the plant. The process design & drawings shall be vetted and signed by the technology supplier / provider also.

e) In case a technology provider is not required for the proposed technology, the bidder shall fulfill

the conditions mentioned in clause above in support of the track record of providing the technology on their own, and also submit CVs/ Credentials of the designer for the proposed STP works.

f) Experience for minimum quantities mentioned above relating to the works executed in the central / any state govt./UT/PSUs/ Municipalities shall be considered only if certified by an officer not below the rank of Executive Engineer and countersigned by an officer not below the rank of Superintending Engineer.

Note: Proportionate Quantities will be considered at the time of evaluation

The bidder should enclose experience certificates in support of technical criteria / requirement issued by the Engineer – In - charge of the State / Central Government departments / Undertakings, not below the rank of Executive Engineer or Equivalent and countersigned by the next higher authority not below the rank of Superintending Engineer or equivalent

C. Financial Requirement:

1) The bidder as a prime contractor should have Satisfactorily Completed Similar Nature of Works of value not less than Rs.1353.30 in any one financial year during the last ten financial years ending with 2016-17. The value will be update by giving 10% simple weight age per year to bring them to 2017-18 price level.

2) The bidder should produce liquid asset / credit facilities / Solvency certificate from any Indian Nationalized / Scheduled Banks of value not less than Rs. 676.65

3) The bidder's average net worth for the last 3 financial years shall not be less than Rs. 1353.30 Lakhs In this regard certificate issued by Chartered Accountant in the current financial year shall be uploaded by the bidder.

4) The bidder who has applied for/ availed "Corporate Debt Restructuring" (CDR) or " Strategic Debt Restructuring" (SDR) in the last Five (5) financial years are not eligible to participate in the bid. In regards to this clause, a certificate issued by the Chartered Accountant in the current financial year shall be uploaded by the bidder.

5) Bids from Joint Ventures not allowed.

6) The Assessed available Bid capacity as per formula (2AN-B) should be greater than internal Bench mark value assessed by the Department.

Where,

A= Maximum Value of Civil Engineering works executed in any one financial year during the last ten financial years (updated 2017-18 price level) taking into account the completed as well as works in progress.

N= Number of years prescribed for completion of the works for which tenders are invited.

B= Value of existing commitments and ongoing works to be completed during the period of completion of the project for which tenders are invited.

7) The bidder should furnish the availability (either owned or leased) of following key and critical equipment required for the work.

a.Pipe layer – 2 Nos.
b. JCB / Hitachi - 1 Nos.
c. Mini Excavator for trenching – 2 Nos.
d. Vibrators – 2 Nos.
e. Pan Vibrators – 2 Nos.
f. Water Tanker – 1 Nos.
g. Trucks/Tractor / Tippers – 2 Nos.
h. Concrete Hopper miller – 2 Nos.
i. Mini Smooth wheeled Roller (3 to 5 T) – 1 Nos.

j. Mini Vibrator Roller (3 to 5 T) – 1 Nos.
k. Pneumatic Pumps for Hydro test – 2 Nos.
l. Hydraulic Testing Equipment for pipes – 1 Nos.

8) The bidder should furnish the availability of following key personnel.

No.	Position	Total Work Experience (Min) [years]	Experience In Similar Work [years]	Qualification
1	Project Manager (1 No.)	20	12	B.E. Civil Exp in Sewerage System. (5 years as Project manager should have O&M experience)
A	**Design Phase**			
1	Sewerage expert(1 Nos.)	15	10	B.E. Civil+ 15 years Exp. (8 years in Sewerage network project experience.)
2	Project Engineer (3 Nos – 1 civil, 1 mechanical and 1 instrumentation)	8	5	B.E. Civil Mechanical/instrumentation
3	Draftsman (1 No.)	5	5	
B	**Construction Phase**			
1	Construction Manager (1 Nos.)	15	5	B.E. Civil
2	Project Engineer (1 Nos.)	10	8	B.E. Civil+ 10 years Exp. (8 years in sewerage network.)
3	Quality Assurance (1 No)	10	8	BE Civil with Experience of QA
4	Draftsman (1 No.)	5	3	
C	**O&M Phase**			
1	Chemist (2 No's)	5	3	B.S.C with sewerage supply project experience
2	Fitter cum Electrician (9 No's.)	5	3	ITI/Diploma Mechanical/Electrical with O& M of Sewerage project experience
3	Helper cum sewage cleaners (7 No's)			

B	Watchman (6 No's)			
1	Helper(9 No's)			
2	Helper/Operator for jetting, jet rodding, desilting and rodding machine(7 No's)			
3	Drivers for vehicles (5Nos.)			Heavy vehicle driving license with badge no
4	Cleaners for manholes(6Nos.)			

9)The bidders should furnish the particulars of quality control testing Lab owned, or tie up with established quality control laboratories

10) The bidder should furnish the Income Tax Pan and submission of latest Income Tax return along with proof of receipt.

11)GST will be adopted time to time as per instructions of Government of Andhra Pradesh

12) The bidder should furnish the GST Registration Certificate issued by Government of AP on or before the issue of Letter of Acceptance and Latest GST/VAT Clearance Certificate.

Note:-The Internal Bench Mark (IBM) is arrived based on the probable quantities indicated in the deliverables.

The Scope, Deliverables, IBM Value, key Performance Indicators & Penalties, Payment Sehedule of Components and Eligibility Criteria for the NIT are submitted before the EPC committee - I for approval and the committee approved the same.

Technical evaluation will be done only based on the documents uploaded on the e-procurement platform as per G.O.M.S.No.94, I&CAD, Dt::01-07-2003 and subsequent G.O.s issued from time to time by the Government.

General Terms & Conditions :

1. The details and certificates are to be furnished as per the pro-forma available in the tender schedules.
2. The bidder should have the key and critical equipment (either owned or leased as mentioned in the tender document).
3. The bidder is subjected to be disqualified and liable for black listing and forfeiture of EMD, if he is found to have misled or furnished false information in the forms statements / certificates submitted in proof of qualification requirements.
4. Even while execution of the work, if found that the contractor had produced false / fake certificates of experience he will be liable for black listing and the contract will be liable for termination and liable for forfeiture of EMD and all the amounts due to him.

5. Bidders shall submit a declaration without any reservation what so ever that the submitted eligibility and qualification details, technical and financial bid are without any deviations and are strictly in conformity with the documents issued by the employer.
6. Declaration should be given for the credentials submitted by the bidder.
7. The employer reserves the right to relax the conditions and required for eligibility of the bidders in the public interest. The Bidder(s) shall not have any right to question the decision taken by the employer in this regard.
8. The bidder(s) shall submit a written power of attorney authorizing the signatory of the bid to commit for the bidder.
9. The bidder should furnish the Income Tax Pan and submission of latest Income Tax return along with proof of receipt.
10.GST will be adopted time to time as per instructions of Government of Andhra Pradesh and IBM will be modified.
11. The bidder should furnish the Govt. of AP GST/VAT Registration Certificate and Latest Govt. of AP GST/VAT Clearance certificate.
Special Conditions :
1) Tenders with an excess of more than **5%** over the internal benchmark value arrived by the department shall be summarily rejected.
2) In respect of tenders beyond 25% less than internal benchmark arrived by the department, a Bank Guarantee or Demand Draft for the difference between the tendered amount and 75% of internal benchmark value should be furnished at the time of agreement as additional security deposit.
3) Government reserves the right to cancel/alter the bid conditions at any time.

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Note: - The Internal Bench Mark (IBM) is arrived based on the probable quantities indicated in the deliverables.

Technical evaluation will be done only based on the documents uploaded on the e-procurement platform as per G.O.M.S.No.94, I&CAD, Dt::01-07-2003 and subsequent G.O.s issued from time to time by the Government.

4. **Cost of tendering**

The bidder shall bear all cost associated with the preparation and submission of his tender and the Employer will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the tendering procedure.

5. **Site Visit**

The bidder is strongly advised to visit and examine the site of work and its surroundings. He shall acquaint and obtain himself at his own responsibility all relevant information such as existing utilities including underground services, availability of labour, basic material, water, electricity etc, that may be necessary for preparation of the tender. A declaration to this effect will have to be signed by the bidder in his tender.

6. **Content of tendering documents**

a) The tender document issued for the purpose of this tender is in two parts Technical Bid and Financial Bid. Technical Bid contains Volume-I & Volume-II and Financial Bid is in Volume-III.

b) Bidder is expected to examine carefully all instructions, conditions, terms, specifications and drawings in the standard tender document viz. Technical Bid and Financial Bid, Technical Bid contains Volume-I & Volume-II and Financial Bid is in Volume-III. Failure to comply with the requirements of tender stipulations will be at the bidders risk. Pursuant to **clause 23**, the tenders which are not substantially responsive to the requirements of this tender will be rejected.

7. **Clarification of tender documents (Not used)**

In case any clarification is required by the bidder, he may obtain it in writing well in advance from the Employer. Clarification for which written request has been received at least 3days prior to pre-bid meeting only will be answered.

8. **Amendments to tender document**

At any time prior to the dead line for submission of tender, the employer may for any reason whether at his own initiative or in response to a clarification requested by a prospective bidder modify the tender document by issuance of an addendum. The addendum will be kept in website www.ap.eprocurement.gov.in one week prior to date of submission of bid.

9. **Language of the documents**

The language of tender shall be English.

10. **Documents comprising the tender**

The tender to be prepared by the bidder shall comprise of the form of tender and appendices thereto, the Bid Security, the information on technical man power to be available on this work, the contractors alternative technical proposals based on scope of work as defined in Volume II, design criteria, soil data and other such relevant information and any other material required to be completed and submitted in accordance with the instructions to bidders embodied in tender document. The forms and the data provided in this document shall be used without exception.

The Technical Bid shall comprise of the following:

a. Scanned copy of EMD

b. Scanned copy of Registration

c. Scanned copy of Proof of Experience

d. Data Sheet-1 – Bidder's Appreciation of the Project

e. Data Sheet-2- Bidder's Organizational setup for the Project

f. Data Sheet-3 – Project Components along with Drawings

g. Data Sheet-4- Management of Design and Engineering Services

h. Data Sheet-5 – Construction Methodology of different components proposed

i. Data Sheet-6 – Proposed Deployment of Key Personnel

j. Data Sheet-7 - Proposed Deployment of Construction Equipment

k. Data Sheet-8- Proposed Sub-Contractors

l. Data Sheet-9- Proposed Source of Key Materials

m. Data Sheet-10- Proposed Construction Schedule of the Project

n. Data Sheet-11 – Quality Control and Assurance System

11. **Tender prices**

i. The bidder shall quote his offer on form of tender Volume III as Lump sum at appropriate place of the tender document to be submitted as per procedure set in **clause 17**. The Bidder shall quote further breakdown of Lump sum costs in **Annexure – I**, **Volume III**. The bidder shall also quote unit prices in **Annexure II, Volume – III**. Negotiations are not permitted at any stage in respect of price bid. The additions & deductions will be worked out based on the **Annexure – II**.

ii. The lump sum price quoted by the bidder shall include all the costs towards survey, investigations, designing, execution, O&M and completing the works as per defined scope of work and based on design criteria and Employers Requirement. The lumpsum offer shall provide for all superintendence, labour, material, plant, equipment and all other things required for work including all taxes, VAT, duties, royalties and such other charges except for the exceptions provided for in the contract.

iii. In addition to L.S. Price the bidder are also to quote unit prices as an **Annexure – I, and II** which shall be reviewed and approved by the employer.

12. **Tender validity**

Validity of the tender will be **120 Days** from the date fixed for opening of the tenders and thereafter until it is withdrawn by notice in writing duly addressed to the authority opening the tender. Such withdrawal after 120 days shall be effective from the date of receipt of notice by the Employer.

13. **Earnest money deposit, its forfeiture and penal action**

13.1 The bidder shall furnish as a part of his tender Bid Security for**Rs. 54,13,190/- (Rupees fifty four lakhs and thirteen thousand one hundred ninty only)**.

13.2 The Bid Security to be furnished shall pay online in Favour of **Managing Director,Greater Visakhapatnam Smart City Corporation Limited**

13.3 Any tender not accompanied by the Bid Security will stand rejected.

13.4 In the event of the tender being accepted subject to provisions of the **sub clause 13.5** below, the said amount of bid security, if so requested by the bidder be appropriated towards the amount of performance security deposit payable by him under the conditions of contract.

13.5 "Forfeiture of Bid security": If after submitting the tender, the bidder withdraws his offer or modifies the same or if after acceptance of his tender fails or neglects to furnish the Performance security, without prejudice to any rights and powers of the Employer here under or in law, the employer shall be entitled to forfeit the full amount of Bid Security deposited by the bidder. The employer

shall also have right to forfeit the full amount of Bid security if the contractor fails to submit the performance guarantee (as per clause 2.8.1) within 21 days from the receipt of LOA issued pursuant to clause No.27.0.

13.6 In the event of tender being not accepted the amount of Bid Security deposited by the bidder, shall unless it is prior thereto to forfeit under provisions of sub clause 12.5 above, be refunded to him on passing of receipt thereto without any interest.

14. **No Variations in tendering conditions**

The bidders are hereby instructed to not to alternate any changes in the bidding documents. If any changes are made by bidder it shall be treated as tampering of documents and the bid shall be summarily be rejected.

15. **Pre-tender meeting**

15.1 A pre tender conference open to all prospective bidders will be held in the Office of the Managing Director**, Greater Visakhapatnam Smart City Corporation Limited** wherein the prospective bidders will have an opportunity to obtain clarifications regarding the tender conditions and the work. For this, only questions received in writing 3 **d**ays prior to the pre tender meeting shall be clarified in writing.

15.2 The prospective bidders are free to ask any additional information or clarification in writing and reply to the same will be given in writing. Minutes of the meeting including copies of the questions raised and the replies given will be furnished to all those attending the meeting (subsequently to all the bidders). Any modifications of tender document which may become necessary as a result of pre tender conference shall be through issuance of an addendum pursuant to **clause 7** of these instructions.

16. **Format and signing of tenders**

16.1 The bidder shall prepare only one copy of the documents comprising the bid as described in **Clause 12** of these Instructions to Bidders.

16.2 The bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the bidder.

16.3 The bid shall contain no alterations, omissions or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case all such corrections shall be initialed by the person or persons signing the bid.

16.4 All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be printed below their signatures.

17. **Submission of tenders**

(a) Bidders need to contact the Commissioner, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED for information on e-procurement.

(b) Bidders need to register on the electronic procurement market place of Government of Andhra Pradesh i.e., "www.ap.eprocurement.gov.in ". On registration on the e-Procurement market place they will be provided with a user ID and password by the system using which they can submit their bids online.

(c) While registering on the e-procurement market place, bidders need to scan and upload the required documents as per the tender requirements on to their profile.

(e) Steps for registration and submission of bids are described in detail in the "Bidders Training Booklet" available at the above web site.

18. **Tender opening**

Tender opening will be as per the e-procurement procedures.

19. **Process to be confidential**

After opening of the tenders publicly information relating to the examination, clarification, evaluation and comparison of tenders and recommendations concerning the award of contract shall not be disclosed to the bidders or other persons not officially concerned with such process until the award of the contract to successful bidder has been announced.

Any effort by a bidder to influence the employer in process of examination clarification evaluation comparison of bids and in decision concerning the award of contract may result in rejection of tender.

20. **Clarification of tenders**

To assist in examination, evaluation of tenders the employer may ask bidders individually for clarification of their offer including break down of costs, reasons in case of very high/very low offer. Such request shall be in writing and the response shall also be in writing.

21. **Tender liable for rejection**

The tender is likely to be rejected if on opening it is found that –

a) The bidder has not strictly followed the procedure laid down for submission of tender.

b) The bidder has proposed conditions which are inconsistent with or contrary to the terms and conditions specified.

c) Additions, corrections or alteration are made by the bidder on any page of the tender document.

d) Any page or pasted slips are missing.

e) The bidder has not signed the tender.

f) The bidder has specified any additional condition.

g) The bidder has not attached the addendum to the main tender form as stated in para 7.

h) In case the technical proposal of bidder who has quoted lowest price and who has satisfied other criteria is not conforming to the stipulations made, the bidder without revising the cost shall modify the same to conform to the stipulations. If the bidder refuses to modify this then the tender shall be treated as non responsive and rejected.

i) The bidder has quoted financial offer anywhere other than specified in Financial Bid.

22. **Correction of errors**

If there is any discrepancy between the offer quoted in figures and in words, the rate quoted in words will be treated as the offer.

23. **Evaluation and comparison of tenders**

Managing Director, Greater Visakhapatnam Smart City Corporation Limitedwill evaluate whether each tenderer is satisfying the eligibility criteria prescribed in the tender document and declares them as a qualified tenderer.

If the technical bid of a tenderer is not satisfying any of the eligibility criteria it will be rejected by the Managing Director, Greater Visakhapatnam Smart City Corporation Limited. However, the tender accepting authority detects any error in the evaluation of tenders by Managing Director, Greater Visakhapatnam Smart City Corporation Limited, the tender accepting authority while returning the tenders may direct the Managing Director, Greater Visakhapatnam Smart City Corporation Limited or Chief Engineer as the case may be, to re-evaluate the tenders.

If any alteration is made by the tenderer in the tender documents, the conditions of the contract, the drawings, specifications or statements / formats or quantities the tender will be rejected.

24. **Award criteria**

Subject to clause 23, the employer will award the contract to a bidder whose tender has been found to satisfy all requirements of tender document and who has offered the lowest price.

25. **Department's right to accept any tender and to reject any or all tenders**

Not withstanding the clause 24, the employer reserves the right to accept or reject any tender and to annul the tender process and reject all the tenders at any time prior to award of contract without there by incurring any liability to the affected bidders or any obligation to inform affected bidder/s of the grounds for employer's action.

26. **Notification of award.**

Prior to the expiration of tender validity period or any such extended period, the employer will notify the successful bidder in writing by a registered letter that his tender has been accepted. This letter (herein after and in conditions of contract called letter of acceptance) shall name the sum which the employer will pay to the Contractor in consideration of the execution, completion and maintenance of the work by the Contractor as prescribed in the Contract. This notification of award will constitute formation of contract.

Upon furnishing the performance security by the successful bidder in accordance with the **clause 27** the order to start work will be given. The work order shall be accompanied by a true copy of the agreement bearing the number under which it is registered in the office of the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED.

7. **Performance guarantee**

The successful bidder whose tender has been accepted will have to pay balance of 1.5% with a total of (1%+1.5%) 2.5%of accepted tender amount as performance security in any of the following forms.

The performance guarantee shall be either in the form of bank guarantee in favour of **Managing Director, Greater Visakhapatnam Smart City Corporation Limited** issued by a Nationalized Banks of India or any scheduled Bank**.** The period of validity for the performance security shall be upto the end of the Defect liability period of **24 Months** after the completion of work.

28. **Signing of agreement**

Upon furnishing the Performance guarantee the contractor will be invited to conclude the agreement.

VOLUME - I

Section – 2 : GENERAL CONDITIONS

1. Definitions:

Sub-clause 1.1

a) The Employer is the **Managing Director, Greater Visakhapatnam Smart City Corporation Limited**

Address : Managing Director, Greater Visakhapatnam Smart City Corporation Limited
Greater Visakhapatnam Municipal Corporation, Room No. 306, Aslimetta Junction, Visakhapatnam – 530003,
Andhra Pradesh, India

E-mail: : visakhapatnamsmartcity@gmail.com

Website: :www.gvmc.gov.in

Telephone Number **:**0891-2746300

Fax No **:**0891- 2746300

b) The "Engineer" is Executive Engineer or any authorized representative appointed by GVMC.

The following additional words and expressions shall have the meanings assigned to them, except where the context otherwise required:

i. Authority or Department shall mean the successors in office and assigns.

ii. The "Chief Engineer" shall mean the Chief Engineer, GVMC

iii. The Managing Director, Greater Visakhapatnam Smart City Corporation Limited" shall mean the Managing Director, Greater Visakhapatnam Municipal Corporation who is designated as such for the time being, in whose jurisdiction the works lies.

iv. The "Executive Engineer" shall mean the Executive Engineer (Municipal Corporation), Visakhapatnam who is designated as such for the time being, in whose jurisdiction the works lies.

v. The "Engineer" shall mean Executive Engineer or any authorized representative who is the consultant to the department appointed by the employer to perform the duties and responsibilities of the consultant in supervising the contract.

vi. The "Engineer's representative "means the project manager appointed / nominated by the Engineer, who is consultant to the department to perform the duties and the responsibilities of the engineer in supervising the contract.

vii. A "Day" shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.

viii. A "Week" shall mean 7 consecutive days without regard to the number of hours worked in any day in that week.

ix. The "Site" shall mean the lands and /or other places, on under, in or through which the work is to be executed under the Contract including

any other lands or places which may be allotted by the Department or used for the purpose of Contract.

x. "Urgent Works" shall mean any measures which, in the opinion of Engineer becomes necessary during the progress of the work to obviate any risk or accident or failure or which becomes necessary for security of the work or the persons working thereon.

Clause 2

Engineer's Duties

Sub-Clause 2.1(d) The Engineer shall obtain the specific approval of the Employer in respect of the following:

a. Approving subletting of the Work

b. Granting claims to the Contractor

c. Ordering suspension of the work

d. Determining an extension of time

e. Waiving off the penalty and arranging the repayment of compensation for delay

f. Issuing of Variation Order

g. Ordering any work/test beyond the scope of the Contract

h. Determining rates for the extra items /extra work

i. Any variations in the contract condition

j. Approval to designs and working drawings

Duties of the Engineer's Representative

Sub Clause 2.7

The duties of the Engineer's Representative are to watch and supervise the work and to test and examine any materials to be used or workmanship employed in connection with the Works

2. Interpretation:

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female, and vice-versa. Headings have no significance. Works have their normal meaning under the language of the contract unless specifically defined. The Engineers-in-charge will provide instructions clarifying queries about the conditions of Contract.

2.2 The documents forming the Contract shall be interpreted in the following order of priority:

1) Agreement

2) Letter of Acceptance, notice to proceed with the works

3) Scope of work and drawings

4) Special Conditions of contract

5) General Conditions of Contract

6) CPHEEO manual on Water Supply and treatment

7) B.I.S. codes on HDPE and their laying and other relevant BIS codes applicable to the work.

8) Technical Proposal of the contractor duly accepted by employer

9) L.S. Price Bid.

10) Any other document listed as forming part of the Contract.

3. Engineer-in-Charge's Decisions:

3.1 Except where otherwise specifically stated, the Engineer-in-charge will decide the contractual matters between the Department and the Contractor in the role representing the Department.

4. Delegation:

4.1 The Engineer-in-charge may delegate any of his duties and responsibilities to other officers and may cancel any delegation by an official order issued.

5. Communications:

5.1 Communications between parties, which are referred to in the conditions, are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act)

6. Sub-contracting:

6.1. If the prime contractor desires to sub-let a part of the work, he should submit the same at the time of filing tenders itself or during execution, giving the name of the proposed Sub-contractor, along with details of his qualification and experience. The Tender Accepting Authority should verify the experience of the Sub-contractor and if the Sub-contractor satisfies the qualification criteria in proportion to the value of work proposed to be sub-let, he may be permitted subject to the approval of Chief Engineer(PH),Guntur. The total value of works to be awarded on sub-letting shall not exceed ***50%***of contract value. The extent of subletting shall be added to the experience of the sub-contractor and to that extent deducted from that of the main contractor.The Agency shall submit the names of their representatives who will be supervising the work along with their photo ID card to the department within a month from the date of entering into agreement. Further, in case of change in the personnel the same shall be intimated to the department, a week in advance. If other are found to be executing / supervising the work, such work will be treated as a work let out un authorized.

6.2. If it is found that the agency has sub-let the work unauthorizedly, the agency shall be black listed and barred from participating in bidding for Government works for a period of six years.

6.3. Recognition of unauthorized sub letting may be based on reports of V&E Department or any officer above the rank of Executive Engineer.

6.4. On receipt of such a report, the agreement concluding authority shall call for an explanation from the agency fixing a time limit not exceeding 30 days. If no reply is received within the time limit, it will be deemed that the agency has no explanation to offer and orders shall be passed black-listing the agency by the Government as per G.O.

6.5. If a reply is received, the reply shall be examined and an order after giving due to consideration to the reply shall be passed by the Government.

6.6. A contracting firm shall also be black listed it is found that the firm has a person as partner / director who is also a partner / director in a black –listed firm.

7. Other Contractors:

7.1 The Contractor shall cooperate and share the Site with other Contractors, Public Authorities, Utilities, and the Department. The Contractor shall also provide facilities and services for them as directed by the Engineer-in-charge.

8. Personnel:

8.1 The Contractor shall employ the required Key Personnel named in the Schedule of Key Personnel to carry out the functions stated in the Schedule or other personnel approved by the Engineer-in-charge. The Engineer-in-charge will approve any proposed replacement of Key Personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

8.2 Failure to employ the required technical personnel by the contractor the following amounts will be recovered from the contractor over and above the provision made in Schedule-B from the contractors bills.

8.3 The technical personnel should be on full time and available at site whenever required by Engineer in Charge to take instructions.

8.4 The names of the technical personnel to be employed by the contractor should be furnished in the statement enclosed separately.

8.5 If the contractor fails to employ technical personnel the work will be suspended or department will engage a technical personnel and recover the cost thereof from the contractor

8.6 If the **Employer/Employer's Representative** asks the Contractor to remove a person who is a member of Contractor's staff or his work force stating the reasons the Contractor Shall ensure that the person leaves the site forthwith and has no further connection with the work in the contract.

8.7 **The List of Key Personnel to be deployed on this project is mentioned in Annexure – A.**

9. Contractor's Risks:

9.1 All risks or loss of or damage to physical property and of personnel injury and death, which arise during and in consequence of the performance of the Contract are the responsibility of the Contractor.

10. **Insurance:**

10.1 The Contractor shall provide, in the joint names of the Department and the contractor, insurance cover from the Start Date to the end of the Defects Liability Period i.e., 24 months after completion for the following events, which are due to the Contractor's risks.

b) Loss of or damage to the Works, Plant and Materials;

c) Loss of or damage to the Equipment;

d) Loss of or damage of property in connection with the Contract; and

e) Personal injury or death of persons employed for construction

f) Professional liability insurance: The Contractor shall affect professional indemnity insurance, which shall cover the risk of professional negligence in the design of the works. This insurance shall be for a limit of not less than **Rs. 20.00 lakhs**. The Contractor shall use his best endeavor to maintain the professional indemnity insurance in full force and effect until

defect liability period. The Contractor undertakes to notify the Employer promptly of any difficulty in extending, renewing or reinstating this insurance.

10.2 Policies and certificates of insurance shall be delivered by the Contractor to **Employer/Employer's Representative** at the time of concluding Agreement. All such insurance shall provide for compensation to be payable to rectify the loss or damage incurred.

i) The contractor shall furnish insurance policy in force in accordance with proposal furnished in the Tender and approved by the Department for concluding the agreement.

ii) The contractor shall also pay regularly the subsequent insurance premium and produce necessary receipt to **Employer/Employer's Representative**, well in advance.

iii) In case of failure to act in the above said manner the department will pay the premium and the same will be recovered from the Contractors payments.

10.3 Alterations to the terms of insurance shall not be made without the approval of **Employer/Employer's Representative.**

11. Site Inspections:

11.1 The contractor should inspect the site and also proposed quarries of choice for materials source of water and quote his percentage including quarrying, conveyance and all other charges etc.

12. Contractor to Construct the Works:

12.1 The **Contractor** shall construct and Commission the Work in accordance with the specifications and Drawings.

13. Diversion of streams /Vagus / Drains.

13.1 The contractor shall at all times carry out construction of cross drainage works in a manner creating least interference to the natural flow of water while consistent with the satisfactory execution of work. A temporary diversion shall be formed by the contractor at his cost where necessary. No extra payment shall be made for this work.

13.2 No separate payment for bailing out sub-soils, water drainage or locked up rain water for diversion, shoring, foundations, bailing of pumping water either from excavation of soils from foundations or such other incidental will be paid. The percentage to be quoted by the contractor are for the finished item of work in situ and including all the incidental charges. The borrow pits are also to be de-watered by the contractor himself at his expense, if that should be found necessary.

13.3 The work of diversion arrangements should be carefully planned and prepared by the contractor and forwarded to the Executive Engineer technically substantiating the proposals and approval of the Executive Engineer obtained for execution

13.4 The contractor has to arrange for bailing out water, protection to the work in progress and the portion of works already completed and safety measures for men and materials and all necessary arrangements to complete the work.

13.5 All the arrangements so required should be carried out and maintained at the cost of the contractor and no separate or additional payments is admissible..

13.6 Coffer Dams.

Necessary coffer dams and ring bunds have to be constructed at the cost of contractor and same are to be removed after the completion of the work at the discretion of the department

14. Power Supply.

14.1 The contractor shall make his own arrangements for obtaining power from the Electricity dept., at his own cost. The contractor will pay the bills of Electricity Department for the cost of power consumed by him.

14.2 The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under Rule-45 (I) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

14.3 The power shall be used for bonafide departmental work only.

15. Temporary Diversions (Works on Highways/Municipal Roads)

15.1 The contractor shall at all times carryout work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the contractor shall in accordance with the directions of the Engineer-in-charge provide and maintain during the execution of the work a passage for traffic, either along a part of the existing carriage way under improvement or along a temporary diversion constructed close to the highway.

15.2 If in the opinion of the **Employer/Employer's Representative**, it is not possible to pass the traffic on part width of the carriageway for any reason, a temporary diversion close to the highway shall be constructed as directed. It shall be paved with the materials such as hard moorum, gravel and stone, metal to the specified thickness as directed by **Employer/Employer's Representative** . In all cases, the alignment, gradients and surface type of the diversion including its junctions, shall be approved by the **Employer/Employer's Representative** before the highway is closed to traffic..

15.3 The contractor shall take all necessary measures for the safety of traffic during construction and provide erect and maintain such barricades, including signs, markings, flags lights and information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the **Employer/Employer's Representative**.

15.4 The barricades erected on either side of the carriage way portion of the carriage way closed to traffic, shall be of strong design to resist violation and painted with alternative black and white stripe. Red lanterns or warnings lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

16. Ramps:

Ramps required during execution may be formed wherever necessary and same are to be removed after completion of the work at the discretion of the department. No separate payment will be made for this purpose.

17. Monsoon Damages:

Damages due to rain or flood either in cutting or in banks shall have to be made good by the contractor till the work is handed over to the Department. The

responsibility of de-silting and making good the damages due to rain or flood rests with the contractor. No extra payment is payable for such operations and the contractor shall therefore have to take all necessary precautions to protect the work done during the construction period.

18. The works to be completed by the Intended Completion Date:

18.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the **Employer/Employer's Representative**, and complete the work by the Intended Completion Date.

19. Safety:

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries:

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Government. The Contractor is to notify **Employer/Employer's Representative** of such discoveries and carry out the **Employer/Employer's Representative** instructions for dealing with them.

21. Possession of the Site.

21.1 The **Department** shall give possession of the site to the Contractor. If possession of a part site is given, the Department will ensure that the part site so handed over is amenable to carryout the work at site by the Contractor.

21.2 Additional land acquisition, if required, in few isolated stretches is foreseen in this project. The Contractor shall submit relevant L.A. proposals as required and pursue with the authorities concerned to acquire the land. The Department will assist the Contractor in this regard and if any compensation has to be paid, department will arrange to pay the same.

The Site for the execution of the work will be available as soon as the work is awarded. In case it is not possible for the department to make entire site available on the award of the work, due to any unforeseen reasons like court orders etc., the contractor will have to modify his working programme accordingly. No claim whatsoever for not giving the entire site in one stretch on award of work, (or) for handing over the site in phases will be tenable.

22. Access to the Site:

22.1 The **Contractor** shall provide the **Employer/Employer's Representative** and any person authorized by the Engineer-in-Charge, access to the site and to any place where work in connection.

23. Instructions:

23.1 The Contractor shall carry out all instructions of the **Employer/Employer's Representative** and comply with all the applicable local laws where the Site is located.

Site Order Book:

A site order book shall be maintained on the site and it shall be the property of the Employer and the Contractor shall promptly sign orders given therein by the Engineer or his authorized representative and comply with them. The compliance

shall be reported by Contractor to the Engineer in good time so that it can be checked. The blank site order book with machine numbered pages in quadruplicate with perforated sheet for three copies to be detached will be provided by the Engineer for this purpose. Whenever any instructions are written in the site order book, the Contractor will be supplied the first carbon copy.

24. Settlement of disputes:

24.1 If any dispute of difference of any kind whatsoever arises between the department and the Contractor in connection with, or arising out of the Contract, whether during the progress of the works or after their completion and whether before or after the termination, abandonment or breach of the Contract, it shall in the first place, be referred to and settled by the Employer/Employer's Representative who shall, within a period of thirty days after being requested by the Contractor to do so, give written notice of his decision to the Contractor. Upon receipt of the written notice of the decision of the Employer/Employer's Representative the Contractor shall promptly proceed without delay to comply with such notice of decision

24.2 If the Employer/Employer's Representative fails to give notice of his decision in writing within a period of thirty days after being requested or if the Contractor is dissatisfied with the notice of the decision of the Employer/Employer's Representative, the Contractor may within thirty days after receiving the notice of decision appeal to the Department who shall offer an opportunity to the contractor to be heard and to offer evidence in support of his appeal, the Department shall give notice of his decision within a period of thirty days after the Contractor has given the said evidence in support of his appeal, subject to arbitration, as hereinafter provided. Such decision of the Department in respect of every matter so referred shall be final and binding upon the Contractor and shall forthwith be given effect to by the Contractor, who shall proceed with the execution of the works with all due diligence whether he requires arbitration as hereinafter provided, or not. If the Department has given written notice of his decision to the Contractor and no claim to arbitration, has been communicated to him by the Contractor within a period of thirty days from receipt of such notice the said decision shall remain final and binding upon the Contractor. If the Department fail to give notice of his decision, as aforesaid within a period of thirty days after being requested as aforesaid, or if the Contractor be dissatisfied with any such decision, then and in any such case the contractor within thirty days after the expiration of the first named period of thirty days as the case may be, require that the matter or matters in dispute be referred to arbitration as detailed below:

SETTLEMENT OF CLAIMS:

Settlement ofclaims for *Rs.50,000/-* and below byArbitration.

All disputes or difference arising of or relating to the Contract shall be referred to the adjudication as follows:

a) Claims up to a value of Rupees 10,000/-.
-Commissioner, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED,

b) Claims above Rs.10,000/- and up to Rupees 50,000/-.
Chief Engineer (PH) Guntur

The arbitration shall be conducted in accordance with the provisions of Indian Arbitration and Conciliation Act 1996 or any statutory modification thereof.

The arbitrator shall state his reasons in passing the award.

Claims above Rs.50,000/-.

All claims of above Rs.50,000/- are to be settled by a Civil Court of competent jurisdiction by way of Civil suit and not by arbitration.

A reference for adjudication under this clauses shall be made by the contractor within six months from the date of intimating the contractor of the preparation of final bill or his having accepted payment whichever is earlier.

B. TIME FOR COMPLETION

25. Program:

25.1 The total period of completion is **24 (Twenty Four)Months**(inclusive of Monsoon Period) from the date of entering with agreement to proceed including rainy season. Keeping in view, the schedule for handing over of site given in condition Sl.No.21 work should be programmed such as to achieve the mile-stones as in "Rate of progress statement". Mile stones will be drawn by the agency which should be acceptable to the Department.

25.2 The attention of the bidder is directed to the contract requirement at the time of beginning of the work, the rate of progress and the dates for the whole work and its several parts as per milestones. The following rate of progress and proportionate value of work done from time to time as will be indicated by Employer/Employer's Representative Certificate for the value of work done and completion of milestones will be required. Date of commencement of their programme will be the date for concluding agreement.

25.3 After signing the agreement, the contractor shall forthwith begin the work, shall regularly and continuously proceed with them.

25.4 Rate of progress:

(i) Work programme of achieving the milestones (Statement).

S.No.	Sectional Milestone	Time from stipulated date of contract start(days)	Event of start	Activities
1	Mobilisation	15	Contract signing	
Sewerage works:				
2	Completion of all survey, investigation work. Submission of QAP	45	Contract signing	Including all surveys, QAP
3	Submission of project Master plan and Implementation plan .	120	Contract signing	Including Designs, BOQ, implementation and phasing program and methodology
4	Approval of Master plan and Implementation plan .	180	Contract signing	
5	Supply, installation and commissioning of pumping units including electrical installations	260	Contract signing	Installation of pumps in the pumping stations including E&M works
6	Supply, installation and commissioning of Process and Electro mechanical units and installations	480	Contract signing	Supplying, laying, jointing, testing and commissioning of process and electro mechanical units for

S.No.	Sectional Milestone	Time from stipulated date of contract start(days)	Event of start	Activities
				25 MLD and 16 MLD STPs
7	Sewerage network including house service connections	660	Contract signing	Supply, laying, jointing, testing and commissioning of sewer networks including giving house service connections
9	Installation and commissioning of SCADA system	700	Contract signing	Installation and commissioning of SCADA system for pumping stations and STPs
10	Completion of entire Sewerage network including, preparation of as built drawing etc.	730	Contract signing	
Operation Service delivery				
12	Operation and maintenance of entire system as per scope of work	2555 days	from the date of final takeover	Manpower supply for Operation and maintenance of sewerage system as per scope of work..
13	Handing over back to Employer	30 days	30 days before End of O&M period	Joint verification of assets, Issuance of O&M period completion certificate and Joint signing of Handing Over document

i. Penalties

Design

S N	Activity	Target period for completion from contract commencement date	Amount of penalty to be recovered in case of delayed output
1	Mobilization on site as per activities	30 days	
2A	Ground verification, ward wise Topographical and house hold survey of the Catchment areas and site locations and planning for its sequence.	70 days	Rs. 25,000 per day
2B	Compilation and submission of woks in complete	130 days	Rs. 50,000 per day
3	Approval of final Master plan and project	180 th day.	Rs. 50,000 per

S N	Activity	Target period for completion from contract commencement date	Amount of penalty to be recovered in case of delayed output
	implementation plan		day
	Construction Period	Damages for delay shall be Five Percent (5 %) of the cost of incomplete work of each milestone per month / as per project schedule. However if the contractor catches with the progress of work the same will be released in Interim Payment Certificates on contractor achieving subsequent milestone(s)	

25.5 The contractor shall commence the works on site within the period specified after the receipt by him of a written order to this effect from Employer/ Employer's representative and shall proceed with the same with due expedition and without delay, except as may be expressly sanctioned or ordered by Employer/ Employer's representative, or be wholly beyond the contractor's control.

25.6 Save in so far as the contractor may prescribe, the extent of portions of the site of which the contractor is to be given possession from time to time and the order in which such portions shall be made available to him and, Subject to any requirement in the contract as to the order in which the works shall be executed, Employer/ Employer's representative will with written order to commence the works, give to the contractor possession of so much of the site as may be required to enable the contractor to commence proceed with the execution of the works in accordance with the programme if any, and otherwise in accordance with such reasonable proposals of the contractor as he shall by written notice to the Employer/ Employer's representative, make and will from time to time as the works proceed, give to the contractor possession of such further portions of the site as may be required to enable the contractor to proceed with the execution of the works with due despatch in accordance with the said programme or proposals as the case maybe ; if the contractor suffers delay or incurs cost from failure on the part of Employer/ Employer's representative to give possession in accordance with the terms of this clause, the Employer/ Employer's representative shall grant an extension of time for the completion of works.

25.7 The contractor shall bear all costs and charges for special or temporary way leases required by him in connection with access to the site. The contractor shall also provide at his own cost any additional accommodation outside the site required by him for the purposes of the work.

25.8 Subject to any requirement in the contract as to completion of any section of the works before completion of the whole of the works shall be completed in accordance with provisions of clauses in the Schedule within the time stated in the contract calculated from the last day of the period named in the statement to the tender as that within which the works are to be commenced or such extended time as may be allowed.

25.9 Delays and extension of time:

Time is considered as the essence of the contract. Should the amount of extra or additional work of any kind or any cause or delay referred to in these conditions or exceptional adverse climate conditions or other special circumstances of any kind

whatsoever which may occur, other than through a default of the contractor be such as fairly entitle the contractor to an extension of time for the completion of works including for milestones as stipulated in Clause 24.4 the amount of such extension and shall notify the contractor has within 28 days after such work has been commenced or such circumstances have arisen or as soon thereafter as is practicable submitted to theEmployer/ Employer's representative full and detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time to be approved by Employer/ Employer's representative. For award of EOT upto six(6) months, Chief Engineer (PH), Guntur is competent and beyond six (6) months, State Level Technical Committee constituted for the purpose is competent.

26. Construction Programme:

26.1 The Contractor shall furnish within 15 days from the receipt of the work order, the work a programme showing the sequence in which he proposed to carry out the work, monthly progress expected to be achieved, also indicating date of procurement of materials plant and machinery. The schedule should be such that it is practicable to achieve completion of the whole work within the time limit fixed and in keeping with the Mile stone programme specified and shall obtain the approval ofEmployer/ Employer's representative. Further rate of the progress as in the program shall be kept up to date. In case it is subsequently found necessary to alter this program, the contractor shall submit sufficiently in advance the revised program incorporating necessary modifications and get the same approved by. Employer/ Employer's representative No revised program shall be operative with out approval Employer/ Employer's representative (Annexure – E).

26.2 The Employer/ Employer's representative hall have all times the right, without any way violating this contract, or forming grounds for any claim, to alter the order of progress of the works or any part thereof and the contractor shall after receiving such directions proceed in the order directed. The contractor shall also report the progress to the Employer/ Employer's representativewithin 7 days of direction to alter the order of progress of works.

26.3 The Contractor shall give written notice to the Employer/ Employer's representative whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawings or order including a direction, instruction or approval is issued by Employer/ Employer's representative within a reasonable time. The notice shall include details of the drawing or order required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

27. Speed of Work:

27.1 The Contractor shall at all times maintain the progress of work to conform to the latest operative progress schedule approved by Employer/ Employer's representative. The contractor should furnish progress report indicating the programme and progress once in a month. The Employer/ Employer's representative may at any time in writing direct the contractor to slow down any part or whole of the work for any reason (which shall not be questioned) whatsoever, and the contractor shall comply with such orders of the Employer/ Employer's representative. The compliance of such orders shall not entitle the contractor to any claim of compensation. Such orders of the Employer/ Employer's representative for slowing down the work will however be duly taken into account while granting extension of time if asked by the contractor for which no extra payment will be entertained..

27.2 Delays in Commencement or progress or neglect of work and forfeiture of earnest money, Security deposit and withheld amounts:

If, at any time, Employer/ Employer's representative shall be of the opinion that the Contractor is delaying Commencement of the work or violating any of the provisions

of the Contractor is neglecting or delaying the progress of the work as defined by the tabular statement. "Rate of progress" in the Articles of Agreement", he shall so advise the Contractors in writing and at the same time demand compliance in accordance with conditions of Tender notice. If the Contractor neglects to comply with such demand within seven days after receipt of such notice, it shall then or at any time thereafter, be lawful for the Employer/ Employer's representative to take suitable action in accordance with **Clause.60 of APSS.**

28. Suspension of works by the Contractor:

28.1 If the Contractor shall suspend the works, or sublet the work without sanction of the Employer/ Employer's representative, or in the opinion of Employer/ Employer's representative shall neglect or fail to proceed with due diligence in the performance of his part of the Contract as laid down in the Schedule rate of progress, or if he shall continue to default or repeat such default in the respects mentioned in clause.27 of the APSS Employer/ Employer's representative shall take action in accordance with **Clause 61 of APSS**.

28.2 If the Contractor stops work for 28 days and the Stoppage has not been authorised by the Employer/ Employer's representative the Contract will be terminated under **Clause 61 of APSS.**

28.3 If the Contractor has delayed the completion of works the Contract will be terminated under **Clause.61 of APSS**.

29. Extension of the Intended Completion Date:

29.1 The Employer/ Employer's representative shall extend or recommend for extension, in accordance with the Government orders in force, the Intended Completion Date if a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

29.2 The Employer/ Employer's representative shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Employer/ Employer's representative for the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

30. Delays Ordered by the Employer/ Employer's representative:

30.1 Employer/ Employer's representative may instruct the Contractor to delay the start or progress of any activity within the Work.

31. Early Warning:

31.1 The contractor is to warn the Employer/ Employer's representative at the earliest opportunity of specific likely future events or circumstances that may adversely affect the Execution of Works.

31.2 The Contractor shall cooperate with the Employer/ Employer's representative in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Employer/ Employer's representative.

32. Management Meetings:

32.1 The Employer/ Employer's representative may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the programme for remaining work and to deal with matters raised in accordance with the early warning procedure.

C. QUALITY CONTROL

33. Identifying Defects:

33.1 The Employer/ Employer's representative shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Employer/ Employer's representative may instruct the Contractor to verify the Defect and to uncover and test any work that the Employer/ Employer's representative considers may be a Defect.

34. Tests:

34.1 Laboratory for testing:

The contractor shall for the purpose of testing the material shall establish a field laboratory of 40 sq. meter area. The contractor shall provide all equipments as per list in **Annexure - D**.

34.2 If the Employer/ Employer's representative instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the Contractor shall pay for the test and any samples.

35. Correction of Defects:

35.1 The Employer/ Employer's representative shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins on Completion. The defects liability period shall be extended for as long as defects remain to be corrected by the Contractor.

35.2 Every time notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified by the Employer/ Employer's representative notice.

36. Uncorrected Defects:

36.1 If the contractor has not corrected the defect within the time specified in the Employer/ Employer's representative notice, the Engineer-in-Charge will assess the cost of having the defect corrected and the contractor will pay this amount.

36.2 The Employer/ Employer's representative shall introduce O.K. cards and prescribed the formats there of. O.K. cards shall relate to all major components of the work. The contractor withhis authorized representative shall be required to initiate and fill in and present the O.K. card to the construction staff who would check the respective items and send to the quality control staff for final check and clearance / O.K. Any defects pointed out by the construction supervision staff or by the Quality Control staff shall promptly be attended to by the contractors and the fact of doing so be duly recorded on the back of O.K. card.

36.3 The Employer/ Employer's representative may also introduce check lists which shall be kept in Bound registers by the construction supervision staff. The contractor may be required to fill up these lists in the first instance and shall be subsequently checked by the Construction / Quality Control engineers.

37. Quality Control:

In addition to the normal inspection by the Engineer regular staff in-charge of the Construction of work, the work will also be inspected by the Executive Engineer Quality control Circle or by the State or District level Vigilance Cell Unit and any other authorized external Agency if any sub-standard work or excess payments are noticed with reference to measurement books etc., during inspection, action will be taken based on their observations and these will be effected by the Engineer-in-Charge of the execution of the work.

D. COST CONTROL

38. Lump Sum Price:

38.1 The Contractor is paid for the quantity of the work done on prorata basis against each item as per Annexure-I, volume-III.

38.2 **Variations in Scope of Work**: It shall be generally understood that the price quoted by the tenderer shall be all inclusive price for completion of scope of work detailed in the tender document and is for finished work at site in all respects including minor modifications where felt essential.

In an unlikely event, should the exigencies of work so demand that any major modifications are found essential in any component of the works, the payment for the corresponding variations shall be regulated as per **Annexure II & III of Volume III**. The variations, not covered by Annexure II&III, rates of **CSSR 2016-2017** will be applied.

38.3 The extra items :

(i) In case of contingent items, approval shall be accorded by Chief Engineer, GVMC.

(ii) Non-contingent shall be approved by the committee constituted for the purpose

(iii) Contingent but outside the scope of the original contract shall be approved by the committee constituted for this purpose

39. Changes in the Scope:

39.1 The contractor is bound to execute all supplemental works that are found essential, incidental and inevitable during execution of main work.

40. Extra Items:

40.1 Extra items of work shall not vitiate the contract. The contractor shall be bound to execute extra items of work as directed by the Employer/ Employer's representative. The rates for extra items shall be worked out by the Employer/ Employer's representative as per the conditions of the Contract and the same are binding on the Contractor.

40.2 The contractor shall before the $_{15}$th day of each month, submit in writing to the Employer/ Employer's representative a statement of extra items if any that they have executed during the preceding month failing which the contractor shall not be entitled to claim any.

40.3 Entrustment of additional items:

40.3.1 Where ever additional items not contingent on the main work and outside the scope of original agreement are to be entrusted to the original contractor dispensing with bids and if the value of such items exceeds the limits up to which the officer is empowered to entrust works initially to contractor without calling for tenders, approval of next higher authorityshall be obtained. Entrustment of such items on nomination shall be at rates not exceeding the estimated rates.

40.3.2 Payment for the additional scope of work executed shall be decided based upon the following:

- Unit rates quoted and duly agreed by the Department.
- A.P. Standard Schedule of rates for the **year 2017 -18.**

41. Cash flow forecasts:

41.1 When the program is updated, the contractor is to provide the Employer/ Employer's representative with an updated cash flow forecast.

42. Payment Certificates:

42.1 The Contractor shall submit to the Employer/ Employer's representative monthly statements of the estimated value of the work completed less the cumulative amount certified previously.

42.2 The Employer/ Employer's representative shall check the Contractor's monthly statement within 14 days.

42.3 The value of work executed shall be determined by the Employer/ Employer's representative.

42.4 The value of work executed shall comprise the value of the quantities in proportion on pro-rata basis against each sub-head in Annexure – I, Volume– III.

42.5 The Employer/Employer's representative may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

43. PAYMENT

43.1 EPC Contractor's Application for Payment

43.1.1 On the fifth Business Day of every month from the date of issue of the Notice to Proceed the EPC Contractor may serve a notice in writing on the Employer's Representative ("Request for Payment") requesting payment of the sum which is considers to be due on achievement of milestones as per the Annexure 1.("Milestone Payment").

Less

(a) The amount to be deducted as Retention Money

(b) Advance payment in proportionate amounts commencing upon the submissions by the EPC Contractor of the Request for Payment for the fourth monthly period after the date of issue of the Notice to proceed and ending upon the date of the last Request for payment; and

(c) Any a0nts due and owing from the EPC Contractor to the Employer pursuant to this Agreement.

43.1.2 The Request for Payment shall be:

(a) Prepared on forms in the form indicated by the Employer's representative and at the expense of the EPC Contractor, the number of copies therefore shall be as the Employer's Representative may determine; and

(b) Accompanied by such supporting documentation as the Employer's Representative may require to establish the value of the work property designed and Executed as referred to in the Request for payment and reasonableness of the amounts added in respect of goods and materials.

43.2 Certificates of Payment

43.2.1 Within fourteen (14) Business Days after the receipt of the Request for payment, the Employer's Representative shall, subject to the EPC Contractor's compliance with Article 43.2 inspect the relevant parts of the Works and the relevant goods and materials in order to satisfy himself that the request for payment is correct.

If the Employer's Representative is so satisfied he shall issue a Certificate of Payment certifying what amounts are due to the EPC Contractor pursuant to this Article 43 subject to the provisions of Article 43.2.2 to 43.2.3 after giving credit to the Employer for any sums to which the Employer is entitled under this Agreement.

43.2.2No sum shall be included in the Certificate of Payment in respect of goods and materials yet to be incorporated into the payment works unless the employers' Representative is satisfied and has approved in writing that:

(a) Such goods and materials have been properly acquired and properly and not prematurely delivered to the Project Site;

(b) Such goods plant and materials are properly stored on the project site ;and fully protected against loss, damage or deterioration;

(c) The EPC Contractor's records of the requisitions, orders, receipts and use of any goods and materials are kept in a form approved by the Employer's Representative, and such records are available for inspection by the Employer's Representative; and

(d) The EPC Contractor has submitted a proper statement of the cost of acquiring the goods and materials together with such documents as may be required for evidencing such cost.

43.2.3In the event that the Employer's Representative ascertains that the value of the works properly designed and Executed in the relevant period is less than the Milestone Payment for the period, he shall include in the Certificate of payment, the value of the works and goods and materials so ascertained by him.

43.2.4 All Certificates of Payment shall specify the amount, which the Employer proposes to pay to the EPC Contractor and the basis on which that amount was calculated. Such amount shall become due on the issue of the said Certificate of Payment.

43.2.5 **5%** of the interim payment certificate shall be paid with in **7 days**& balance shall be paid within 14 days of receipt from the Engineer.

43.2.6 The final payment certificate (statement at completion) shall be paid within **84 days** of receipt form the Engineer.

44. Certificate of Completion of works:

44.1 Certificate of Completion of works:

44.1.1 When the whole of the work has been completed and has satisfactory passed any final test that may be prescribed by the Contract, the Contractor may give a notice to that be in writing and shall be deemed to be request by the Contractor for the Employer/ Employer's representative to issue a Certificate of completion in respect of the Works. The Employer/ Employer's representative shall, within **twenty one days** of the date of delivery of such notice either issue to the Contractor, a certificate of completion stating the date on which, in his opinion, the works were completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the Works which, in the" Employer/ Employer's representative opinion, required to be done by the Contractor before the issue of such Certificate. The Employer/ Employer's representative shall also notify the Contractor of any defects in the Works affecting completion that may appear after such instructions and before completion of the Works specified there in. The Contractor shall be entitled to receive such Certificate of the Completion within twenty one days of completion to the satisfaction of the Employer/ Employer's representative of the Works so specified and making good of any defects so notified.

44.1.2 Similarly, the Contractor may request and the Employer/ Employer's representative shall issue a Certificate of Completion in respect of:

a) Any section of the Permanent works in respect of which a separate time for completion is provided in the Contract, and

b) Any substantial part of the Permanent Works which has been both completed to the satisfaction of the Employer/ Employer's representative and occupied or used by the Department.

44.1.3 If any part of the Permanent Works shall have been completed and shall have satisfactorily passed any final test that may be prescribed by the Contract, the Employer/ Employer's representative may issue such certificate, and the Contractor shall be deemed to have undertaken to complete any outstanding work in that part of the Works during the period of Maintenance.

45. Taxes included in the bid:

45.1 Thepercentage quoted by the contractor shall be deemed to be inclusive of the sales Tax and other taxes on all materials that the contractor will have to purchase for performance of this contract including VAT for Cylindrical and Non – Cylindrical PSC pipes CED is not included.

45.2**Interest on Money due to Contractor**

No omission by the Executive Engineer or the sub Divisional officer to pay the amount due upon certificates shall vitiate or make void the contract nor shall the contractor be entitled to interest upon any guarantee fund or payments in arrear, nor upon any balance which may on the financial settlements of his accounts, founded to be due to him.

45.3**Income Tax:**

(a) The income tax will be deducted as per rules in force from the contractor bills

(b) Income Tax clearance certificate should be furnished before the payment of final Bill.

(c) The contractors staff, personal and labour will be liable to pay personnel income taxes in respect of their salaries and wages as are chargable under the Laws and regulations for the time being in force and the contractor shall perform such duties in regard to such deductions there of as may be imposed on him by such laws and regulations.

45.4**Seigniorage Charges:**

45.5.1 Seigniorage charges will be recovered as per rules

45.5.2 The Seigniorage charges will be recovered from the contractors bills as per rules or as per the rates fixed by the Mines & Geology Department from time to time as on Date of recording measurements in measurement books whichever is higher for the materials consumed theoretically on the work only.

45.6 GST/VAT :

45.6.1 GST/VAT on Running Bills will be recovered as per rules.

45.6.2 The contractor should produce a valid GST/VAT Clearance Certificate before the payment of the final bill, otherwise payment to the contractor will be withheld.

46. Price Adjustment: Price adjustment for steel, cement, bitumen, POL and other pipe materials is applicable as per G.Os in force and issued from time to time.

TERMS OF PAYMENT

The payment will be made to the contractor as per clause 68 of PS to APSS.

Payment Conditions :

S.No.	Description	Percentage of Payment on the rate
1.	After Supply, delivery of Material to site in good condition and after Quality inspection	65 %
2.	After Erection / Installation	25 %
3.	Testing and commissioning	10 %

47. Retention:

47.1 The department shall retain from each payment due to the contractor @ the rate of **7.5%** of bill amount until completion of the whole of the Works.

47.2 Deleted

47.3 On completion of the Defects Liability Period half (5%)of the total amount retained including 2.5% EMD is re-paid to the Contractor and the Employer/ Employer's representative has certified that all the Defects notified by the Employer/ Employer's representative to the Contractor before the end of this period have been corrected. While the balance half (5%) shall be paid on completion of O&M period

47.4 On completion of the whole works, the Contractor may substitute retention money with an "on demand" Bank Guarantee.

48. Liquidated Damages:

48.1 If for any reason, which does not entitle the contractor to an extension of item, the rate of progress of works, or any section is at any time, in the opinion of the Employer/ Employer's representative too slow to ensure completion by the prescribed time or extended time for completion Employer/ Employer's representative shall so notify the contractor in writing and the contractor shall there upon take such steps as are necessary and the Employer/ Employer's representative, may approve to expedite progress so as to complete the works or such section by the prescribed time or extended time. The contractor shall not be entitled to any additional payment for taking such steps. If as a result of any notice given by Employer/ Employer's representative under this clause the contractor shall seek Employer/ Employer's representative permission to do any work at night or on Sundays, if locally recognised as days or rest, or their locally recognized equivalent, such permission shall not be unreasonably refused..

48.2 If the contractor fails to complete whole of the works or any part thereof or section of the works within the stipulated periods of individual mile stones (including any bonafide extensions allowed by the competent authority without levying liquidated damages), the Employer/ Employer's representative may without prejudice to any other method of recovery will deduct one tenth of one percent of contract value per calendar day or part of the day for the period of delays subject to a maximum of 10% of the contract value as a penalty from any monies in his hands due or which may become due to the contractor. The payment or deductions of such damages shall not relieve the contractor from his obligation to complete the works, or from any other of his obligations and liabilities under the contract.

48.3 The liquidated damages for the whole of the work will be filled up at the time ofconcluding agreement

S N	Activity (2)	Target period for completion from contract commencement date (3)	Amount of penalty to be recovered in case of delayed output (4)

S N	Activity (2)	Target period for completion from contract commencement date (3)	Amount of penalty to be recovered in case of delayed output (4)
1	Mobilization on site as per activities	30 days	
2A	Ground verification, ward wise Topographical and house hold survey of the Catchment areas and site locations and planning for its sequence.	70 days	Rs. 25,000 per day
2B	Compilation and submission of woks in complete	130 days	Rs. 50,000 per day
3	Approval of final Master plan and project implementation plan	180 th day.	Rs. 50,000 per day

Construction Period:

Damages for delay shall be Five Percent (5 %) of the cost of incomplete work of each milestone per month / as per project schedule. However if the contractor catches with the progress of work the same will be released in Interim Payment Certificates on contractor achieving subsequent milestone(s)

The maximum amount of liquidated damages for the whole of the works is ten percent of final contract price.

The milestones will however be firmed up at the time of agreement after obtaining a program of the work from the bidder.

49. Mobilisation Advance: (As per G.O. Ms. Rt. No. 1474 MA & UD (A1) Dept. Dt: 12-12-2007and as per Memo No.979695/UBS/2017/at 29-1-2018 of MA&UD(UBS)Dept.

49.1 The contractors are permitted to avail the facility of Mobilization advance of 10% towards Labour and Material Mobilization against an 100% Unconditional and irrevocable Bank Guarantee acceptable to the Department, to facilitate the agencies in procurement of materials to achieve better progress of works. The interest rate @SBI MLCR+2%.

49.2 A form of Bank Guarantee acceptable to Executive Engineer is indicated at Annexure B. The advance mobilization loan shall be used by the contractor exclusively for Labour and material mobilization expenditures, in connections with the works.

49.3 Should the contractor misappropriate any portion of the advance loan, it shall become due to the Employer/ Employer's representative and payable immediately in one lump by the contractor and no further loan will be considered thereafter.

49.4 The above advance shall bear an interest of prevailing SBI PLR+2% per annum. The interest on the amounts paid as advance is chargeable from the date the amount is paid. However if completion is delayed by circumstances beyond control of the contractor for which an extension has been granted by the Executive Engineer the interest charges on such advances shall be waived for the period of extension.

In case of contractor not maintaining the progress of works as per agreed programme the interest of mobilization advance shall be levied at prevailing SBI PL R+4% per annum for the period in which the progress is not maintained. In case the

progress is made good as per the programme the rate of interest shall be at prevailing SBI PLR+2% per annum.

49.5 The value of Bank Guarantee for the advance payment given to the contractor can be progressively reduced by the amount repaid by the contractor as certified by the Executive Engineer.

49.6 Recovery of advances:

49.6.1 The advance loan together with interest at the rate as specified above shall be repaid within percentages deductions from the intermediate payments under the contract. Deduction shall commence from the first intermediate bill. The total advance amount plus interest amount shall be recovered before 90% of work is completed. The rate of recovery shall be adjusted suitably to satisfy the above criteria.

50. Securities:

50.1 The Earnest Money Deposit and Additional Security (for discount tender percentage beyond 25%) shall be provided to the Department not later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank acceptable to the Department. The Earnest Money shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security shall be valid until a date 28 days from the date of issue of the certificate of completion.

51. Cost of Repairs:

51.1 Loss or damage to the Works or materials to the Works between the Start Date and the end of the Defects Correction Periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

FINISHING THE CONTRACT

52. **Completion:**

52.1 The Contractor shall request the Employer/ Employer's representative to issue a Certificate of completion of the Works and the Employer/ Employer's representative will do so upon deciding that the work is completed.

53. Taking Over:

53.1 Except as stated in clause 52 the works shall be taken over by the Employer when they have been completed in accordance with the Contract (except as described in sub-paragraph (a) below), have passed the Tests on Completion and a taking-Over Certificate for the works has been issued, or has deemed to have been issued in accordance with this Sub-Clause. If the works are divided into sections, the Contractor shall be entitled to apply for a Taking-over certificate for each section.

The Contractor may apply by notice to the Employer's Representative for a taking-over certificate not earlier than 14 days before the works or section (as the case may be) will, in the contractor's opinion, be complete and ready for taking over. **"The request for taking over shall be accompanied by as built drawings."** The employer's representative shall, within 28 days after the receipt of the contractor's application:

(a) Issue the taking-over certificate to the contractor, stating the date on which the works or section were completed in accordance with the contract (except for minor outstanding work that does not affect the use of the works or section for their intended purpose) including passing the tests on completion: or

(b) Reject the application, giving his reasons and specifying the work required to be done by the contractor to enable the taking-over certificate to be issued: the

contractor shall then complete such work before issuing a further notice under this sub-clause.

If the Employer's representative fails to issue the taking over certificate or to reject the Contractors application within the period of 28 days, and if the works or section (as the case may be) are substantially in accordance with the contract, the taking-over certificate shall be deemed to have been issued on the last day of that period.

53.2 **Use by The Employer**

The Employee shall not use any part of the works unless the employer's representative has issued a taking-over certificate for such part. If a taking-over certificate has been issued for any part of the works (other than a section), the liquidated damages for delay in completion of the reminder of the works (and of the section of which it forms part) shall, for any period of delay after the date stated in such taking-over certificate, be reduced in the proportion which the value of the part so certified bears to the value of the works or section (as the case may be), such values shall be determined by the Employer's Representative.. The provisions of this paragraph shall only apply to the rate of liquidated damages , and shall not affect the limit of such damages.

If the Employer does use any part of the works before the taking-over certificate is issued:

(a) the part which is used shall be deemed to have been taken over at the date on which it is used,

(b) the Employer's Representative shall, when requested by the Contractor, issue a taking-over certificate accordingly, and

(c) the contractor shall cease to be liable for the care of such part from such date, when responsibility shall pass to the Employer.

After the Employer's Representative has issued a taking-over certificate for a part of the works, the contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding tests on completion, and the contractor shall carry out such tests on completion, and the contractor shall carry out such tests on completion as soon as practicable, before the expiry of the contract period.

53.3 **Interference with Tests on Completion**

If the contractor is prevented from carrying out the tests on completion by a cause for which the Employer (or another contractor employed by the Employer) is responsible, the employer shall be deemed to have taken over the works or section (as the case may be) on the date when the Tests on Completion would otherwise have been completed. The Employer's Representative shall then issue a taking-over certificate accordingly, and the contractor shall carry out the tests on completion as soon as practicable, before the expiry of the contract period. The Employer's Representative shall require the tests on completion to be carried out by 14 days notice and in accordance with the relevant provisions of the Contract. If the contractor incurs additional cost as a result of this delay in carrying out the tests on completion, such cost plus reasonable profit shall be determined by the employer's Representative and shall be added to the contract price.

54. Final Account:

54.1 The Contractor shall supply to the Employer/ Employer's representative a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer/ Employer's representative shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if

it is correct and complete. If it is not, the Employer/ Employer's representative shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the final Account is still unsatisfactory after it has been resubmitted, the Employer/ Employer's representative shall decide on the amount payable to the Contractor and issue a payment certificate within 56 days of receiving the Contractor's revised account.

55. **Termination:**

55.1 The Department may terminate the Contract if the contractor causes a fundamental breach of the Contract.

55.2 Fundamental breaches of Contract include, but shall not be limited to the following.

a) The Contractor stops work for 28 days when no stoppage of work is shown on the current program and the stoppage has not been authorised by the Employer/ Employer's representative.

b) The Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation.

c) The Employer/ Employer's representative gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Employer/ Employer's representative; and

d) The Contractor does not maintain a security which is required

e) The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined.

f) If the contractor, in the judgment of the Department has engaged in corrupt or fraudulent practices in competing for or in the executing the contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment o the Government and includes collusive practice among Bidders (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Government of the benefits of free and open competition.

55.3 Notwithstanding the above the Department may terminate the contract for convenience.

55.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secured leave the Site as soon as reasonably possible.

56. Payment upon Termination:

56.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Employer/ Employer's representative shall issue a certificate for the value of the work done less advance payments received upon the date of the issue of the certificate, less other recoveries due in terms of the Contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed. Additional Liquidated Damages shall not apply. If the total amount due to the Department exceeds any payment due to the Contractor the difference shall be a debt payable to the Department.

57. Property:

57.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Department if the Contract is terminated because of Contractor's default.

58. Release from Performance:

58.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Department or the Contractor the Employer/ Employer's representative shall certify that the contract has been frustrated. The Contractor shall make the site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all works carried out before receiving it and for any work carried out after wards to which commitment was made.

59. Water Supply:

The Contractor has to make his own arrangements for water required for the work and to the colonies and work sites, which are to be established by the Contractor.

60. Electrical Power:

The Contractors will have to make their own arrangements for drawing electric power from the nearest power line after obtaining permission from the Andhra Pradesh State Electricity Board at his own cost. In case of failure of electricity, the Contractor has to make alternative arrangements for supply of electricity by Diesel Generator sets of suitable capacity at place of work. If the supply is arranged by the Department, necessary Tariff rates shall have to be paid based on the prevailing rates.

The contractor will pay the bills of Electricity Board for the cost of power consumed by him.

The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under rule *—45(I)* of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

The power shall be used for bonafide Departmental works only.

60.1 Electric Power for Domestic Supply:

a) The contractor has to make his own arrangements for the supply of electric power for domestic purposes and the charges for this purpose have to be paid by him at the rates as fixed by the Andhra Pradesh State Electricity Board from time to time.

b) The contractor will have to make his own arrangements to lay and maintain the necessary distribution lines and wiring for the camp at his own cost. The layout and the methods of laying the lines and wiring shall have the prior approval of the Employer/ Employer's representative. All camp area shall be properly electrified. All lines, streets, approaches for the camp etc., shall be sufficiently lighted for the safety of staff and labour of the contractor, at the cost of the Contractor and it will be subject to the approval of the Employer/ Employer's representative.

61. Land:

61.1 Land for Contractor's use:

The contractor will be permitted to use Government land for execution of work. The contractor shall have to make his own arrangements for acquiring and clearing the site, leveling, providing drainage and other facilities for labour staff colonies, site office, work-shop or stores and for related activities. The Contractor shall apply to the Department within a reasonable time after the award of the contract and atleast 30 days in advance of its use, the details of land required by him for the work at site and the land required for his camp and should any private land which has not been acquired, be required by the contractor for his use. The same may be acquired by the contractor at his own cost by private negotiations and no claim shall be admissible to him on this account.

The Employer/ Employer's representative reserves the right to refuse permission for use of any government land for which no claim or compensation shall be admissible to the contractor. The contractor shall, however, not be required to pay cost or any rent for the Government land given to him.

61.2 Surrender of Occupied Land:

a) The Government land as here in before mentioned shall be surrendered to the Employer/ Employer's representative within seven days, after issue of completion certificate. Also no land shall be held by the contractor longer than the Engineer-in-Charge shall deem necessary and the contractor shall on the receipt of due notice from the Employer/ Employer's representative, vacate and surrender the land which the Engineer-in-Charge may certify as no longer required by the Contractor for the purpose of the work.

b) The. contractor shall make good to the satisfaction of the Employer/ Employer's representative any damage to areas, which he has to return or to other property or land handed over to him for purpose of this work. Temporary structures may be erected by the contractor for storage sheds, offices, residences etc., for non-commercial use, with the permission of the Employer/ Employer's representative on the land handed over to him at his own cost. At the completion of the work these structures shall be dismantled site cleared and handed over to the. Employer/ Employer's representativeThe land required for providing amenities will be given free of cost from Government lands if available otherwise the contractor shall have to make his own arrangements.

61.3 Contractor not to dispose off Spoil etc.:-

The contractor shall not dispose off or remove except for the purpose of fulfillment of this contract, sand, stone, clay ballast, earth, trees and shrubs or other materials obtained in the excavation made or lying on the site of the work, and all such materials and produce shall remain property of the Government. The Department may upon request from the contractor, or if so stipulated in the conditions of the contract allow the contractor to use any of the above materials for the works either free of cost or after payment as may be specifically mentioned or considered necessary during the execution of the work.

62. Roads:

In addition to existing public roads and roads Constructed by Government, if any, in work area all additional approach roads inside work area and camp required by the Contractor shall be constructed and maintained by him at his own cost. The layout design, construction and maintenance etc. of the roads shall be subject to the approval of the Employer/ Employer's representative. The contractor shall permit the use of these roads by the Government free of charge.

It is possible that work at, or in the vicinity of the work site will be performed by the Government or by other contractors engaged in work for the Government during the contract period. The contractor shall without charge permit the government and such other contractor and other workmen to use the access facilities including roads and other facilities, constructed and acquired by the contractor for use in the performance of the works.

The contractor's heavy construction traffic or tracked equipment shall not traverse any public roads or bridges unless the contractor has made arrangement with the authority concerned. In case contractor's heavy construction traffic or tracked equipment is not allowed to traverse any public roads or bridges and the contractor is required to make some alternative arrangements, no claim on this account shall be entertained.

The contractor is cautioned to take necessary precautions in transportation of construction materials to avoid accidents.

63. Payment for Camp Construction:

No payment will be made to the contractor for construction, operation and maintenance of camp and other camp facilities and the entire cost of such work shall be deemed to have been included in the tendered rate for the various items of work in the schedule of quantities and bids.

64. Explosive And Fuel Storage Tanks:

No explosive shall be stored within 1/2(half) KM of the limit of the camp sites. The storage of gasoline and other fuel oils or of Butane, Propane and other liquefied petroleum gases, shall confirm to the regulations of Andhra Pradesh State Government and Government of India. The tanks, above ground and having capacity in excess of 2000 liters, shall not be located within the camp area, nor within 200m, of any building.

65. Labour:

The contractor shall, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

Labour importation and amenities to labour and contractor's staff shall be to the contractor's account. His quoted percentage shall include the expenditure towards importation of labour amenities to labour and staff;

The contractor shall, if required by the Employer/ Employer's representative, deliver to the Employer/ Employer's representative a written in detail, is such form and at such intervals as the Employer/ Employer's representative may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the contractor on the Site and such information respecting Contractor's Equipment as the Employer/ Employer's representative may require.

65.1 Transportation of Labour:

The contractor shall make his own arrangement for the daily transportation of the labour and staff from labour camps colonies to the work spot and no labour or staff of the contractor shall stay at the work spot. No extra payment will be made to the contractor for the above transportation of the labour and his quoted percentage to the work shall include the transportation charges of labour from colonies to work spot and back.

II. The contractor will at all times duly observe the provisions of employment of children Act XXVI of 1938 and any enactment or modification of the same and will not employ or permit any person to do any work for the purpose under the provisions of this agreement in contravention of said Act. The contractor here by agrees to indemnify the department from and against all claims, penalties which may be suffered by the department or any person employed by the department by any default on the part of the contractor in the observance and performance of the provisions of the employment of children Act. XXVI of 1938 or any enactment or modification of the same.

As per Govt. memo No.721/Gr.(I)/81-35, dt:17.11.87. The contractor shall obtain the insurance at his own cost to cover the risk on the works to labour engaged by him during period of execution against fire and other usual risks and produce the same to the Employer/ Employer's representative concerned before commencement of work.

66. Safety Measures:

1. The contractor shall take necessary precautions for safety of the workers and preserving their health while working in such jobs, which require special protection and precautions. The following are some of the measures listed but they are not exhaustive and contractor shall add to and augment these precautions on his own initiative where necessary and shall comply with directions issued by the Employer/ Employer's representative or on his behalf from time to time and at all times.

2. Providing protective foot wear to workers situations like mixing and placing of mortar or concrete sand in quarries and places where the work is done under much wet conditions.

3. Providing protective head wear to workers at places like under ground excavations to protect them against rock falls.

4. Providing masks to workers at granulates or at other locations where too much fine dust is floating about and sprinkling water at frequent intervals by water hoses on all stone crushing area and storage bins abate to dust.

5. Getting the workers in such jobs periodically examined for chest trouble due to too much breathing in to fine dust.

6. Taking such normal precautions like fencing and lightening in excavation of trenches, not allowing rolls and metal parts of useless timber spread around, making danger areas for blasting providing whistles etc.

7. Supply work men with proper belts, ropes etc., when working in precarious slopes etc.

8. Avoiding electrical wire etc., as they would electrocute the works.

9. Taking necessary steps towards training the workers concerned on the machinery before they are allowed to handle them independently and taking all necessary precautions in around the areas where machines hoists and similar units are working.

67. Fair Wage Clause:

1. The contractor shall pay not less than fair wages to labourers engaged by him on the work.

2. "Fair" wages means wages whether for time of piecework notified by the Government from time in the area in which the work is situated.

3. The contractor shall not with-standing the revisions of any contract to the contrary cause to be paid to the labour, in directly engaged on the work including any labour engaged by the sub-contractor in connection with the said work, as if the labourers had been directly employed by him.

4. In respect of labour directly or indirectly employed in the works for the purpose of the contractors part of the agreement the contractor shall comply with the rules and regulations on the maintenance of suitable records prescribed for this purpose from time to time by the Government. He shall maintain his accounts and vouchers on the payment of wages to the labourers to the satisfaction of the Employer/ Employer's representative.

5. The Employer/ Employer's representative shall have the right to call for such record as required to satisfy himself on the payment of fair wages to the labourers and shall have the right to deduct from the contract amount a suitable amount for making good the loss suffered by the worker or workers by reason of the "fair wages" clause to the workers.

6. The contractor shall be primarily liable for all payments to be made and for the observance of the regulations framed by the Govt. from time to time without prejudice to his right to claim indemnity from his sub-contractors.

7. As per contract labour (Regulation and abolition) Act. 1970 the contractor has to produce the license obtained from the licensing officers of the labour department along with the tender or at the time of agreement.

8. Any violation of the conditions above shall be deemed to be a breach of his contract.

9. Equal wages are to be paid for both men and women if the nature of work is same and similar.

10. The contractor shall arrange for the recruitment of skilled and unskilled labour local and imported to the extent necessary to complete the work within the agreed period as directed by the **Employer/ Employer's representative** in writing.

68. Indemnity Bond:

Name of the Work :

Investigation, Survey, Design, Execution, Operation & Maintenance of "Distribution Network Improvements for NRW reduction and 24x7 supply in ABD Area of Greater Visakhapatnam Municipal Corporation"

I _____contractor S/o._____ aged Resident of _____ do hereby bind myself to pay all the claims may come (a) under Workmen's Compensation Act. 1933 with any statutory modification thereof and rules there under or otherwise for or in respect of any damage or compensation payable in connection with any accident or injury sustained (b) under Minimum wages Act 1948 (c) under payment of wages Act. 1936 (d) under the Contractor labour (Regulation and Abolition) Act. 1970 by workmen engaged for the performance of the business relating to the above contract ie., Failing such payment of claims of workmen engaged in the above work, I abide in accepting for the recovery of such claims, effected from any of my assets with the departments. accepting for the recovery of such claims, effected from any of my assets with the departments.

69. Compliance With Labour Regulations:

During continuance of the contract, the contractor and his sub contractors shall abide at all times by all existing labour enactment and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notifications that may be issued under any labour law in future either by the State or the Central Government or the local authority and also applicable labour regulations, health and sanitary arrangements for workmen, insurance and other benefits. Salient features of some of the major labour laws that are applicable to construction industry are given below. The contractor shall keep the Department indemnified in case any action is taken against Department by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Department is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for nonobservance of the provision stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the contractor, the Engineer-in-charge /Department shall have the right to deduct any money due to the contractor including his amount of performance security. The Department/Engineer-in-Charge shall also have right to recover from

the contractor any sum required or estimated to be required for making good the loss or damage suffered by the Department.

The employees of the Contractor and the Sub-contractor in no case shall be treated as the Employees of the Department at any point of time.

70. Salient features of some major labour laws applicable to establishment engaged in buildings and other construction work:

(a) **Workmen compensation Act 1923:** The Act provides for compensation in case if injury by accident arising out of and during the course of employment.

(b) **Payment of Gratuity Act 1972:** Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if any employee has completed 5 years service or more, or on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments, employing 10 or more employees.

(c) **Employees P.F. and Miscellaneous provision Act 1952:** The Act provides for monthly contributions by the Department plus workers @ 10% or 8.33%. The benefits payable under the Act are:

(i) Pension or family pension on retirement or death, as the case may be.

(ii) Deposit linked insurance on the death in harness of the worker.

(iii) Payment of P.F. accumulation on retirement/death etc.,

(d) **Maternity Benefit Act 1951:** The Act provides for leave and some other benefits to women employees in case of confinements or miscarriage etc.

(e) **Contract Labour (Regulation & Abolition) Act 1970:** The Act provides for certain welfare measures to be provided by the contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided by the Principal Department by Law. The Principal Department is required to take certificate of Registration and the contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Department if they employ 20 or more contract labour.

(f) **Minimum wages Act 1948:** The Department is supposed to pay not less than the Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment construction of Buildings, Roads, Runways are scheduled employment.

(g) **Payment of wages Act 1936:** It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made form the wages of the workers.

(h) **Equal Remuneration Act 1979:** The Act provides for payment of equal wages for work of equal nature to Male or Female workers and for not making discrimination against Female employee in the matters of transfers, training and promotions etc.

(i) **Payment of Bonus Act 1965:** The Act Is applicable to all establishments employing 20 or more employees. The Act provides for payment of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs. 3500/- per month or less. The bonus to be paid to employees getting Rs.2500/-per months or above and up to Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per monthly only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances.

Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

(j) **Industrial Disputes Act 1947:** The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock- out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(k) **Industrial Employment (Standing Orders) Act 1946:** It is applicable to all establishments employing 100 or more workmen' (employment size reduced by some of the State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Department on matters provided in the Act and get the same certified by the designated Authority.

(1) **Trade Unions Act 1926:** The Act lays down the procedure for registration of trade unions of workmen and Departments. The Trade Unions registered under the act have been given certain immunities from civil and criminal liabilities.

(m) **Child Labour (Prohibition & Regulation) Act 1986:** The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes, Employment Child Labour is prohibited in Building and Construction Industry regulation of employment of children in all other occupations and processes, Employment Child Labour is prohibited in Building and Construction Industry.

(n) **Inter-State Migrant workmen's (Regulation of Employment & Conditions of service) Act 1979:** The Act applicable to an establishment, which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another State). The inter State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home up to the establishment and back, etc.

(o) **The Building and Other Construction workers (regulation of Employment and conditions of service) Act 1996 and the Cess Act of 1996:** All the establishments who carryon any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 1% of the cost of construction as may be modified by the Government. The Department of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Department to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

(p) **Factories Act 1948:** The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 person or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

71. Liabilities of the Contractor:

71.1 Accident Relief and workmen compensation:

The contractor should make all necessary arrangements for the safety of workmen on the occurrence of the accident, which results in the injury or death of any of the workmen employed by the contractor, the contractor shall within 24 hours of the happenings of the accident and such accidents should intimate in writing to the **Employer/ Employer's representative** of the Department the act of such accident. The contractor shall indemnify Government against all loss or damage sustained by the Government resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or fines if any payable by Govt. as a consequence of Govt. failure to give notice under workmen's compensation Act or otherwise conform to the provisions of the said Act in regard to such accident.

71.2 In the event of an accident in respect of which compensation may become payable under the workmen's compensation Act VIII 23 whether by the contractor, by the Government it shall be lawful for the Employer/ Employer's representative to retain such sum of money which may in the opinion of the Employer/ Employer's representative be sufficient to meet such liability. The opinion of the Executive Engineer shall be final in regard to all matters arising under this clause.

71.3 The contractor shall at all times indemnify the Govt. of A.P. against all claims which may be made under the workmen's compensation act or any statutory modification

(a) The contractor shall, at all times, maintain on the works, staff of qualified Engineers, and Supervisors of sufficient experience of similar other jobs to assure that the quality of work turned out shall be as intended in the specifications. The contractor shall also maintain at the works, a Work Manager or sufficient status, experience and office and duly authorize him to deal with all aspects of the day-today work. All communications to any commitments by the Work Manager shall be considered as binding on the Contractor.

(b) The Contractor shall at all times submit details of skilled and unskilled labour and equipment employed to the Engineer-in-Charge in prescribed proforma as he may require to assess and ensure the proper progress of work.

(c) If the contractor does not employ the technical person agreed to on the work a fine of Rs.25,000/- will be imposed. If he does not employ for 30 days, thereafter it becomes a fundamental breach of contract.

Accommodation and food:

The contractor should arrange accommodation he needs, at his own cost. The contractor shall make his own arrangements for supply of food grains, fuel and other provision to his staff and labourers including controlled commodities.

74. Relationship:

Contractor shall have to furnish information along with tender, about the relationship he is having with any officer of the Department, Government of Andhra Pradesh of the rank Assistant Engineer and above engaged in the work and any officer of the rank of Assistant Secretary and above of the Department of Government of Andhra Pradesh.

75. Protection of adjoining premises:

The contractor shall protect adjoining sites against structural, decorative and other damages that could be caused by the execution of these works and make good at his cost any such damages.

76. Work during night or on Sundays and holidays:~

The works can be allowed to be carried out during night, Sundays or authorised holidays in order to enable him to meet the schedule targets and the work shall require MORT&H round the clock working keeping in view:

(i) The provisions of relevant labour laws being adhered to:

(ii) Adequate lighting, supervision and safety measures are established to the satisfaction of the Employer/ Employer's representative and

(iii) The construction programme given by the Contractor and agreed upon by the Employer/ Employer's representative envisages such night working or working during Sundays or authorised holidays.

(iv) The construction programme given by the Contractor and agreed upon by the Employer/ Employer's representative envisages such night working or working during Sundays or authorised holidays.

The contractor shall deposit materials for the purpose of the work on such parts only of the ground as may be approved by the Employer/ Employer's representative before starting work. A detailed survey, clearly indicating position and areas where materials shall be stacked and sheds built is to be conducted by the contractor at his own cost and only after obtaining necessary approval of the plan for use of sites by the Employer/ Employer's representative, the Contractor can use the sites accordingly.

Procurement of blasting materials and its storage is the responsibility of the contractor. The contractor shall engage licensed blaster for blasting operation. The contractor is to act in accordance with Indian Explosive Act and other rules prevailing, during the execution of work. It is the responsibility of the contractor to see, that works by other agencies in the vicinity are not hampered, in such cases if any claim is made by other agencies that should be borne by the contractor. Carriage of blasting materials, from the magazine to the work site, is the responsibility of the contractor.

79. Plant and Equipment:

79.1 The contractor shall have sufficient plant, equipment and labour and shall work such hours and shifts as may be necessary to maintain the progress on the work as per the approval progress schedule. The working and shifts hours shall comply with the Govt. Regulations in force.

79.2 It is to expressly and clearly understood that contractor shall make his own arrangements to equip himself with all machinery and special tools and plant for the speedy and proper execution of the work and the department does not undertake responsibility towards their supply.

79.3 The department shall supply such of the machinery that may be available on hire basis but their supply cannot be demanded as matter bf right and no delay in progress can be attributed to such non-supply of the plant by the department and the department cannot be made liable for any damage to the contractor. The Contractor shall be responsible for safe custody of the departmental machinery supplied to him (which will be delivered to contractor at the machinery yard at site of work) and he has to make good all damages and losses if any other than fire, wear and tear to bring it to the conditions that existed at the time of issue to the contractor before handing over the same to the department. The hire charges for the machinery handed over to the contractor will be recovered at the rate prevalent at the time of supply. The contractor will have to execute supplemental agreement with Employer/ Employer's representative at the time of supply of the machinery.

79.4 The acceptance of departmental machinery on hire is optional to the contractor.

The contractor shall not deposit materials at any site, which will cause inconvenience to public. The Employer/ Employer's representative may direct the contractor to remove such materials or may undertake the job at the cost of the contractor.

82. Conflict of interest:

Any bribe, commission, gift or advantage given, promised or offered by on behalf of contractor or his partner, agent or servant or any one on his behalf to any officer, servant, representatives, agents of Employer/ Employer's representative, or any persons on their behalf, in relation to the obtaining or to execution of this, or any other contract with Employer/ Employer's representative shall in addition to any criminal liability, which it may occur, subject to the cancellation of this or all other contracts and also to payment of any loss or damage resulting from any such cancellation. Employer/ Employer's representative shall then be entitled to deduct the amount, so payable from any money, otherwise due to the contractor under this or any other contract.

83. Contract documents and materials to be treated as confidential:

All documents, correspondences, decisions and orders, concerning the contract shall be considered as confidential and/or restricted in nature by the contractor and he shall not divulge or allow access to them by any unauthorized person.

84. General obligations of Contractor:

84.1 The contractor shall, subject to the provision of the contract and with due care and diligence, execute and maintain the works in accordance with specifications and drawings.

84.2 The contractor shall promptly inform the Department and the Employer/ Employer's representative of any error, omission, fault and such defect in the design of or specifications for the works which are discovered when reviewing the contract documents or in the process of execution of the works.

84.3 If Contractor believes that a decision taken by the Employer/ Employer's representative was either outside the authority given to Employer/ Employer's representative by the Contract or that the decision was wrongly taken, the decision shall be referred to the technical expert within 14 days of the notification of the Employer/ Employer's representative decisions

84.4 Pending finalization of disputes, the contractor shall proceed with execution of work with all due diligence.

85. Security measures:

a) Security requirements for the work shall be in accordance with the Government's general requirements including provisions of this clause and the Contractor shall conform to such requirements and shall be held responsible for the actions of all his staff, employees and the staff and employees of his sub-contractors.

b) All contractors' employees, representatives and sub-contractor's employees shall wear identifications badges provided by the contractor. Badges shall identify the contractor, showing and employee's number and shall be worn at all times while at the site. Individual labour will not be required to wear identification badges.

c) All vehicles used by the contractor shall be clearly marked with contractor's name.

d) All contractors' employees, representatives and sub-contractor's employees shall wear identifications badges provided by the contractor. Badges shall identify the contractor, showing and employee's number and shall be worn at all times while at the site. Individual labour will not be required to wear identification badges.

e) The contractor shall be responsible for the security of the works for the duration of the contract and shall provide and maintain continuously adequate security personnel to fulfill these obligations. The requirements of security measures shall include, but not limited to maintenance of order on the site, provision of all lighting, fencing, guard flagmen and all other measures necessary for the protection of the works within the colonies, camps and elsewhere on the site, all materials delivered to the site, all persons employed in connection with the works continuously throughout working and non working period including nights, Sundays and holidays for duration of the contract.

f) Other contractors working on the site concurrently with the contractor will provide security for their own plant and materials. However, their security provisions shall in no way relieve the contractor of his responsibilities in this respect

g) Separate payment will not be made for provision of security services.

86. Fire fighting measures:

a) The contractor shall provide and maintain adequate fire fighting equipment and take adequate fire precaution measures for the safety of all personnel and temporary and permanent works and shall take action to prevent damage to destruction by fire of trees shrubs and grasses.

b) Separate payment will not be made for the provision of fire prevention measures.

87. Sanitation:

The contractor shall implement the sanitary and watch and ward rules and regulations for all forces employed under this contract and if the Contractor fails to enforce these rules, the Employer/ Employer's representative may enforce them at the expenses of the Contractor.

88. Training of personnel:

The contractor, shall, if and as directed by the Employer/ Employer's representative provide free of any charge adequate facilities, for vocational training of Government Officers, students, Engineers, supervisors, foremen, skilled workman etc. not exceeding six in number at any one time on the contractor's work. Their salaries, allowances etc. will be borne by the Government and the training schemes will be drawn up by the Employer/ Employer's representative in consultation with the contractor.

89. Ecological balance:

a) The contractor shall maintain ecological balance by preventing de-forestation, water pollution and defacing of natural landscape. The contractor shall so conduct his construction operation as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings

in the vicinity of the work. In respect of the ecological balance, Contractor shall observe the following instructions.

i) Where unnecessary destruction, scarring, damage or defacing may occur, as result of the operation, the same shall be repaired replanted or otherwise

ii) All trees and shrubbery which are not specifically required to be cleared or removed for construction purposes shall be preserved and shall be protected from any damage that may be caused by the contractor's construction operation and equipment. The removal of trees and shrubs will be permitted only after prior approval by the Employer/ Employer's representative. Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and the contractor shall adequately protect such trees by use of protective barriers or other methods approval by the Employer/ Employer's representative. Trees shall not be used for anchorages. The contractor shall be responsible for injuries to trees and shrubs caused by his operations. The term "injury" shall include, without limitation bruising, scarring, tearing and breaking of roots, trunks or branches. All injured trees and shrubs be restored as nearly as practicable without delay to their original condition at the contractor's expense.

(iii) The contractor's construction activities shall be performed by methods that will present entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastage into river. Such pollutant and waste include earth and earth products, garbage, cement concrete, sewage effluent, industrial wastes, radio-active substances, mercury, oil and other petroleum products, aggregate processing, mineral salts and thermal pollution. Pollutants and wastes shall be disposed off in a manner and at sites approved by the Employer/ Employer's representative.

(iv) In conduct of construction activities and operation of equipments the contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize the air pollution. The excessive omission of dust in to the atmosphere will not be permitted during the manufacture, handling and storage of concrete aggregates and the contractor shall use such methods and equipment as a necessary for collection and disposal or prevention of dust during these operation. The contractor's methods of storing and handling cement shall also include means of eliminating atmospheric discharges of dust, equipment and vehicles that give objectionable omission of exhaust gases shall not be operated. Burning of materials resulting from clearing of trees, bushes, combustible construction materials and rubbish may be permitted Only when atmospheric conditions for burning are considered favorable.

b) Separate payment will not be made for complying with the provisions of this clause and all cost shall be deemed to have been included in the unit rates and prices included in the contract if any provision is not complied with within a reasonable time even after issue of a notice in this respect, the necessary operations would be carried out by the Employer/ Employer's representative at the cost of the Contractor, Orders of the Employer/ Employer's representative in this respect would be final and binding on the contractor.

90. Preservation of existing vegetation:

a) The contractor will preserve and protect all existing vegetation such as trees, on or adjacent to the site which do not unreasonably interfere with the construction as may be determined by the Employer/ Employer's representative. The contractor will be held responsible for all unauthorized cutting or damage of trees, including damage due to careless operation of equipment, stockpiling of materials or trekking of grass areas by equipment. Care shall be taken by the Contractor in felling tress authorized for removal to avoid any unnecessary damages to vegetation and tress that are to remain in place and to structures under construction or in existence and to workmen.

b) All the produce from such cutting of trees by the contractor shall remain the property of Government and shall be properly stacked at site, approved by the Employer/ Employer's representative.. No payment whatsoever, shall be made for such cutting and its stacking by the Contractor. If any produce from such cutting is not handed over to the Government by the contractor, he shall be charged for the same at the rates to be decided by the Employer/ Employer's representative.. The recovery of this amount shall be made in full from the intermediate bill that follows.

c) The contractor shall also make arrangements of fuel deposits for supply of required fuel for the labourer to be employed for cooking purpose at his own cost in order to prevent destruction of vegetation growth in the surrounding area of the work site.

91. Possession prior to completion:

The Employer/ Employer's representative shall have the right to take possession of or use any completed part of work or works or any part there of under construction either temporarily or permanently. Such possession or use shall not be deemed as an acceptance of any work either completed or not completed in accordance with the contract with in the interest of Clause 28 of APSS except where expressly otherwise specified by the Employer/ Employer's representative.

92. Payment upon termination:

If the contract is terminated because of a fundamental breach of contract by the contractor, the Employer/ Employer's representative shall issue a certificate for the value of the work done less advance payment received upon the date of the issue of the certificate and less the percentage to apply to the work not completed as indicated in the contract data. Additional liquidated damages shall not apply. If the total amount due to the Department exceeds any payment due to the contractor the difference shall be a debt payable to the Department. In case of default for payment within 28 days from the date of issue of notice to the above effect, the contractor shall be liable to pay interest at 12% per annum for the period of delay.

93. Access to the contractor's books:

Whenever it is considered necessary by the Engineer-in-Charge to ascertain the actual cost of execution of any particular extra item of work or supply of the plant or material on which advance is to be made or of extra items or claims, he shall direct the contractor to produce the relevant documents such as payrolls, records of personnel, invoices of materials and any or all data relevant to the item or necessary to by the Employer/ Employer's representative. and the Engineer-in-Charge's representative and by any other persons authorised by the Employer/ Employer's representative. in writing.

95. B.I.S. [I.S.I.] books and APSS to be kept at site:

A complete set of Indian Standard specifications ,CPHEEO manual on sewerage and treatment and any other relevant literature referred to in "Technical Specifications" and A.P.S.S. shall be kept at site for reference.

96. Variations by way of modification, omissions or additions:

For all modifications, omissions from or additions to the drawings and specifications, the Employer/ Employer's representative will issue revised plans, or written instructions, or both and no modification, omission or addition shall be made unless so authorised and directed by the Employer/ Employer's representative. in writing.

The Employer/ Employer's representative shall have the privilege of ordering modifications, omission or additions at any time before the completion of the work and such orders shall not operate to annual those portions of the specifications with which said changes do not conflict.

Employer/ Employer's representativeDecision:

It shall be accepted as in separable part of the contract that in matters regarding materials, workmanship, removal of improper work, interpretation of the contract drawings and contract specification, mode of the procedure and the carrying out o the work, the decision of the Engineer-in-Charge, which shall be given in writing shall be binding on the contractor.

97. Care and diversion of river/stream:

The contractor shall submit details regarding the diversion and care of river or stream during construction of the work along with a separate print-out of the time table showing earliest and latest start and finish dates of various activities. He should submit a detailed layout plan with drawings for the diversion and care of river during construction of work. The above arrangements shall be at contractor's cost.

98. Income tax:

a) Income Tax will be recovered as per rules in force.

b) Income Tax clearance certificate should be furnished before the payment of final bill.

c) The contractor's staff, personnel and labour will be liable to pay personnel income taxes in respect of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

99. Seigniorage charges:

99.1 *Seigniorage charges will be recovered as per rules from the work bills of the contract or based on the theoretical requirement of materials*

99.2 The rates are liable to be revised and amended from ~time to time by the State Government, by notification in the 'Andhra Pradesh Gazette'. If the revised Seigniorage fee is more than the above mentioned, the recovery from the contractor's bills is as per revised rates.

99.3 The Sand consumed in all Government works by the contractors, normal Seigniorage fee with one time penalty may be recovered from the work bills by the consuming

department in case of procurement of sand is without valid permits issued by theconcerned Assistant Director of Mines & Geology.

100. Tax:

100.1 Any changes made in the GST structure from time to time shall be considered.

100.2 The contractor should produce a valid Sales Tax Clearance Certificate before the payment of the final bill, otherwise payment to the contractor will be withheld.

101. Supply of construction materials:

i) The contractor has to make his own arrangements for procurements, supply and use of construction materials.

[Any other special conditions applicable to the work put to Tender]

102. In respect of EPC works the conventional Schedule- A giving the quantities against each item of work is dispensed with. Only project information regarding project features, major components as available are given in project profile of bid documents. Scope of work and basic project parameters of the project and deliverables shall be defined in the bid documents. The bidders shall review the data / information provided in bid documents and satisfy themselves. Any doubts shall be got cleared in pre bid meeting. The contractor shall quote the bid price in lump-sum after careful analysis of cost involved for the performance work considering all basic parameters, specifications and conditions of contract The bid offer shall be for the whole work and not for individual item / part of work. The bidder shall quote for the entire work on a single source responsibility basis. The cost of all items of work necessary to achieve the objective as setout in the basic parameters shall be included in the bid price. The total cost of work shall be mentioned.

103. In respect of EPC works the execution shall be strictly in accordance with bid conditions. Contractors shall not deviate from basic parameters of the project to reduce his costs. EPC being a turnkey system extra items / financial claims on the department contingent to the work other than price adjustments shall not be considered.

104. In respect of EPC the Internal Bench Mark (IBM) put to tender value shall be the basis for comparison of tenders.

105. **The agency shall furnish the detailed estimates prepared based on approved drawings as per provision of agreement.**

106. Drawings given, listed and indexed in bid documents are indicative. The above drawings show the system, as a whole .The contractor shall carry out investigation to prepare detailed layout, designs and drawings of all components of the work within the stipulated time period, to be approved by consultant/ departmental authority. The contractor shall follow all relevant BIS codes / circulars issued by the department from time to time for various components of the works. In case of difference of opinion on technical matters between the contractor and the Engineer-in-charge, the decision of the appellate authority shall be final and binding on the contractor.

107. The appellate authority is MD & CEO, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED in respect of designs and drawings approved by Engineer-in-charge.

108. The appellate authority is Chief Engineer (PH) Guntur in respect of designs and drawings approved by Superintending Engineer.

109. The appellate authority is the Committee constituted by the Government in respect of designs and drawings approved by Superintending EngineerVisakhapatnam municipal Corporation

110. In case of EPC works, if the prime contractor desires to sublet a part of the work, he should submit the same at the time of filing bids (itself) or during execution, giving the name of the proposed sub contractor, along with details of his qualification and experience. The bid accepting authority should verify the experience of the sub contractor and if the sub contractor satisfies the qualification criteria in proportion to the value of work proposed to be sub let, including his past track record of completion and quality of work, he may permit the same. The aggregate value of works to be awarded on sub letting shall not exceed 50% of contract value. The extent of sub letting shall be added to the experience of the sub contractor and to that extent deducted from that of the main contractor.

111. The Chief Engineer (PH) shall permit grant of extension of time up to six months and the State level Committee constituted by the Govt. for beyond six months, subject to levying liquidated damages wherever necessary and the employer conveys the same to the agency.

112. Termination of contact shall also be as per condition No.55 of General Conditions of EPC contract.

113. Entrustment of additional items of work contingent to main work and outside the scope of the contract will be authorized by the employer with the prior approval of the Committee constituted by the Government and the contractor shall be bound to execute such additional items and shall be compensated at the price decided by the Committee formulated by the Government.

114. Whenever additional items not contingent on the main work and outside the scope of original contract are entrusted to the contractor, entrustment of such items and the price to be paid shall be referred to the Committee formulated by Government for final decision.

115. In respect of open category tenders, technical evaluation shall be done first following the criteria specified in the bid document and financial bid evaluation shall be done in respect of those who are qualified in technical bid evaluation.

116. In addition to the four methods of execution viz., (i) the departmental method (ii) the piece work contract method (iii) the lump sum contract method and (iv) the schedule contract method , (v) fifth method is introduced for execution of EPC works by an agreement in the form approved by Government for EPC works.

117. In regard to method (v) the details are set forth clearly in the form of articles of agreement, tender notice and tender documents approved by committees constituted by Government.

118. In case of EPC works, measurements shall be recorded by EPC agency in M.Books and L.F. Books issued by the concerned EE duly numbered and certified. The M. Books and L.F. Books have to be maintained by the EPC agency through authorized graduate engineers as per procedure prescribed in Code and finally to be handed over to the department (Engineer-in-charge).

119. Wherever Quality Control agencies are in existence, such agency has to record its findings in M Books/LF Books besides furnishing certificates as prescribed separately.

120. Contractors are permitted to avail the facility of Mobilization advance in two installments equivalent to 10% (5% for Labour Mobilization and 5% for Machinery & equipment) of the contract amount. The Mobilization advance of 5% towards Labour Mobilization be paid in two installments as detailed below

121. 1% after concluding the agreement

122. 4% at the time of commencement of work (After completion of investigation, survey & designs).

123. Mobilization advance on Machinery is payable against the production of invoices in proof of purchase of the machinery by the contractor / firm.

124. The invoices should be on the name of the contractor / firm only and the machinery should have been purchased only after the date of conclusion of the agreement for the work on which the payment of mobilization advance is proposed.

125. Mobilization advance is payable against copies of bills in respect of new machinery purchased @ 100% value as prescribed in the agreement. The same is payable in respect of old machinery at 50% of the value (as prescribed in the agreement) as per the registered sale deed.

126. No Mobilization advance is payable on the pre-owned machinery prior to conclusion of the agreement for the work or leased machinery or purchased by the contractor.

127. Recovery of mobilization advance along with interest shall be made as per provisions of the contract. The interest at SBI MCLR +2%.

128. The estimate shall be prepared based on available preliminary data, the scope of works and project parameters taking into consideration

129. Superintending Engineer Municipal Corporation,Visakhapatnamshould prepare project profile and basic project parameters with project cost under EPC turnkey System. The same shall be approved by the Committee constituted for the purpose.

130. in case the department has any new facts which will materially affect the cost of the project they shall be taken into consideration and brought to the notice of the IBM Committee. After approval of the IBM Committee, technical sanction will be accorded.

131. If that cost of estimate is found to exceed the Administrative approval, Revised administrative approval must be obtained before according Technical sanction.

132. In case of EPC works the designs are to be submitted by the executing agency which shall be approved by the competent authority. The EPC agency responsible for the technical features of designs.

133. In addition to the three methods of execution fourth method is introduced for execution of EPC works. (iv) By an agreement in the form approved by Government for EPC.

134. In regard to method (iv) The details are set forth clearly in the form of articles of agreement, tender notice and bid documents approved by Government.

135. Contract documents approved by the Committee constituted by Government for EPC works in terms of Para 153 of “D” Code shall be followed whenever tenders are invited for EPC works.

136. In respect of EPC works limited/ open tender system shall be followed.

137. In respect of EPC works, M. Books and L.F. Books have to be issued by the Executive Engineer to EPC agency duly certified and numbered for recording measurements and levels. The M. Books and L.F. Books shall be maintained by EPC Agency and bills are to be submitted to the **Engineer in Charge** by the EPC agency along with a true extract of the entire set for checking and making payment. The Engineer-in-charge has to keep the full set of true extract with him and return the originals to the agency for further use. The entire original record shall be finally handled over for record to the Engineer-in-charge by the EPC Agency.

138. In respect of EPC works, EPC Agency shall prepare monthly work bills based on measurements of work done and submit to Engineer-in-charge.

139. In respect of EPC works, payments shall be regulated in accordance with Annexure-II- Schedule of Payments component wise.

140. The components may be further divided into appropriate sub components and stages. The payment of each stage of sub component shall be expressed as percentage of total cost of approved bid which shall also be approved by the Superintending Engineer and shall form part of contract. Sum of all such stages of particular component shall be equal to the percentage of that component shown in Annexure-II of Schedule of Payments.

141. The percentage fixed for sub component shall be correlated to the main component and volume of the work.

142. The eligibility for payment shall be limited to completed portions of works, subject to other conditions envisaged in the agreement and executive instructions from time to time.

143. Schedule-A indicates only firm lump-sum amount of the contract.

144. Bidder shall quote lump sum amount for the work as a whole.

145. Percentages of components shall be indicated by the department in Annexure-II to Schedule .A

146. The Chief Engineer is empowered to modify the percentage of components; stage wise based on the detailed investigation, detailed drawings, and detailed estimation done by the EPC agency keeping the total price bid unaltered.

147. The Superintending Engineer is empowered to modify the sub-components reach-wise/stage-wise keeping the percentages of component unaltered.

148. The Sub Divisional Officer and Engineer-in-charge shall exercise check to see that the bill submitted by EPC agency is in accordance with agreement conditions and certified by the departmental Quality Control Authorities (or) 3rd Party Quality Control Agency (or) by both if both are deployed on the work.

149. Engineer-in-charge (EE) should check the claim with reference to the measurements recorded to see that the percentage at which the bill is claimed is clearly traceable into the documents on which payments are to be made. Payments shall be adjusted for recovery of advance payments, liquidated damages in terms of agreement conditions, security deposit for due fulfillment of the contract. Recoveries shall be affected towards seignorage charges on the materials used and VAT and other statutory recoveries as per State and Central Government Rules and Acts.

In relaxation of provisions contained in APDSS, D-code, Financial Code, Accounts code, the following shall be applicable to the EPC turnkey system:

150. Definitions: (i) The employer is The MD & CEO, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED i.e., the agreement concluding authority (ii) “Engineer-in-Charge” is the Executive Engineer in charge of execution.

151. In respect of EPC works the conventional Schedule- A giving the quantities against each item of work is dispensed with. Only project information regarding project features, major components as available are given in project profile of bid documents. Scope of work and basic project parameters of the project and deliverables shall be defined in the bid documents. The bidders shall review the data / information provided in bid documents and satisfy themselves. Any doubts shall be got cleared in pre bid meeting. The contractor shall quote the bid price in lump-sum after careful analysis of cost involved for the performance work considering all basic parameters,

specifications and conditions of contract The bid offer shall be for the whole work and not for individual item / part of work. The bidder shall quote for the entire work on a single source responsibility basis. The cost of all items of work necessary to achieve the objective as setout in the basic parameters shall be included in the bid price. The total cost of work shall be mentioned.

152. The execution shall be strictly in accordance with bid conditions. Contractors shall not deviate from basic parameters of the project to reduce his costs. EPC being a turnkey system extra items / financial claims on the department contingent to the work other than price adjustments shall not be considered.

153. In respect of EPC works drawings given, listed and indexed in bid documents are indicative. The above drawings show the system as a whole .The contractor shall carry out investigation to prepare detailed layout, designs and drawings of all components of the work within the stipulated time period, to be approved by consultant/ departmental authority. The contractor shall follow all relevant BIS codes / circulars issued by the department from time to time for various components of the works. In case of difference of opinion on technical matters between the contractor and the Engineer-in-charge, the decision of the appellate authority shall be final and binding on the contractor.

NOTE ON ROLES AND RESPONSIBILITES OF CONSTRUCTION STAFF, QUALITY CONTROL WING AND THIRD PARTY QUALITY CONTROL AGENCY IN EXECUTION OF PROJECT TAKEN UP UNDER EPC TURNKEY SYSTEM.

The Government of Andhra Pradesh has taken up large number of Drinking Water Supply Projects to bring the water supply position to the standards of CPHEEO. Government have also taken up Under Ground Drainage, Storm Water Drainage, Solid Waste Management Projects in different ULBs to improve the standard of living of the people. Most of the projects are being grounded and are at various stages of progress. As the projects are to sustain for number of decades, Quality Control assumes an important role. Maintenance of Quality of Projects is a continuous process and has to be ensured and assured by the executing agency under EPC System, construction staff, Department Quality Control and the third party Quality Control agencies wherever appointed.

The following guidelines are drafted with reference to the roles and responsibilities of filed staff, quality control staff and 3rd party quality control agencies, procedure for recording of work executed in M Books for making payments to the contractors for the work executed every month including maintenance of records and certification of quality of work executed and the same may be followed to have a uniform procedure in maintaining the quality controls / assurance in the project taken up under EPC turnkey system

A) The roles and responsibilities of field staff, Quality Control Staff and 3rd Party Quality Control Agencies.

I) FIELD STAFF

1) The field staff (construction staff) has to associate with the EPC agency while conducting the tests. In case of necessity they may conduct tests independently whenever required. Under EPC system the field staff play a vital role in quality assurance of the works.

2) The field staff shall invariably check and produce all the following Records and OK **cards maintained by EPC Agency at the site to the Inspecting Officers.**

A) Registers

1) Site Order

2) Register of Bench Marks

3) Material OK Register

4) Register of Foundations

5) Register of placement for concrete, Embankment, reinforcement and other test reports.

6) Register of laying pipelines, testing.

7) Register of test reports of comprehensive strength of concrete specimens

8) Cement Day Book

9) In case of Earthwork excavation embankment, the field staff have to check and record the pre levels 25% of the pre levels taken by the EPC agency. In case of cut-off and foundations the field staff have to check and record 100% levels.

II) Department Quality Control Staff

a) The Department Quality Control staff shall verify the records maintained at site by EPC agency and the third party quality control agency. The filed quality control staff have to check 25% of works such as pipes, laying, jointing, testing including pumping machinery and record independently.

b) Regarding the tests and frequency of tests, the field quality control staff have to conduct / associate with construction staff as mentioned in Annexure – D. In case of ambiguity, they shall conduct tests in APERL / independent laboratory approved by employer.

c) Wherever the Third Party quality control agency is not appointed, the Department Quality Control staff have to issue the quality certificates for releasing payment to the EPC agency during construction and other completion.

III Third Party Quality Control Agency

a) The Third Party Quality Control agency should posses all the testing facilities as per agreement and conduct independent testing to assure the quality of work. They should also verify 10% of the tests being done by the EPC agency independently.

b) The third party quality control agency has to submit the reports and records to the Engineer-in-Charge vide appendix “E”.

B Recording of measurements and certifying payments to the EPC Agency.

a) Measurements are to be recorded by the EPC Agency in the Measurement Book and LF Books.

b) The measurement book and LF book are to be issued by the concerned Executive Engineer duly certified and numbered.

c) Field Engineer (AE/AEEs) have to check and record 25% of prevels and 100% for final levels.

d) Field Engineer (AE/AEEs) have to check measure 20% of final measurement.

e) Field Dy. EEs have to check the measure 25% of the levels and measurements spread over the entire work

f) Field EE/SEs have to check measure as per codal provisions and rules in vogue.

g) The measurement books and LF books have to be maintained by the EPC agency and finally to be handed over the Department (Engineer-in-Charge)

h) The Department QC Staff have to check 25% of the work such as pipes, laying, jointing, testing, concrete work, etc.

i) Measurement will be recorded by the EPC agency for the finished work duly certifying that all tests are conducted and work done by the agency in accordance with specifications and contracts conditions by using the material specified in the contract.

j) The EPC Agency shall prepare monthly work bills based on the recorded measurement of work done and submit to the Engineer-in-charge duly signed by them or his authorized signature for arranging

k) The Engineer-in-Charge shall recommend for release of payment duly ensuring quality certificate by the third party quality control agency / Department quality control staff (in absence of third party quality control).

NOTE: The above guidelines have to be followed duly inter relating with the relevant conditions / clauses of the respective Agreements concluded.

(C) Reporting procedure for adverse remarks of 3rd party Quality Control Agency and Departmental Quality Control Staff.

1 Reporting procedure shall be followed as per Appendix 'E'.

2 The third party quality control agency shall submit reports in four sets for specific cases of deficiencies for corrective action to the Engineer-in-charge soon after verification. The sub-standard material shall be rejected and got them removed from the site. In case necessity, Engineer-in-Charge shall arrange to stop the work till the deficiencies are rectified to the satisfaction of the 3rd party Quality control Agency / departmental quality staff.

3 The Engineer-in-Charge shall communicate the above remarks of 3rd party quality control agency to the EPC agency for compliance of corrective action.

4 The EPC agency shall furnish compliance report to the Engineer-in-Charge, who in turn forward the same to the third party quality control agency / department quality control as the case may be for verification.

5 Soon after receipt of report on the compliance to the remarks of the third party quality control agency by the EPC agency, evidence of compliance of corrective action has to be furnished to the Engineer-in-Charge to proceed with further work.

6 In addition to the above, the observations made by the third party quality control and the Department quality control staff have to be invariably completed with before the next bill is present for payment and certificate to that effect has to be recorded in bills presented by the EPC agency duly countersigned by their field construction staff before making payments.

7 On completion of the works, the third party control agency and Department Quality Control staff have to certify that the work has been executed as per design and specifications satisfying intended scope of project as indicated in the agreement before making final payments to the EPC agency.

8 All Quality Control Units inclusive of 3rd party agency shall be under the Technical Control of Chief Engineer (Public Health)

Salient points on the Duties of the Construction Engineers under E.P.C. System:

- Under E.P.C. System, the field Engineers are primarily responsible for Quality Assurance of the work executed by them and conduct all field tests before allowing further work.

- Shall check and produce to inspecting officers the following Records and O.K. Cards maintained by the E.P.C. Agency.

A) Registers:-

1. Site order.
2. Register of Bench Marks.
3. Material O.K. Register.
4. Register of pipes, laying, jointing, testing.
5. Register of foundations.
6. Register of placement of concrete, Embankment, Reinforcement and other test reports.
7. Register of test reports of compressive strength of concrete specimens.

E.Es/S.Es have to check measure as per Codal provisions and rules in vogue.

- The Measurement records have to be maintained by E.P.C. Agency and finally handed over to the Engineer-in-Charge.

- The observations made by Third party Quality Control, Department Quality Control Staff have to be invariably complied with before the next bill for payment is presented. To that effect certificate has to be recorded by E.P.C. Agency and countersigned by the field Engineers.

Under E.P.C. System of contract, fortnightly Management Meetings with E.P.C. Agency by the Superintending Engineer shall invariably discuss the Quality Assistance Aspects and records in the Minutes of Meeting regularly.

Salient Points on the Duties of Department Quality Control Staff.

- Shall verify the records maintained @ site by the E.P.C. agency and the Third Party Quality Control agency.

- Shall check 25% of the pipe laying, testing, final levels/measurements of Earth work, revetment, leveling, concrete, linear dimensions of important structures, etc.

- Shall conduct/Associate with construction staff with regard to Test & Frequency of Tests as stipulated in the Annexure 'D' of Committee on Q.C. Recommendations.

- In case of Ambiquity of Test Results, they shall conduct tests in A.P. E.R.L. independently.

- Shall issue quality certificates for releasing payment in absence of Third Party Quality Control to the E.P.C. Agency during construction and after completion.

- Shall certify that the work has been executed as per designs & Specifications (agreement) before final payment to E.P.C. Agency.

Third Party Quality Control Agency

The Third Party Quality Control Agency should possess all the testing facilities as per Agreement and conduct independent Testing to assure the Quality of Work.

- Shall verify 10% of the tests done by the E.P.C.Agency.

- Shall submit the Reports and Records to Engineer-in-Charge as per agreement with the Department.
- Shall give Quality Control Certificate for each work bill executed by the EPC Agency.
- On completion of the work, the third Party Quality Control Agency shall certify that the work has been executed as per Design and specifications indicated in the agreement satisfying intended scope project before marking final payment to the E.P.C. Agency.

VOLUME – II

SECTION – 4

TECHNICAL SPECIFICATIONS

SETTING OUT OF WORKS, DESIGN CRITERIA, OBLIGATORY REQUIREMENTS AND SPECIFICATIONS

4.01 General & Approach to Work Site

The general site site particulars is shown in the Drawings enclosed in the Volume – IV Tender Document. The scope of topographic survey for the contractor consist of establishing bench mark stations, carrying out traverses, topographic survey for provision of Major & Minor Sewers, development of surface level roads, design of drainage system for the surface level roads and integration of the drainage system to the natural outfall.

4.02 Topographic Survey, Bench Marks & Setting out of Works

a. The contents of the topographic survey drawing covering topographic details, bench marks and coordinates is for reference. The Department does not take responsibility about the correctness of the details in the drawing.

b. Contractor shall carry out detailed topographic survey by carrying out horizontal and vertical traverse followed by capturing of topographic survey details. Contractor shall establish one Permanent Control Point at the project site connected with atleast three inter-visible points. Contractor shall also establish atleast two Bench mark stations in all the arms of the junctions, with the distance between two bench mark stations not exceeding 400m. Control Point and Bench mark station shall be in precast RCC Pillar with a minimum dimensions with length and width of 150mm and total depth of 600mm with 400mm standing height above the top of existing road / ground level.

c. Contractor shall conduct horizontal traverse for the project using Total Station of 1 sec least count connecting stations in the form of loop and the traverse closure shall be better than 1 in 20000 accuracy and the misclosure error shall be distributed. In case, the traverse closure is above 1 in 20000, the contractor shall re-conduct the traverse until the closure is within the permissible value of 1 in 20000 or better. Vertical traverse shall be conducted using Auto Level from Survey of India benchmark which shall be transferred to the permanent control point of the project. Vertical data recordings shall be based on double tertiary measurements of the three cross hair readings of the instrument. The closure error shall be checked for the permissible limits of 12 x sqrt(K) in millimeters, where K is the distance in Km. The error shall be distributed within to all the bench marks in the loop. In case, the error is more than the permissible limits, then the survey shall be re-conducted.

d. Contractor shall be solely responsible for the correctness of the traverses data. The reduced levels shall be painted on all the bench marks.

e. The Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the positions, levels and dimensions and alignments of all parts of the works and for the provision of all necessary instruments, appliances and labour in connection therewith. Setting out of piers / abutments / RE wall edges and other obligatory points / locations as desired by Employer / Employer's representative shall be secured at ground with nails and painted the point with circle along with identification. The Contractor shall give at least 24 hours notice to the Employer / Employer's Representative of his intention to set out or give levels.

f. If at any time during the progress of the work, any error may appear or arise

in the positions, levels, dimensions of alignments of any part of the work, the Contractor shall at his own expenses, rectify such errors to the satisfaction of the Employer / Employer's Representative at no additional cost and time.

g. All duties concerning establishment of a set of bench marks, permanent stations for setting up total stations, centre line pillars, etc. for performing all the functions necessary at the commencement and during the progress of work till the physical completion of all the items of the work in his scope, shall be carried out by the Contractor at his own cost.

h. The centre line and edges of Major Bridge / Road, and the foundations shall be established by total station and the centre line marks shall be engraved on smoothly finished masonry or concrete pillars of such dimensions and constructed at such intervals and places as may be directed by the Employer / Employer's Representative and shall be maintained in proper manner throughout the period of construction. The Contractor shall submit a drawing showing the Major Bridge / Road alignment and wall locations within 15 (fifteen) days from the date of signing of agreement.

i. The contractor shall also keep proper record of such permanent Bench marks established denoting therein their correct levels.

j. The work of establishment of all such Bench Marks shall be carried out by only experienced staff of the Contractor with the help of precise instruments suitable for this type of work. The instruments used shall be checked for their accuracy and for permanent adjustments before the commencement of the work and also at frequent intervals during the progress of the work.

k. All such Bench marks established by the Contractor shall be subjected to check and approval of the Employer / Employer's Representative or his representative as and when required, and any variations noticed in the work as a result of improper establishment and maintenance of such Bench Marks shall be rectified at the Contractor's risk and expense.

4.03 **Design Criteria**

Programme of submission and approval of design and drawings for Sewerage Scheme:

The programme for submission of designs and drawings is as listed out below:

Details	**Time from award of work**
Award of work	0
1 Completion of all survey, investigation work. Submission of QAP	45 Days
2 Submission of project Master plan and Implementation plan .	120 Days

4.04 Submission of Design and Drawings

a) The design should be submitted in sufficient details and as lucidly as possible so as to enable quick proof checking by the Consultants. The designs and drawings will be proof checked and commented generally within 15 days of submission. All the design calculations after incorporating the comments of the proof checking consultants along with corresponding construction drawings marked "Good for Construction" shall be submitted, got approved by the proof consultants for use at site within 7 days thereafter.

b) <u>If the designs and drawings are not submitted within the time frame, then a penalty at the rate of Rs. 5,000/- (Rupees Five thousand only) per day shall be charged for every day of delay.</u>

c) Any other component which required redesigning on account of exigencies of the site like redesigning the foundations for utilities, etc., during the duration of the works shall be approved as expeditiously as possible. Such designs should be submitted within 10 days of taking a decision to redesign the component.

d) Analysis and design as far as possible shall be done using computer with recognized software. The contractor shall submit with design, the detailed description of method of analysis with explanatory notes and submit sample manual calculations for adequate number of typical cases. The Computer Programme as submitted will be further tested by comparison with solutions of worked examples.

e) Drawings and designs shall be in metric units. Calculations shall be neat and clear, preferably typed and printed and supplemented by full explanatory notes and sketches wherever required. All construction drawings of initial submissions and final approval shall be in Autocad only.

f) If during the scrutiny of detailed design calculations and working drawings, any changes therein which are found necessary in the opinion of the Employer / Employer's Representative, the same shall be incorporated without altering the lumpsum quotations. It is entirely the responsibility of the contractor to submit properly prepared and completed designs in good time to enable the Employer / Employer's Representative to approve them in time.

g) Bar bending schedule of reinforcement, shop drawings of prestressing tendons and other elements and average quantity of reinforcement per Cum. of concrete quantity (and also percentage with respect to gross cross sectional area of the component) should also be shown on the relevant drawings.

h) Eight sets of prints of approved working drawings including one set on reproduction tracing, floppy diskette of the Autocad/Felixcad drawing and 4 sets of approved design calculations shall then be supplied by the contractor which will be formally authenticated by the Employer / Employer's Representative (one set of design calculations and working drawings shall be returned to the contractor after verifying and the remaining shall be retained by the Employer / Employer's Representative). The design calculations and drawings shall be submitted in plastic files and plastic folders free of cost.

i) After completion of each stage of work, 3 sets of record plans and one set of final design calculations based on the work as actually executed on site, shall be supplied by the Contractor in bound volumes, to the Employer / Employer's Representative.

j) Approval to drawings and designs and design calculations by the Employer / Employer's Representative shall not in any way relieve the Contractor of his responsibility for the correctness, soundness and structural stability and safety of the structure.

k) The approved drawings and the design calculations of the Major Bridge shall be the property of the Department.

l) The Contractor's designer or consultant shall attend all the review meetings conducted by Employer / Employer's Representative from time to time without any extra cost and shall also remain present as and when required during the checking of designs for clarifications if required.

4.05 **Documentation, instrumentation, etc.**

a) All drawings shall be made in latest version of Autocad and the soft copies on CDs and six copies of prints of all approved drawings and "as built" drawings shall be supplied by the Contractor free of cost as per the agreed programme.

b) Floppy diskettes CDs and six copies of all design calculation shall be submitted as per agreed programme.

c) "Maintenance Manual" describing access arrangements, important obligatory precautions from the point of view of structural safety, and procedure for minor and major repairs of each component of the Major Bridge, renewals of finishes and treatments periodically shall be supplied by the Contractor free of cost.

d) A "Quality Assurance Manual" covering designs and drawings, mix-designs, materials, testing, soil and rock properties, statistical quality control, etc. shall be prepared by the Contractor free of cost well before starting the work.

e) A "Construction manual" covering various aspects of construction methods, difficulties faced and how they are overcome during execution etc., shall be supplied by the contractor free of cost at the time of finalisation of work.

f) The Contractor shall install fixtures and fastenings provided by the Department for housing any instrumentation that may be useful for the Department at his cost.

g) Fixing arrangement for internal and external lighting shall be got approved from Employer / Employer's Representative and executed.

4.06 **Specifications for Design and Codes to be followed**

4.07 Order of precedence in case of conflicts

In case of conflicts between the different partners of the tender. The following order of precedence shall prevail.

i. Design Criteria as specified in the Tender

ii. Special conditions of contract

iii. General conditions of contract

iv. Standard Codes of practice

4.08 **Disputes**

In case of disputes arising between the Contractor and the authority approving the designs, the matter may be referred to the Employer / Employer's Representative. The decision of the Employer / Employer's Representative shall be final and binding on the contractor.

SECTION-5
MATERIALS,PLANT&MACHINERY

Sl. No.		Description	
A)	**CIVIL WORKS:**		
	Division – 1	…	General Specifications
	Division – 2	…	Site Work
	Division – 3	…	Earth Work Excavation
	Division – 4	…	Masonry
	Division – 5	…	Plastering and Pointing
	Division – 6	…	Concrete

DIVISION – 1

GENERAL SPECIFICATIONS

The I.S. Codes shall be those indicated or subsequent amendments thereon

SL. No.	Description	I.S. No.
LIST OF INDIAN STANDARDS		
I.	CEMENT	
1.	Ordinary and Low Heat Portland Cement.	269 – 1976
2.	Pozzolana Portland Cement.	1489 – 1976
3.	43 Grade or 53 Grade Cement	8112–12269 Respectively
II.	AGGREGATES	
1.	Aggregates, Coarse& Fine from Natural resources for concrete.	383 – 1970
2.	Sand for Masonry Mortar	2116 – 1965
3.	Methods of tests for aggregates for concrete	2386 - 1963
	Part – I Particle size and shape	2386 – 1963 (Part – I)
	Part – II Estimation of deleterious Materials & Organic impurities	2386 – 1963
	Part – III Soundness	2386 – 1963
4.	Specification for test sieves. Part – I: Wire Cloth test sieves.	460 – 1978 (Part – I)
III.	BRICKS	
1.	Common burnt clay building bricks	1077 – 1976
IV.	STEEL	
1.	Mild steel and medium tensile steel bars and hard drawn steel wire, concrete reinforcement. Part – I Mild Steel & Medium tensile Steel Bars.	432 – 1982
2.	High strength deformed steel bars and wires for concrete reinforcement.	1786 – 1985
3.	High Tensile Steel for PSC Pipes.	1784 – 1986 (Part-I)
4.	Hand Drawn Wire	432 – 1953
5.	Bending and Flexing of Bars for Concrete reinforcement.	2502 – 1963
6.	Recommendations for detailing of	

SL. No.	Description	I.S. No.
V.	CONCRETE	
1.	Plain and reinforced concrete, code of practice for.	456 –2000
2.	Laying in Situ cement concrete flooring	2571 – 1970
3.	Sampling and analysis of Concrete	IRC : 15-2002
4.	Code of practice for liquid retaining structures	3370 – 1967
5.	Code of practice of concrete roads	IRC : 15 – 2002.
VI.	MASONRY	
1.	Brick Masonry	2212 – 1962
2.	Construction of Stone Masonry	1597 – 1967
VII.	*PIPES AND FITTINGS*	
1.	Concrete pipes with and without reinforcement.	458 – 1988
4.	Method of tests for concrete pipes	458 – 1988,
8.	Methods of tests of concrete pipes	3597 – 1985
VIII.	MACHINERY	
1.	Batch type concrete mixer.	1791 – 1968
2.	Sheep foot roller	4616 – 1968
IX.	SAFETY	
1.	Safety code for excavation works.	3764 – 1966
2.	Safety Code for scaffolds and ladders	
	Part – I – Scaffolds.	3696 – 1966 (Part – I)
	Part – II – Ladders.	3696 – 1966 (Part – I)

DIVISION-2

SITE WORK

2.1 Intimation about commencement of work:

Before commencing the works and also during progress the bidder shall give due notice to the concerned authorities, the Municipality, the Roads and Buildings and Electricity Board, Telephone Department, the Traffic Department attached to the Police, other Departments and companies as may be required to the effect that the work is being taken up in a particular locality and that necessary diversion of traffic may be arranged for. The bidder shall cooperate with the Departments concerned and provide for necessary barricading of roads, protections to existing underground mains, cables etc.

2.2 Cross Drainage:

The bidder shall handle all flows from natural drainage channels intercepted by the work under these specifications, perform any additional excavation and grading for drainage as directed and maintain any temporary construction required to bypass or otherwise cause the flows to be harmless to the work and property. When the temporary construction is no longer needed and prior to acceptance of the work, the bidder shall remove the temporary construction and restore the site to its original condition as approved by the Engineer-in-Charge. The cost of all work and materials required by this paragraph shall be included by the bidder in the unit prices quoted in the section 6 of Vol. III (bill of quantities) and no separate payment will be made for the same.

2.3 Stacking of Excavated Material:

Where the location of the work is such and does not permit the deposition of excavated earth while digging trenches for laying pipes, the excavated earth should be conveyed to a convenient place and deposited there temporarily, as directed by the Engineer-in-Charge. Such deposited earth shall be reconveyed to the site of work for the purpose of refilling of trenches, if such deposited soil is suitable for refilling. The unit rate for trench work of excavation and refilling shall include the cost of such operations.

2.4 Disposal of Surplus Earth:

The rate for excavation of trench work, shall include charges of shoring, strutting, any of these contingent works. While bailing out water care should be taken to see that the bailed out water is properly channelised to flow away without stagnation or inundating the adjoining road surfaces and properties.

2.5. Shoring, Strutting and Bailing out Water :

The rate for excavation of trench work, shall include charges of shoring, strutting, bailing out water wherever necessary and no extra payment will be made for any of these contingent works. While bailing out water care should be taken to see that the bailed out water is properly channelised to flow away without stagnation or inundating the adjoining road surfaces and properties.

DIVISION-3

EARTH WORK

3.1 EARTH WORK - GENERAL:

3.1.1 Earth work diagrams and Data:

To the extent that they exist plans and earth work data prepared for the Government's (that is Government of Andhra Pradesh) studies of earth work for construction of the related works will be available for Inspection by the bidders in the Office of the concerned Engineer-in-Charge.

Such information is made available solely for the convenience of bidders. The Government does not represent that this information is accurate or complete. Bidders are cautioned that this information is subject to revision and that the Government disclaims responsibility for any interpretations, deductions or conclusions which may be made there from. It is not intended that this earth work information will limit or prescribe the excavation and handling procedure of the contractor, and the Government reserves the right to utilize and distribute earth work materials during the progress of work as best serves the interest of the Government.

3.1.2 Compacting Earth Materials:

Where compacting of earth materials is required, the materials shall be deposited in horizontal layers and compacted as specified in this paragraph. The excavation, placing, moistening and compacting operations shall be such that the materials will be uniformly compacted throughout the required section and will be homogeneous, free from lenses, pockets, streaks, voids, lamination or other imperfections. The compaction shall be carried out in accordance with the relevant clauses of I.S 4701 – 1982.

EXCAVATION:

Classification of Excavation:

Except as other-wise provided in these specifications, material excavated will be measured in excavation to the lines shown on the drawings or as provided in these specification, and all materials so required to be excavated will be paid for at the applicable prices bid in the schedule for excavation. No additional allowance above the price bid in the schedule will be made on account of any of the material being wet. Bidders and the contractors must assume all responsibility for deducting and concluding as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavation. The Government does not represent that the excavation can be performed or maintained at the pay lines described in these specifications or shown on the drawings.

Excavation for removal of debris and deposited earth on berms while forming roads is to be carried out as specified in relevant clauses of 154701-1982 as compared before lying of berms with the same setting of roads.

Excavation for Structures:

General:

Excavation for the foundation of structures shall be to the elevation shown on the drawings or as directed by the Engineer-in-Charge. In so far as practicable, the material 3-2

removed in excavation for structures shall be used for back fill and embankments. Otherwise it shall be disposed off as specified in paragraph 2.4.

Foundations for Structures:

The Contractor shall prepare the foundations at structure/sites by methods which will provide firm foundation for the structures. The bottom and side slopes of common excavation upon or against which the structure is to be placed shall be finished to the prescribed dimensions and the surfaces so prepared shall be moistened and tamped with suitable tools to form firm foundation upon or against which to place the structure. The Contractor shall prepare the foundation for the structures as shown on respective drawings. The natural foundation material beneath, the required excavation shall be moistened if required and compacted in place.

Separate payment will not be made to the contractor for Moistering and compacting the foundation of structures. The contractor shall include cost thereof in the price bid per cubic meter of the item of the Bill of quantities for preparation of foundations.

Whenever unsuitable material is encountered in the foundation for a structure the Engineer-in-Charge will direct additional excavation to remove the unsuitable material. The cost of such additional excavation shall be paid at the unit price bid in the Bill of quantities for earth. The additional excavation shall be refilled by selected bedding material and compacted.

(c) **Over Excavation:**

If at any point in common excavation the foundation material is excavated beyond the lines required to receive the structure, or if at any point in common excavation the natural foundation material is disturbed or loosened during the excavation process, it shall be compacted in place or where directed, it shall be removed and replaced as follows. In excavation soils, the over excavation shall be filled in by selected bedding material and compacted. In excavation in rock it shall be filled with M5 grade cement concrete. Any and all excess excavation or over excavation performed by the Contractor for any purpose or reason except for additional excavation as may be prescribed by the Engineer-in-Charge and whether or not due to the fault of the contractor shall be at the expense of the contractor. Filling for such excess excavation or over excavation shall be at the expense of the contractor.

(d) **Measurement for payment:**

Excavation for structures will be measured for payment, for box cutting with vertical sides of foundation dimensions. The contractor will have to make his own arrangement for shoring, strutting, provision of adequate slopes for the sides to prevent slips etc., and no separate charge will be paid for any incidental charges arising either during excavation of foundation or construction of the structure.

(e) **Payment:**

Payment for excavation for structures will be made at the unit price per cubic metre bid therefor in the Bill of quantities for excavation for structures. The unit price bid in the bill of quantities for excavation for structures shall include the cost of all labour and materials for coffer dam and other temporary construction, of all pumping and dewatering, of all other work necessary to maintain the excavation in good order during construction, of removing such temporary construction where required and shall include the cost of disposal of the excavated material.

3.3 BACKFILL:

3.3.1 Back Fill Around Structures:

(a) **General:**

The item of the schedule for backfill around structures including pipe portions of structures includes all backfill required to be placed under these specifications.

(b) **Materials:**

The type of material used for backfill, the amount thereof, and the manner of depositing the material shall be subject to approval of Engineer-in-Charge. In so far as practicable backfill material shall be obtained from material removed in required excavations for structures. But when sufficient suitable material is not available from this source, additional material shall be obtained from approved borrow-areas. The borrow pit excavation shall be in accordance with clause-9.1 to 9.3 of I.S 4701-1982.

Backfill material shall contain no stones larger than 80 millimeters in diameter. If the excavation for the foundation of the structure is in swelling soils, a layer of cohesive non-swelling soil conforming to I.S..9451-1980 should be interposed between the swelling soil of the structure and compacted to atleast 95% standard proctors density.

(c) **Placing Backfill:**

Backfill shall be placed to the lines and grades shown on the drawings as prescribed in this paragraph or as directed by the Engineer-in-Charge. All backfill shall be placed carefully and spread in uniform layers not exceeding 150 mm, so that all spaces about rocks and clods will be filled. Each layer shall be watered and well compacted before the succeeding layer is laid, care being taken not to disturb the constructed structure. Backfill shall be brought up as uniformly as practicable on both sides of walls and all sides of structure to prevent unequal loading. Backfill shall be placed to about the same elevation on both sides of the pipe positions of the structures to prevent unequal loading and displacement of the pipe.

(d) **Measurement and Payment:**

Excavation refill required to be placed about structures that is within the pay line limits for excavation for the structures, will be measured in place for payment as backfill about structure provided that where the contractor elects not to excavate material which is outside the limits of the actual structure or pipe, but within the pay line limits of excavation, all such material will be included in the measurement for payment of backfill.

The unit price bid therefor in the Bill of quantities for excavation of foundation of structure shall include cost of backfilling about the structure upto ground level. No separate payment will be made for backfill of foundation.

Refill of excavation performed outside the established paylines for excavation for structures shall be placed in the same manner as specified for the adjacent backfill and such refill shall be placed at the expense of the contractor.

DIVISION-4

MASONRY

4.1 MATERIALS:

4.1.1 Stone for Masonry:

(a) **General:**

The stones used for stone masonry shall conform to the relevant specifications of Clause 4.1 of I.S 1597 (Part-I) 1967 code of practice for construction of stone Masonry Part-I Rubble Stone Masonry.

The stone of the required quality shall be obtained from the quarries specified in the lead chart appended to the Schedule. The common types of natural stones which are generally used are Granite and other ingenious rocks, and shall be free from defects like decay, cavities, cracks, flaws, sand, holes, soft seams, veins, patches of soft or loose materials or any other deleterious materials like iron oxide Organic Impurities etc. They shall be free from rounded, worn or weathered surfaces or skin or coating which prevents the adherence of mortar. All stones used shall be clean of uniform colour and texture, strong, hard and durable.

The percent of water absorption shall not exceed 5% by weight as determined in accordance with I.S. 1124-1974.

The approval of the quarries by the Engineer-in-Charge shall not be constructed as constituting approval of all or any of the stones collected from the deposits; and the bidder will be held responsible for suitability of the stones used in the work.

(b) **Cost:**

The cost of collecting the stones for masonry will not be paid for separately and their cost including the cost of quarrying, transporting, stacking, royalty seigniorage charges shall be included in the unit price per cubic metre bid therefor in the relevant item in the bill of quantities.

4.1.2 Brick for Masonry

General:

Bricks used for brick masonry shall conform to the relevant specifications of I.S. 1077-1986 common burnt clay building bricks.

Bricks shall be hand or machine moulded. They shall be sound, hard, homogeneous in texture well burnt and shall give a clear ringing sound when struck. They shall be clean, free from warping, distortion, cracks, chips, flaws, stones and nodules of free lime. Unless otherwise specified the sizes of the bricks shall be 190 x 90 x 90 mm. The compressive strength shall not be less than 40 Kg/Cm^2. The percentage of water absorption shall not be more than 20 per cent by weight after 24 hours immersion in cold water.

(b) **Cost:**

The cost of collecting the bricks for masonry will not be paid for separately and their cost including the cost of transporting, stacking, royalty seigniorate charges shall be included in the unit price per cubic metre bid therefore in the relevant item in the bill of quantities.

4.1.3 **Sand for Masonry:**

General:

Sand shall generally conform to specifications given in paragraph 6.2.5 except that the sand for mortar shall conform to the grading of sand given in clause 4 of I.S.2116-1189 as detailed below in Table 4(b).

Table 4(b): Grading of Sand for use in Masonry Mortars:

I.S. Sieve Designation	Percentage passing by Mass
4.75 mm	100
2.36 mm	90 to 100
1.18 mm	70 to 100
600 Micron	40 to 100
300 Micron	5 to 70
150 Micron	0 to 15

A sand whose grading falls out-side the specified limits due to excess or deficiency of coarse or fine particles may be processed to comply with the standard by screening through a suitably sized sieve and/or blending with required quantities of suitable size and particles.

The procurement of sand for masonry shall confirm to the specifications given in paragraph 6.2.5.

Cost:

The cost of sand for masonry will not be measured and paid separately and the cost of sand including the cost of stripping, transporting and storing and royalty charges shall be included in the unit price per cubic metre bid therefor in the relevant item of work in the bill of quantities for which this and is required.

4.1.4 **Cement:**

General:

As per clause 4 of I.S. 456-1978 for the purposes of these specifications, cement used shall be any of the following with the prior approval of the Engineer-in-Charge Ordinary Portland (OPC) – GRADES 43 & 53 Conforming to BIS : 811 : 12269 respectively (or) portland pozzolana cement conforming to I.S. 1489 relevant amendments upto date.

The provisions of this paragraph apply to cement for use in cast-in-place concrete required under these specifications. Portland cement required for items such as concrete pipes, precast concrete structural members and other precast concrete products, for grout and mortar and for other item is provided for in the applicable paragraphs of these specifications covering the items for which such portland cement is required.

The water used in making and curing of concrete, mortar and grout shall be free from objectionable quantities of silt, organic matter, injurious amounts of oils, acids, salts, and other impurities etc., as per I.S. specification No.456-1978.

The Engineer-in-Charge will determine whether or not such quantities of impurities are objectionable.

Such determination will usually be made by comparison of compressive strength, water requirement, time of set and other properties of concrete made with distilled or very clean water and concrete made with the water proposed for use. Permissible limits for solids when tested in accordance with I.S. 3025-1964 shall be as tabulated below.

Permissible limit for Solids:		Maximum permissible limit
1. Organic		200 mg/litre
2. Inorganic		3000 mg/litre
3. Sulphates (as SO_4)	500	mg/litre
4. Chlorides (as CL) and		2000 mg/litre for plain concrete work 1000 mg/litre for R.C.C. work
5. Suspended matter		2000 mg/litre

If any water to be used in concrete, mortar or grout is suspected by the Engineer-in-Charge of exceeding the permissible limits of solids, samples of water will be obtained and tested by the Engineer-in-Charge in accordance with I.S. 3025-1964.

4.2 MORTAR

Preparation of Mortar:

Unless otherwise specified, the cement mortar used in Masonry works shall be cement mortar mix MM5 (1:5) grade using minimum 288 Kgs. of cement per cubic metre of mortar.

Mixing shall be done thoroughly preferably in a mechanical mixer. In such cases, the cement and sand in the specified proportions shall be mixed dry thoroughly in the mixer operated manually or by power.

Water shall be added gradually and wet mixing continued atleast for 3 minutes. Water should not be more than that required for bringing the mortar to the required working consistency of 90 to 130 milli meteres as required in clause 9.11 of I.S. 2250-1981. The mix shall be clean and free from injurious kind of soil, acid, alkali, organic matter or deleterious substances.

Time of use of Cement Mortar:

Cement mortar shall be used as soon as possible after mixing and before it has begun to set, within 30 minutes after the water is added to the dry mixture.

Mortar unused for more than 30 minutes should not be used and shall be removed from the site of work. The cost of such wasted mortar shall be borne by the bidder. The use of retempered mortar will not be permitted to be used for the masonry.

Tests of Mortar:

Mortar Test cubes shall be cast for the mortar used on the work and shall be tested in accordance with Appendix-A of I.S.2250-1965 code of practice for preparation and use of Masonry Mortars. Such cubes shall develop a compressive strength of atleast 50 Kgs/squre centimetre for MM5 (1:5) Grade cement mortar mix, 75 Kgs/square

centimetre for MM 7.5 (1:4) grade cement mortar mix and 30 Kgs/ square centimetre for MM-3 grade cement mortar mix.

Mortar not conforming to the specifications will be rejected, and the cost of such wasted mortar shall be borne by the bidder.

Measurement and Payment:

Cement Mortar will not be measured and paid separately and its cost, including cost of materials, transporting and placing shall be included in the unit price per cubic metre bid therefore in the bill of quantities of the contractor for the relevant finished item of work or which cement mortar mix mentioned in the above paragraph is required.

4.2.5. **Dismantling of Structures:**

During course of excavation of drainage works certain dismantling of brick masonry / R.R. masonry retaining walls in CM C.C M10 grade levelling course are to be carriedout. These have to be carriedout as specified under section 202 of A.P.S.S, and as per directions of Engineer-in-Charge and site cleared before facing up actual execution.

DIVISION-5

PLASTERING & POINTING

5.1 **SECTION – MATERIALS:**

5.1.1 **Sand for Mortar for Plastering and Pointing:**

(a) **General:**

The sand for preparation of Mortar for plastering and pointing shall confirm to the following gradation, shown in Table 5(A).

TABLE 5 (A)

REQUIREMENTS OF GRADING FOR SANDS FOR EXTERNAL PLASTERING AND RENDERING

		Percentage by weight passing I.S., Sieve	
I.S.	**SIEVE**		
	Designation	Class – A	Class - B
	4.75 MM	100	100
	2.36 MM	90 to 100	90 to 100
	1.18 mm	70 to 100	70 to 100
	600 Microns	40 to 85	40 to 95
	300 Microns	5 to 50	10 to 65
	150 Microns	0 to 10	0 to 10

For the purpose of indicating the suitability for use, the sand is classified as Class A and Class B in accordance with the limits of grading. Class 'A' sands shall be used generally for plastering and pointing, and when they are not available, Class 'B' sands may be used with the approval of Engineer-in-Charge.

The procurement of sand for Mortar for plastering and pointing shall conform to the specifications given in paragraph 6.2.5.

(b) **Cost:**

The cost of sand for mortar for plastering and pointing will not be measured and paid separately, and the cost of sand including the cost of stripping, transporting and storing and royalty charges shall be included in the unit price per Cubic metre bid therefor in the relevant item of work in the Schedule 'A' for which this sand is required.

5.1.3 **Cement:**

The specifications and conditions specified for supply for cement in paragraph 4.1.4 shall be applicable here also.

Portland pozzolana cement conforming to I.S. 1489-1976 shall be used for preparation of mortar for plastering and pointing work. Ordinary portland cement – Grades 43 & 53 may also be used in the event of non-availability of P.P.C.

5.1.4 **Water:**

The specifications and conditions specified for procurement of water in paragraph 4.1.5 shall be applicable here also.

5.2 **SECTION – MORTAR:**

5.2.1 **Preparation of Mortar for Plastering work:**

Unless otherwise specified, the cement mortar used in plastering work shall be in cement mortar mix of MM. 7.5 (1:4) grade, using minimum 360 Kgs. of cement per cubic metre of mortar.

The other specifications and conditions enunciated in paragraph 4.2.1 shall apply for this mortar for plastering work also.

5.2.2 **Preparation of Mortar for Pointing:**

The cement mortar used in pointing work shall be cement mortar mix of M.M 7.5 grade, using 480 Kgs. of cement per cubic metre of mortar.

The other specifications and conditions enunciated in paragraph 4.2.1 shall apply for this mortar for pointing work also.

5.3 **SECTION – PLASTERING WITH CEMENT MORTAR MIX. MM 7.5 GRADE 20 MM THICK:**

Preparation of Surface:

The roughening of the background improves the bond of plaster. All joints shall be thoroughly raked. After roughening the surface, care shall be taken to moisten the surface sufficiently before plastering as otherwise rashly exposed surface may tend to absorb considerable amount of water from the plaster. The surface shall be wetted evenly before applying the plaster. Care shall be taken to see that the surface is not too dry as this may cause lack of adhesion or excessive suction of water from the plaster. A fog spray may be used for this work. As far as possible, the plaster work shall be done under shade.

5.3.2 **Laying of Plastering with Cement Mortar Mix MM.7.5 grade 20 mm thick:**

The mortar used for plastering shall be stiff enough to cling and hold when laid. To ensure even thickness and true surface, plaster shall be applied in patches of 150 mm x 150 mm of the required 20 mm thickness at nor more than 2 metres intervals horizontally and vertically over the entire surface to serve as guides. The surface of these guides shall be truly in the plane of the furnished plaster surface and truly plumb. The mortar shall then be applied to the surface to be plastered between the guides with a trowel. Each trowel full of mortar shall overlap and sufficient pressure shall be used to force it into thorough contact with the surface. On relatively smooth surfaces, the mortar shall be dashed on with the trowel to ensure adequate bond. The mortar shall be applied to a thickness slightly more than that specified, using a string, stretched out between the guides. This shall then be brought to a true surface by working with a long wooden float with small sawing motion. The surface shall be periodically checked with a string stretched across it. Finally the surface shall be rendered smooth with a small wooden float, over working shall be avoided. All corners, arises, and junctions shall be brought truly to a line with any necessary rounding or chamfering.

If it is necessary to suspend the work at the end of the day, it shall be left in a clean horizontal or vertical line not nearer than 150 millimetres for any corner or arises or

on parapet tops or on copings etc. When recommending the work, the edges of the old work shall be scraped clean and treated with cement slurry before the new plaster is laid adjacent to it. After the first coat is done, it shall be kept undisturbed for the next 24 hours and thereafter kept moist and not permitted to dry until the final rendering is applied.

After the plaster has sufficiently hardened cement slurry with cream like consistency shall be applied as thinly and evenly and rubbed to a fine condition.

The finished surface shall be cured with water for a period of 10 days.

5.4 SECTION – POINTING TO STONE MASONRY WITH CEMENT MORTAR MIX MM.75 GRADE

The joints in the masonry shall be raked out to a depth not less than the width of the joint or as directed when the mortar is green. Joints are to be brushed clean of dust and loose particles with a stiff brush. The area shall then be washed and the joints thoroughly wetted before pointing is commenced.

5.4.2 Flush Pointing with Cement Mortar Mix MM. 7.5 Grade for Rubble Masonry:

The pointing to be done shall be flush pointing with cement mortar mix MM. 7.5 grade. The mortar shall be pressed into the raked out joints according to the types of pointing required. The mortar shall not be spread over the corners, edges or surface of the masonry. The pointing shall then be finished as detailed below. The mortar shall be finished off flush and level with the edges of the stones, so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and a straight edge.

The pointing shall be cured for seven days.

5.5 SECTION – MEASUREMENT AND PAYMENT:

Plastering:

The measurement of plastering will be in units of square metres, and it shall be paid at the relevant unit price bid per ten square metres of Plastering in the schedule Bill of Quantities which unit price shall include the cost of materials, their conveyance, charges for preparation of mortar including mixing charges and charges for performing the plastering work as illustrated in this division, including curing.

Pointing:

The measurement for pointing will be in units of square metres, and it shall be paid at the relevant unit prices per ten square metres bid in the schedule Bill of quantities which unit price shall include the cost of materials, their conveyance, charges for preparation of mortar including mixing charges and charges for performing the pointing work as illustrated in this division, including curing.

DIVISION-6

CONCRETE

6.1 CONCRETE STRUCTURES:

6.1.1 Concrete in Structures:

(a) Concrete in structures shall conform to the requirements of Paragraph 6.2

(b) Measurement and payment for concrete in structures will be made as prescribed in paragraphs 6.3 & 6.4.

6.1.2 Construction of Structures:

Cast-in-place concrete for the structures shall conform to the requirements of section.

The structures shall be built to the lines, grades and dimensions shown on the drawings. The dimensions of each structure as shown on the drawings will be subject to such modifications as may be found necessary by the Engineer-in-Charge to adopt the structure to the conditions disclosed by the excavation or to meet other conditions. Where the thickness of any portion of a concrete structure is variable, it shall vary uniformly between the dimensions shown.

Where necessary, as determined by the Engineer-in-Charge, the Contractor will be furnished additional detailed drawings of the structures to be constructed. The bidder will not be entitled to any additional allowances above the prices bid in the schedule by reason of the dimensions fixed by the Engineer-in-Charge or by reasons of any modifications or extensions of a minor character to adopt a structure to a structure at site, as determined by the Engineer-in-Charge.

The cost of furnishing all materials and performing all work for installing timber, metal and other accessories for which specific prices are not provided in the schedule, shall be included in the applicable prices bid in the schedule for the work to which such items are appurtenant.

6.2 GENERAL CONCRETE REQUIREMENTS:

6.2.1 Composition :

(a) **General :**

Concrete shall be composed of cement, sand, coarse aggregate, water and admixtures (if any) as specified, all well mixed and brought to the proper consistency.

(b) **Nominal maximum size of Aggregates:**

In coarse aggregates to be used in concrete shall be as large as practicable, consistent with required strength, spacing of reinforcement and embedded items, and placement thickness. The size of the coarse aggregate to be used will be determined by the Engineer-in-Charge and may vary incrementally according to the conditions encountered in each concrete placement. Nominal maximum size of aggregate for concrete in structures shall be as indicated in the relevant drawings appended to the contract documents. Smaller coarse aggregate than specified shall be used where in the opinion of the Engineer-in-Charge that proper placement of concrete is impracticable with the size of the aggregate specified in the drawings.

(c) **Mix Proportions:**

The proportions of various ingredients to be used in the concrete for different parts of the work will be established by proper mix design by the Engineer-in-Charge during the progress of the work. In proportioning concrete, the quantity of both cement and aggregate should be determined by mass as per clause 9.2 of I.S. 456-1978 water shall be either measured by volume in calibrated tanks or weighted. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked. Adjustments shall be made as directed to obtain concrete having suitable workability, impermeability, density, strength and durability without use of excessive cement. The acceptance or rejection of concrete shall be as per the acceptance criteria laid down in clause 15 of I.S. 456-1978.

The mix design and average concrete strength shall be adjusted according to the cube strength test results conforming to clauses 14.2, 14.3, 14.4, 14.5 of I.S. 456-1978. The bidder shall not be entitled for any additional allowances above the prices bid in the schedule due to adjustments of the mix proportions.

The net water cement ratio exclusive of water absorbed by the aggregate shall be sufficiently low to provide adequate durability in concrete. The water-cement ratio for various grades of concrete shall be as determined and ordered by the Engineer-in-Charge.

(d) **Consistencies:**

The slump of concrete at the placement shall be as follows:

Reinforced Cement Concrete:

Sl. No.	Placing Condition	Degree of Workability	Value of Workability
1.	Concreting of lightly reinforced sections without vibration or heavily reinforced sections with vibration	Medium	25 mm to 75 mm slump for 20 mm aggregate
2.	Concreting of heavily reinforced section without vibration	High	75 mm to 125 mm slump for 20mmaggregate

ii) For plan concrete work, slump requirements mentioned in item - (i) above are applicable.

If the specified slump is exceeded at the placement, the concrete is unacceptable. The Engineer-in-Charge reserves the right to require lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of vibration specified by the Engineer-in-Charge. The use of any equipment which will not readily handle and place concrete of the specified slump will not be permitted.

To maintain concrete at proper consistency, the amount of water and sand batched for concrete shall be adjusted to compensate for any variation in the moisture content or grading of the aggregates as they enter the mixer. Addition of water to compensate for stiffening of the concrete after mixing but before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

6.2.2 **Concrete Quality Control Measures and Concrete Quality Assurance Test Programme.**

(a) Concrete Quality Control Measures: The bidder shall be responsible for providing quality concrete to ensure compliance of the bid requirements.

(b) Concrete Quality Assurance Programme: The concrete samples will be taken by the Departmental Engineers and its quality will be tested in the departmental laboratory as per the relevant Indian Standard Specifications I.S. No. 516-1959 and I.S. 1199-1959.

Tests: The Government will obtain samples and conduct tests as specified in I.S. 456-1978, I.S. 1199-1959 and I.S. 516-1959.

Test Facilities: The bidder shall furnish free of cost samples of all ingredients of concrete for testing and obtain approval from the Engineer-in-Charge. He should also supply free of cost, the samples of all the ingredients of concrete for conducting the required tests.

6.2.3 **Cement:**

General:

Shall conform to paragraph 4.1.4.

6.2.4 **Water:** Shall conform to paragraph 4.1.5

6.2.5 **Sand (Fine Aggregate) :**

General:

The term sand is used to designate aggregate most of which passes 4.75 milli metre I.S. Sieve and contains only so much coarser material as permitted in Clause 4.3 of L.S. 383-1970. Sand shall be predominantly natural sand which may be supplemented with crushed sand to make up deficiencies in the natural sand gradings.

All sand shall be furnished by the bidder from any source approved by Engineer-in-Charge.

Sand as delivered shall have a uniform and stable moisture content. Determination of moisture content shall be made as frequently as possible, the frequency for a given job being determined by the Engineer-in-Charge according to weather conditions (I.S. 456-1978).

Quality:

The sand shall consist of clean, dense, durable, un-coated rock fragments, as per I.S.383-1970. Sand may be rejected if it fails to meet any of the following quality requirements.

Organic impurities in Sand: Colour no darker than the specified standard in clause 6.2.2 of I.S 2386 (Part-II) 1963. (Indian Standard method of test for aggregates for clearance Part-II estimation of deleterious materials and organic impurities).

Sodium Sulphate Test for Soundness: The sand to be used shall pass a Sodium of Magnesium Sulphate accelerated test as specified in I.S. 2386 (Part-V) 1963 for limiting loss of weight.

Specific Gravity: 2.6 minimum

Deleterious Substances:

The amounts of deleterious substances in sand shall not exceed the maximum permissible limits prescribed in Table I Clause 3.2.1 of I.S. 383-1970 (Indian Standard specification for coarse and fine aggregate from natural sources for concrete when tested in accordance with I.S. 2386-1963.

c) **Grading:**

The sand as batched shall be well graded and when tested by means of standards sieves shall conform to the limits given in Table-4 of I.S. 383-1970, and shall be described as fine aggregates, grading zones-I, II, III and IV. Sand complying with the requirements of any of the four grading zones is suitable for concrete. But, sand conforming to the requirements of grading Zone-IV shall not be used for reinforced cement concrete work.

6.2.6 **Coarse Aggregate:**

General:

For the purposes of these specifications, the term "Coarse Aggregate" designates clean well grade aggregate most of which is retained on 4.75 mm I.S. Sieve containing only so much finer material as permitted for various types described under clause 2.2 of I.S 383-1970. Coarse aggregate for concrete shall consist of uncrushed, crushed and partially crushed stone.

Coarse Aggregate for concrete shall be furnished by the Contractor from the sources approved by the Engineer-in-Charge.

Coarse Aggregate as delivered shall generally have uniform and stable moisture content. In case of variations, clause 9.2.3 of I.S 456-1978 shall govern during batching.

Quality:

The Coarse aggregate shall consist of natural occurring (crushed or uncrushed) stones, and shall be hard, strong, durable, clear and free from veins and adherent coating, and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious materials.

Coarse aggregate for concrete shall be separated into various nominal maximum sizes specified in the relevant drawings. Separation of the coarse aggregate into the specified sizes shall conform to the grading requirements specified in Table-2 of I.S. 383-1970, when tested in accordance with I.S 2386-(Part-I) 1963 (Method of test for aggregates for concrete Part-I Particle size and shape).

Coarse aggregate for mass concrete may be separated as previously herein specified. Separation of the coarse aggregate into the various sizes shall be such that when tested in accordance with I.S. 2386 (Part-I) 1963 shall conform to the requirements specified in Table-3 of I.S. 383-1970.

Sieves used in grading tests will be standard mesh sieves conforming to I.S. 460 (Part-I) – 1978 (Specification for test sieves Part-I wire cloth test sieves).

6.2.7 **Mixing:**

General:

The concrete ingredients shall be thoroughly mixed in mechanical mixers designed to positively insure uniform distribution of all the component materials throughout the concrete at the end of the mixing period. Mixing shall be done as per clause 9.3 of I.S. 456-1978. The mixer should comply with I.S. 1971-1968 (I.S. Specifications for batch type concrete mixers).

The concrete as discharged from the mixer, shall be uniform in composition and consistency from batch to batch. Workability shall be checked at frequent intervals as per I.S. 1199-1969. Mixers will be examined regularly by the Engineer-in-Charge for changes in conditions due to accumulation of hardened concrete or mortar or to wear of blades. The mixing shall be continued until there is a uniform distribution of the materials so that the mass is uniform in colour and consistency and to the

satisfaction of the Engineer-in-Charge. If there is segregation after unloading, the concrete should be remixed.

Any mixer that at any time produces unsatisfactory mix, shall not be used until repaired. If repair attempts are unsuccessful, a defective mixer shall be replaced. Batch size shall be atleast 10% of, but not in excess of the rate capacity of the mixer unless otherwise authorised by the Engineer-in-Charge.

Concrete Mixers:

Water shall be admitted prior to and during charging of mixer with all other concrete ingredients. After all materials are in the mixer, each batch shall be mixed for not less than the time specified by the Engineer-in-Charge. The minimum mixing time shall be 2 minutes. The minimum mixing time specified is based on average mixer performance.

The Engineer-in-Charge will adjust the minimum mixing time as required by the observations of the mix delivered from mixer. Excessive over mixing which require addition of water to maintain the required concrete consistency will not be permitted.

6.2.8 **Forms:**

General:

Forms shall be used wherever necessary, to confine the concrete and shape it to the required lines. The bidder shall set and maintain concrete forms so as to insure completed work is within the applicable to clearance limits prescribed in clause 10 of I.S 456-1978. If a type of form does not consistently perform in an acceptable manner, as determined by the Engineer-in-Charge, the type of form shall be changed and method of erection shall be modified by the bidder subject to approval by the Engineer-in-Charge.

Plumb and string lines shall be installed before, and maintained during concrete placement. Such lines shall be used by the bidder's personnel and by the Engineer-in-Charge and shall be in sufficient number and properly installed as determined by the Engineer-in-Charge. During concrete placement, the bidder shall continuously monitor plumb, and string line, form positions and immediately correct deficiencies.

Forms shall have sufficient strength to with stand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in position. Where form vibrators are to be used, forms shall be sufficiently rigid to effectively transmit, energy, form the form vibrators to the concrete, while not damaging or altering the positions of forms. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Chamfer strips shall be placed in the corners of forms and at the top of walls placements to produce levelled edges on permanently exposed concrete surfaces. Interior angle of intersecting concrete surface and edges of construction joints shall not be levelled except where indicated on the drawings.

Suitable struts or stiffeners or ties shall be used for the form work wherever necessary. All supports, shall be braced and cross braced in two directions. All splices and braces shall be secured by bolting unless specially intended otherwise. All struts shall be firmly supported against settlement and slipping by suitable means as directed. All supports shall be cut square at both ends and firmly supported against settlement and slipping. When the form work is supported on soils, planks, sleepers etc., shall be used to properly disperse the loads. In case, the supports rest on already completed beam or slab, suitable props shall be provided under the latter.

The form work shall be of well seasoned timber or steel. When timber forms are used, they shall be lined with M.S sheet or other suitable smooth faced non-absorbent material as specified. Supports may be of timber or steel. Suitable wedges

in pairs to facilitate adjustment and subsequent releasing of forms shall be provided preferably at the upper end of the supports. The details of the proposed form work and supports shall be submitted to the Engineer-in-Charge and got approved before erection.

In case of columns, retaining walls or deep vertical component, the height of the column shall facilitate any placement and compaction of concrete and suitable arrangement may be made for securing the form to the already poured concrete for placing the subsequent lifts. No steel ties or wires used for securing this form work shall be left exposed on the face of the finished work.

Suitable inserts for block outs for electrical and other service fixtures where necessary shall be provided in the required locations as specified.

Cleaning and Oiling of Forms:

At the time the concrete is placed informs, the surfaces of the forms shall be free from encrustation of mortar, grout or other foreign materials. Before concrete is placed, the surface of the forms shall be oiled with a commercial forms of oil.

Removal of Forms:

The stripping of form work shall be conform to clause 10.3 of I.S. 456-1978. The bidder shall be liable for damage and injury caused by removing forms before the concrete has gained sufficient strength. Forms on upper sloping faces of concrete such as forms on the water sides of warped transitions, shall be removed as soon as the concrete has attained sufficient to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed immediately by the specified curing.

To void excessive stresses in concrete that might result from swelling of forms, wood forms for wall openings shall be loosened as soon as the loosening can be accomplished without damaged to the concrete. Forms shall be removed with care so as to avoid injury to the concrete, and any concrete so damaged shall be repaired in accordance with paragraph 6.2.16.

Cost:

The cost of furnishing all materials and performing all work for constructing forms, including any necessary treatment or coating of forms shall be included in the applicable prices bid in the schedule for the items of concrete for which the forms are used.

6.2.9 **Concrete Surface Irregularities:**

Surface Irregularities:

General:

Bulges, depressions and offsets are defined as concrete surface irregularities. Concrete surface irregularities are classified as “abrupt” or “gradual” and are measured relative to the actual concrete surface.

Abrupt Surface Irregularities:

Abrupt surface irregularities are defined herein as offsets such as those caused by misplaced or loose forms, loose knots in form Lumber, or other similar forming faults. Abrupt surface irregularities are measured using a straight edge held firmly against the concrete surface over the irregularity and the magnitude of the offset is determined by direct measurement.

Gradual Surface Irregularities:

Gradual surface irregularities are defined herein as bulges and depressions resulting in gradual changes on the concrete surface. Gradual surface irregularities are measured using a suitable template conforming to the design profile of the concrete surface being examined. The magnitude of the gradual surface irregularities is defined herein as a measure of the rate of change in slopes of the concrete surface.

The surface irregularities shall not exceed 6 mm for bottom slab and 12 mm for side slopes when tested with a straight edge of 1.5 metres in length. The magnitude of gradual surface irregularities on concrete shall be checked by the bidder to insure that the surfaces are within the specified to tolerances. The Engineer-in-Charge will also make such checks to hardened concrete surfaces as determined necessary to ensure compliance with these specifications.

Repair of Hardened Concrete not within specified tolerance:

Hardened concrete which is not within specified tolerances shall be repaired to bring it within those tolerances. Such repair shall be in accordance with paragraph 6.2.16 and shall be accomplished in a manner approved by the Engineer-in-Charge. Concrete repair to bring concrete within the tolerances shall be done only after consultation with a representative of Engineer-in-Charge regarding the method of repair. The Government shall be notified as to the time when repair will be performed.

Concrete which will be exposed to public view shall be repaired in a manner which will result in a concrete surface with a uniform appearance. Grinding of concrete surface exposed to view shall be limited in depth such that no aggregate particles are exposed to view shall be limited in a depth such that no aggregate particles are exposed more than 1.5 millimetres at the finished surface. Where grinding causes exposure of aggregate particles greater than 1.5 millimetres at the finished surface. Concrete shall be repaired by excavating and replacing the concrete.

Prevention of Repeated failure to meet tolerances:

When concrete placements result in hardened concrete that does not meet the specified tolerances, the bidder shall submit to the Government an outline of all preventive actions such as modification to forms, modified procedure for setting screeds, and different finishing techniques to be implemented by the bidder to avoid repeated failures.

The Government reserves the right to delay concrete placement until the bidder implements such preventive actions which are approved by the Engineer-in-Charge.123

6.2.10.**Reinforcing Bars:**

General:
Reinforcing bars shall be placed in the concrete as shown in the drawings or as directed.
Materials:

Unless shown otherwise on the drawings, the reinforcement to be used shall be or High Yield strength deformed (H.Y.S.D) bars of grade Fe-415 conforming to I.S.

1786-1979 (IS. Specifications for High Yield strength deformed steel bars and wires for concrete reinforcement).

Placing:

Reinforcement shall be bent and fixed in accordance with the procedure specified in I.S. 2502-1963 (code of practice for bending and fixing of bars for concrete reinforcement). All reinforcement shall be placed and maintained in the position shown in the drawings, splices shall be located where shown on the drawings provided that the location of the splices may be altered subject to the written approval of the Engineer-in-Charge.

Subject to the written approval of the Engineer-in-Charge, the bidder may for his convenience, splice bars at additional locations other than those shown on the drawings.

All additional splices allowed shall be at the expense of the bidder. In order to meet design and space limitation. On splicing, some bent bars may exceed usual clearance cutting and bending of such bars from stock lengths may be required at the site.

Unless otherwise prescribed, placement dimensions shall be to the centre lines of the bars. Reinforcement will be inspected for compliance with requirements as to size, shape, length, splicing, position, and amount after it has been placed, but before being covered with concrete.

Before reinforcement is embedded in concrete, the surfaces of the bars and the surfaces of any supports shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease or other foreign substances which in the opinion of the Engineer-in-Charge, are objectionable. Heavy flaky rust that can be removed by firm rubbing with burlap, or equivalent treatment is considered objectionable.

As specified in Clause 11.3 of I.S. 456-1978 unless otherwise specified by the Engineer-in-Charge, reinforcement shall be placed within the following tolerances:

a) For effective depth 200 mm or less - $\pm$ 10 mm

b) For effective depth more than 299 m - $\pm$ 15 mm

The cover in no case be reduced by more than one third of specified over or 5 mm whichever is less.

Reinforcement shall be securely held in position so that it will not be displaced during the placing of the concrete and special care shall be exercised to prevent any disturbance of the reinforcement in concrete that has already been placed. Welding of bars shall be done as directed by the Engineer-in-Charge and in conformity with the requirements of clause 11.4 of I.S 456-1978. Chairs, hangers, spacers and other supports for reinforcement shall be of concrete, metal or other approved material. Concrete over shall be as shown on the drawings.

(d) **Reinforcement Drawings:**

The Government will supply drawings of reinforcement details and bar bending schedules for adoption.

(e) **Measurement and Payment:**

Measurement for payment of reinforcement bars will be based on the weight of the bars placed in the concrete in accordance with the drawings supplied by the Government when conformance with these specifications drawings has been determined at the time of embedment. Except as otherwise provided below, payment for furnishing and placing reinforcing bars will be made at the unit price per one kilogram bid in the bill of quantities for furnishing and placing reinforcing bars which unit price shall include the cost of reinforcing bars, attaching wire ties or other approved supports and of cutting, bending, cleaning, securing and maintaining in position reinforcing bars as shown on the drawings.

6.2.11 **Preparation for Placing:**

General:

No concrete shall be placed until all form work, installation of items to be embedded, and preparation of surface involved in the placement have been approved.

All surfaces of forms embedded materials shall be free from curing compound, dried mortar from previous placement, and other foreign substances before the adjacent or surroundings concrete placement is begun.

Prior to beginning concrete placement, the bidder shall make ready, a sufficient number of properly operating fibrators and operators, and shall have readily available additional vibrators to replace defective ones during the progress of the placement. The Engineer's representative at the placement may require that the bidder delay the start of the concrete placement until the number of working vibrators available is acceptable.

(b) **Foundation Surface:** All surfaces upon or against which concrete is to be placed shall be free from frost, ice, water, mud and debris.

Rock surfaces shall be free from oil, objectionable coatings, and loose, semidetached and unsound fragments. Immediately prior to placement of concrete, surfaces of rock shall be washed with an air water jet and shall be brought to a uniform surface dry conditions.

Earth foundation surfaces shall be wet to a depth of 15 cm. or to impermeable material whichever is less before concrete is placed.

(c) **Construction Joint:**

Construction joints are defined as concrete surface upon or against which concrete is to be placed and to which new concrete is to adhere but which have become so rigid that the new concrete can not be incorporated integrally which that previously placed. The provision of construction joints shall conform to clauses 12.4.1 and 12.4.2 of I.S. 456-1978.

When the work has to be resumed on a surface which has hardened such surface shall be roughened. It shall be swept clean and thoroughly wetted. For vertical joints neat cement slurry shall be applied on the surface before it is dry. For horizontal joints the surface shall be covered with a layer of mortar about 10 to 15 mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This layer of cement slurry or mortar shall be freshly mixed and applied immediately before placing of the concrete.

Where the concrete has not fully hardened all balance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgment of particles of aggregate. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be placed and shall be well rammed against old work, particular attention being paid to corners and close spots, and work thereafter shall proceed in the normal way.

6.2.12 **Placing:**

General:

The Bidder shall notify the Engineer-in-Charge before batching begins for placement of concrete. Placing shall be performed only in the presence of an authorised

Engineer's representative. Placement shall not begin until after all preparations are complete to the satisfaction of the Engineer-in-Charge.

All surfaces upon or against which concrete is to be placed shall be prepared in accordance with paragraph 6.2.11.

Retampering of concrete will not be permitted. Any concrete which has becomes so stiff that proper placing cannot be assured shall be wasted.

Concretes shall not be placed in standing water except with written permission of the Engineer-in-Charge and the method of placing shall be subject to approval. Concrete shall not be placed in running water and shall not be subjected to running water until after the concrete has hardened.

Concrete shall be deposited as nearly as practical in its final position and shall not be allowed to flow in such a manner that the lateral movement will cause segregation of the coarse aggregate from the concrete mass. Methods and equipment employed in depositing concrete informs shall minimize clusters of coarse aggregate. Clusters that occur shall be scattered before the concrete is vibrated.

Forms shall be constantly monitored and their position adjusted as necessary during concrete placement in accordance with paragraph 6.2.8.

All concrete shall be placed in approximately horizontal layers. The depth of layers shall not exceed 25 cm. The Engineer-in-Charge reserves the right to require lesser depths of layers where concrete cannot otherwise be placed and consolidated in accordance with the requirements of these specifications. All construction joints which intersect exposed concrete surface shall be made straight and level to plumb as shown otherwise on the drawings.

The placing of concrete shall be in accordance with clause 12.2 of I.S.456-1978.

If concrete is placed monolithically around openings having vertical dimensions greater than 60 cm. or if concrete in decks, floor slabs or other similar parts of structures is placed monolithically with supporting concrete, the following requirements shall be strictly observed.

Concrete shall be placed upto the top of the formed openings at which point further placement will be delayed to accommodate settlement of fresh concrete. If levels are specified beneath nearly horizontal structural members such as decks, floor slabs, beams and girders, such bevels being between the nearly horizontal members and the vertical supporting concrete below, concrete shall be placed to the bottom of the levels before delay of placement.

The last 60 cm or more of concrete placed below horizontal members of levels shall be placed with a 50 mm or less slump and shall be thoroughly consolidated.

In placing concrete on unformed slopes so steep as to make internal vibration of the concrete impractical without forming, the concrete shall be placed ahead of non-vibrating slip form screed extending approximately 0.75 metres back form its leading edge. Concrete ahead of the slip form screed shall be consolidated by internal vibrators so as to insure complete filling under the slip form.

A cold joint is an unplanned joint resulting when a concrete surface hardens before the next batch is placed against it. Cold joints will be allowed only in the event of equipment breakdown or other unavoidable prolonged interruption of continuous placing. If such unavoidable delays in placing occur which make it appear that unconsolidated concrete may harden to the extent that alter vibration will not fully consolidate it, the Bidder shall immediately consolidate such concrete to a stable and uniform slope. If delay of placement is then short enough to permit penetration of the underlying concrete, placement shall resume with particular care being taken to thoroughly penetrate and reverberate the concrete surface placed before the delay. If concrete cannot be penetrated with vibrator, the cold joint shall be then treated as a construction joint.

Care shall be taken to prevent cold joints when placing concrete in any part of the work. The concrete placing rate shall insure concrete is placed while the previously placed adjacent concrete is plastic so that the concrete can be made monolithic by normal use of vibrators.

Concrete shall not be placed in rain sufficiently heavy or prolonged to wash mortar from concrete. A cold joint may necessary result from prolonged heavy rainfall.

The bidder shall not be entitled to any additional payment, over the unit prices bid in the schedule for concrete, by reason of any limitation in the placing of concrete required under the provisions of this paragraph.

b) **Transportation:**

The transportation of concrete to clause 12.1 of I.S.456-1978.

c) **Consolidation:**

The consolidation of concrete shall conform to clause 12.3 of I.S. 456-1978

Concrete shall be consolidated by vibrators. The vibration shall be sufficient to remove the undesirable air voids from the concrete, including the air voids trapped against the forms. After consolidation, the concrete shall be free of rock pockets and honey bomb areas and shall be closed snugly against all surfaces of forms and embedded materials. All concrete shall be properly consolidated before it hardens.

Except as hereinafter provided, consolidation of all concrete shall be by immersion type vibrators. Immersion type vibrators shall be operated in nearly vertical position and the vibrating head shall penetrate and reverberate the concrete in the upper portion of the underlying layer. Care shall be exercised to avoid contact of the vibrating head with embedded items and with formed surfaces which will later be exposed to view. Concrete shall not be placed upon either plastic concrete until the previously placed concrete has been thoroughly consolidated.

6.2.13.**Finished and Finishing:**

The requirements for finishing of concrete surface shall be as specified in this paragraph, paragraph 6.2.9 or as otherwise indicated on the drawings. The bidder shall notify the Engineer-in-Charge before finishing concrete. Unless inspection is waived, in each specific case, finishing of concrete shall be performed only when a Engineer's representative is present. Finished concrete which is not within the specified tolerances shall be repaired in accordance with paragraph 6.2.16.

Interior surface shall be sloped for drainage where shown on the drawings or as directed. Surfaces which will be exposed to the weather, and which would normally be level, shall be sloped for drainage.

Floating may be performed by use of hand or power driver equipment. Floating shall be started as soon as the screeded surface has stiffened sufficiently and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Joints and edge shall be tooled where shown on the drawings or as directed.

6.2.14.**Protection:**

The bidder shall protect all concrete against damage until final acceptance by the Engineer-in-Charge.

The Bidder shall provide protection to prevent erosion to fresh concrete whenever precipitation either periodic or sustaining is imminent or occurring.

When precipitation appears imminent, the bidder shall immediately make ready at the placement site all materials, which may be required for protection of fresh concrete. The Engineer-in-Charge may delay placement of concrete until adequate provisions for protection against weather are made.

All fresh concrete surfaces shall be protected from contamination and from foot traffic until the concrete has hardened. Hardened concrete surfaces which have to

receive finish shall be protected against damage from foot traffic and other construction activity by covering with protective mats, ply-wood, or by other effective means. Methods of protection shall be subject to approval by the Engineer-in-Charge.

Concrete curing membranes shall be kept intact, and other curing materials and process shall be maintained as necessary to assure continuous curing for a minimum specified curing time. Protection of curing membranes and other curing methods shall be as described in paragraph 6.2.15.

6.2.15. **Curing :**

a) **General :**

The Bidder shall furnish all materials and perform all work required for curing concrete. The curing of concrete shall conform to clause 12.5 to I.S. 456-1978 and clause 5.8. IS.. 3873 – 1978.

Concrete shall be cured by water curing.

The unformed top surfaces of bridges or culvert decks shall be cured for 28 days with damp sand cover or curing mat cover. The sand or curing mats shall not be kept so wet as to allow water to drain from them and stain other concrete. The sand or curing mats shall be removed after the expiry of the curing period.

All concrete surfaces shall be treated as specified to prevent loss of moisture from the concrete until the required curing period elapsed or until immediately prior to placement of other concrete or back fill against those surfaces. Only sufficient time to prepare construction joint surfaces and to bring them to a surface dry condition shall be allowed between discontinuance of curing and placement of adjacent concrete.

Forms shall be removed within 24 hours after the concrete has hardened sufficiently conforming to clause 10.3 of I.S. 456-1978, to prevent structural collapse or other damage by careful from removal. Where required, repair of all minor surface imperfections shall be made immediately after form removal and prior to curing. Minor surface repair shall be completed within 2 hours after from removal and shall be immediately followed by the initiation of curing by the applicable method specified herein. Concrete surfaces shall be kept continuously moist after from removal until initiation of curing.

b) **Materials:**

Concrete cured with water shall be kept wet for atleast 28 days from the time the concrete has obtained sufficient set to prevent detrimental effects to the concrete surfaces. The concrete surfaces to be cured shall be kept wet by covering them with water-saturated material by using a system of perforated pipes, mechanical sprinklers or porous-hose, or by other methods which will keep all surfaces continuously (not periodically) wet. All curing methods are subjected to approval of Engineer-in-Charge.

c) **Cost:**

The cost of furnishing all materials and performing all work for curing concrete shall be included in the price bid in bill of quantities for the concrete on which the particular curing methods are required.

6.2.16. **Repair of Concrete:**

a) **General:**

Concrete shall be repaired in accordance with clause 5.7 to I.S. 3873-1978. Imperfections and irregularities on concrete surface shall be corrected in accordance with paragraph 6.2.9 and clause 5.7. of I.S. 3873-1978.

b) **Types of Repair:**

All repairs shall be made with concrete. Repairs to concrete surfaces and addition were required shall be made by cutting regular opening into the concrete and placing fresh concrete to the required lines. The chipped openings shall be sharp and shall not be less than 70mm in depth. The fresh concrete shall be reinforced and chipped and trawled to the surface to the surface of the openings. The mortar shall be placed in layers not more than 20 mm in thickness after being compacted and each layer shall be compacted thoroughly. All exposed concrete surfaces shall be cleaned of impurities, lumps of mortar or grout and unsightly stains.

c) **Cost:**

The cost of furnishing all materials and performing all work required in the repair of concrete shall be borne by the Bidder.

6.3. **Measurement of Concrete:**

Measurement for payment of concrete required to be placed directly upon or against surfaces of excavation will be made to the lines for which payment for excavation is made.

Measurement for payment of all concrete will be made to the neat lines of the structures, unless otherwise specifically shown on the drawings prescribed in these specification. The unit of measurement will be cubic meter. In measuring concrete for payment, the volume of all openings, embedded pipes and metal work, each of which is larger than 0.1 square meter in cross section will be deducted.

6.4. **Payment for Concrete:**

Payment for concrete in the various parts of the work will be made at the applicable, unit prices bid therefore in the schedule, which unit price shall include the cost of furnishing all materials and performing all works required for the concrete construction, except that payment for furnishing and placing reinforcing bars will be made at the respective unit prices bid therefore in the schedule.

SECTION-6
Supplementary Specifications

6.1 **Preamble**

This section contains the specifications for proposed work and shall be read in conjunction with the various other sections forming the contract namely Notification Inviting Applications, Instructions to Tenderers, General Conditions, Special Conditions, Drawings and other related documents mentioned in this Tender Document together with any Addendum issued thereto.

6.2 **General Specifications :** As mentioned in Section-4 of Volume-II

6.3 **Supplementary Specifications :** As mentioned in Section-4 of Volume- II

SECTION-7
SPECIFICATIONS FOR REINFORCED EARTH /SOIL STRUCTURES

7.1 as per relavent IS code and as per Annexure -F

SECTION-8
SPECIFICATIONS FOR ELECTRIFICATION WORKS

8.1 as per relavent IS code and as per Annexure -F

SECTION-9
PARTICULAR SPECIFICATION

9.1 as per relavent IS code and as per Annexure -F

Sewerage System - Specifications

1.0 This Specification covers the requirements for manufacturing, testing, supplying, lowering, laying, jointing, testing at work sites and commissioning of following pipes:

- DWC SN8 (HDPE)pipes (as per IS 14333) up to 500 mm dia
- RCC pipes PE lined (as per IS 458)
- DI pipe as per (IS 8329) with HAC (High alumina lining) has been proposed for rising main from pumping station as well as for drop connections.

1.1 Applicable Codes & Standards

The manufacturing, testing, supplying, jointing and testing at work sites of pipes shall comply with all currently applicable statutes, regulations, standards and codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the Codes shall be referred to. If requirements of this Specification conflict with the requirements of the Codes and standards, this Specification shall govern. However, other codes as approved by Employers Engineer but not specifically mentioned below pertaining to the use of RCC, DI, HDPE Pipes shall form part of these specifications

Table 1: Applicable Codes

IS Code	Description
IS: 458	Specification for Concrete Pipes (with and without Reinforcement).
IS: 3597	Method of Tests for Concrete Pipes.
IS: 432 Part I & II	Specification for mild steel and medium (tensile steel bars and hard drawn steel) wires for concrete reinforcement.
IS: 456	Code of Practice for Plain and Reinforced Concrete.
IS: 783	Code of Practice for Laying of Concrete Pipes.
IS: 516	Method for test for strength of concrete.
IS: 8329	Centrifugally cast (spun) Ductile Iron Pressure pipes for water, gas and sewage.
IS: 9523	Ductile iron fittings for pressure pipes for water, gas and sewage.
IS: 12288	Code of practice for use and laying of ductile iron pipes.
IS: 5382	Specification for Rubber Sealing Rings for Gas Mains, Water Mains and Sewers.
IS: 14333	Specification for High Density Polyethylene pipes (HDPE) and fittings for the use of Sewerage.
IS: 7634 Part 2	Code of practice for Laying and Jointing of High Density Polyethylene pipes (HDPE) piping system.
IS: 2530	Method of test for polyethylene moulding materials and polyethylene Compounds.
IS: 7328	High Density Polyethylene material for moulding and extrusion.
IS: 4905	Method for random sampling.

1.3 HDPE PE 100 PN 6 Pipes

General

Design

Design of HDPE pipes including material details and the maximum allowable hydrostatic design stress taking into consideration, the temperature and design life of pipes shall be in accordance with the relevant clauses of IS:14333

Grade of Material

The High Density Polyethylene Pipes (HDPE) shall be of PE-100 PN6 grade. Material Grade, Minimum Required Strength and Maximum Allowable Hydrostatic Design Stress shall conform to the relevant clause of IS – 14333.

Color

The color of the pipe shall be as per the direction of Engineer-Incharge.

Manufacturing, Workmanship and Finish

General

- The method of manufacture of HDPE pipes shall be such that the internal and external surfaces of the pipes shall be smooth, clean and free from grooving and other defects. The ends shall be cleanly cut and shall be square with axis of the pipes.

- The Employers Engineer shall at all reasonable times have free access to the place where the pipes and fittings are manufactured for the purpose of examining and testing the pipes and fittings and of witnessing the test and manufacturing.

- All tests specified either in this specification or in the relevant Indian standards shall be performed by the supplier/contractor at his own cost and in presence of the Employers Engineer if he so desires. For this, sufficient notice before testing of the pipes and fittings shall be given to the Employers Engineer.

- If the test is found unsatisfactory, the Employer Engineer may reject any or all pipes of that lot.

- **Materials**

The material used by the manufacturer of pipes should not constitute toxicity hazard, should not support microbial growth, should not give rise to unpleasant odour, cloudiness or discoloration of water. Pipe manufacturers shall obtain a certificate to this effect from the manufacturers of raw material by any reputed organization as per the satisfaction of the Employers Engineer.

Raw Material

- Raw material used to manufacture the HDPE pipes shall be 100% virgin PE compound or Natural black PE resin confirming to IS: 14333(latest version), IS: 7328 and ISO: 4427 for this a certification has to be given by the resin manufacturer as per IS: 14333 (latest

version). The resin proposed to be used for manufacturing of the pipes should also comply with the following norms as per ISO: 9080.

- The resin should have been certified by an independent laboratory of international repute for having passed 10,000 hour long term hydrostatic strength (LTHS) test extrapolated to 50 years to show that the resin has a minimum MRS of over 10MPa. Internal certificate of any resin manufacturer will not be acceptable. The minimum required strength of material should not be lower than 6.30 MPa at 20 deg. Centigrade at 50 years.

- Certificate for having passed the full scale rapid crack propagation test as per ISO 13478. High density Polyethylene (HDPE) used for the manufacture of pipes shall conform to designation PEEWA-45-T-006 of IS: 7328. HDPE conforming to designation PEEWA-45-T-012 of IS: 7328 may also be used with the exception that melt flow rate (MFR) shall not exceed 1.10 g/10 min. In addition the material shall also conform to clause 5.6.2 of IS 7328.

- The specified base density shall be between 941.0kg/m^3 and 946.0kg/m^3 (both inclusive) when determined at 27°C according to procedure prescribed in IS: 7328 The value of the density shall also not differ from the nominal value by more than 3kg/m^3 as per 5.2.1.1 of IS: 7328. The MFR of the material shall be between 0.41 and 1.10 (both inclusive) when tested at 190°C with nominal load of 5 kgf as determined by method prescribed in IS: 2530. The MFR of the material shall also be within ± 20% of the value declared by the manufacturer.

- The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5 ±0.5% and the dispersion of carbon black shall be satisfactory when tested as per IS: 2530.

Anti-Oxidant

The percentage of anti-oxidant used shall not be more than 0.3% by mass of finished resin. The anti-oxidant used shall be physiologically harmless and shall be selected from the list given in IS: 10141.

Maximum Ovality of Pipes

The outside diameter of pipes, tolerance on the same and ovality of pipe shall be as given in IS 14333. Ovality shall be measured as the difference between maximum outside diameter and minimum outside diameter measured at the same cross section of the pipe, at 300 mm away from the cut end.

Dimensions and Tolerances

- The outside diameters of pipes, tolerance on the same and ovality of pipes shall be as given in relevant clause of I.S. 14333(latest version). No negative tolerances are allowed.

- The minimum & maximum wall thickness of pipe for the given grade of material, namely PE 100 and PN6 class shall be as given in IS: 14333.

- The length of straight pipe used shall be 6 m or as agreed by Employers Engineer.

Testing

The specimen of pipes for the following tests shall be selected in accordance with relevant clause of IS: 2530 and tests in accordance with the methods described in relevant clause of IS: 14333. Following tests shall be taken in consideration:

- Hydrostatic Test
- Reversion Test
- Density Test
- Melt Flow Test
- Carbon Black Content and Dispersion

Sampling and Inspection

- Three samples of the same size and same pressure rating selected at random shall be tested for compliance with the requirements of the type test for Internal Pressure Creep Rupture Test.
- In case, any of the samples fails in the type test, the testing authority, at its discretion, may call for fresh samples not exceeding the original number and subject them to type test again. In case of the sample fails in the repeat tests, the type of pipe shall not be approved.
- Acceptance tests are carried out on samples selected from a lot for the purpose of acceptance of the lot.
- A lot having satisfied dimensional and visual requirements shall be tested for hydraulic characteristics, reversion, density, MFR and Carbon Black content / dispersion requirements. The lot shall be considered to have met the requirements of these tests, if none of the samples tested fails.
- **Workmanship / Appearance**

Pipes shall be free from all defect including indentations, delaminating, bubbles, pinholes, cracks, pits, blisters, foreign inclusions that due to their nature degree or extent detrimentally affect the strength and serviceability of the pipe. The pipe shall be as uniform as commercially practicable in colour opacity, density and other physical properties as per relevant IS Code or equivalent International Code. The inside surface of each pipe shall be free of scouring, cavities, bulges, dents, ridges and other defects that result in a variation of inside diameter from that obtained on adjacent unaffected portions of the surface. The pipe ends shall be cut clearly and square to the axis of the pipe.

Carting & Handling

During handling, transportation, storage and lowering of pipes & fittings, all sections shall be handled by such means and in such a manner that no distortion or damage is done to the section or to the pipes as a whole. Also, unless waived by the Employers Engineer, method statements shall be submitted by the Contractor for the approval of the Employers Engineer before the handling, transportation and laying of any pipes commences.

All pipes shall be handled and stored in compliance with the manufacturer's recommendations. Pipes and fittings /specials shall be transported from the factory to the

central pipe store and unloaded there before being transported to Site. At every point of loading or unloading, all pipes and fittings shall be lifted using approved lifting tackle. Unloading by rolling down any form of inclined ramp will not be permitted. Pliable straps or slings shall be used to lift pipes. Rope, wire rope, hooks or chains shall not be allowed to come into contract with any pipe surface. All pipes shall be thoroughly inspected on arrival on site and immediately prior to installation. Any damage to the pipes shall be notified to the Employers Engineer for a decision as to the acceptability of the pipes, with or without repairs or remedial work. The final judgement will be taken by the Employers Engineer based on his judgement of the suitability of the items for the purpose intended.

The following procedures should be followed so as to eliminate potential damage to pipes & fittings and to maintain maximum safety during unloading, lifting and lowering of pipes:

- Pipes must not be stored or transported where they are exposed to heat sources likely to exceed 60°C.

- Pipes shall be stored such that they are not in contact with direct sunlight, lubricating or hydraulic oils, petrol, solvents and other aggressive materials.

- Scores or scratches to a depth of greater than 10% or more of wall thickness are not permissible; any pipes having such defects should be strictly rejected.

- PE pipes should not be subjected to rough handling during loading and unloading operations. Rollers shall be used to move, drag the pipes across any surface.

- Only polyester webbing slings should be used to lift heavy PE (>315mm) pipes by crane. Under no circumstances, chains, wire ropes and hooks be used on PE pipes.

- Pipes shall not be dropped to avoid impact or bump. If any time during handling or during installation, any damage, such as gouge, crack or fracture occurs, the pipe shall be repaired if so permitted by the competent authority before installation.

- Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set.

- Pipes manufactured at factory are to be carried to the site of work directly or stacked suitably and neatly along the alignment/road side/elsewhere near by the work site or as directed by the Employers Engineer.

- Damages during transit, handling, storage will be to the Contractor's account and replacement for such pipes has to be made by the Contractor without any extra cost as directed by the Employers Engineer.

Storage

- Black polyethylene pipes may be stored either under cover or in the open. It is suitably protected from ageing due to sunlight by the addition of the appropriate quantity and type of carbon black. .

- Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set.

- Storage of pipes in heated areas exceeding 30°C should be avoided.

2.1. RCC NP3 and NP4 Pipes

Manufacturing of pipe as per IS 458.

2.2. Drop Manholes

When a branch sewer connects a main sewer, and where the difference in level between pipeline (peak flow level) of main line and the invert level of branch line is more than 600 mm or a drop of more than 600 mm is required to be given in the same sewer line and it is uneconomical or impractical to arrange the connection within 600 mm, a drop connection shall be provided for which a manhole, incorporating a vertical drop pipe from the higher sewer to the lower one.

The pipe shall be provided inside the shaft supported by brackets as per IS 4111.The diameter of the back drop should be at least as large as that of the incoming pipe. The drop pipe should terminate at its lower end with a plain or duck-foot bend turned so as to discharge its flow at 45 degrees or less to the direction of the flow in the main sewer. Adequate means for rodding should be provided for internal drops.

2.3. Flushing manholes

Where it is not possible to obtain self-cleaning velocities due to flatness of the gradient especially at the top end of branch sewer which receive very little flow, it is essential that some form of flushing device be incorporated in the system. The relevant Indian standard IS: 4111(part two) can be referred.

Flushing tanks shall be provided in such sections of the sewers where flow is never sufficient to generate self-cleaning velocity. They may be located at heads of sewers (main or branch) or even intermediate points of the sewers. Sufficient velocity shall be imparted in the sewer to wash away the deposited solid. The flush is usually effective up to a certain distance after which the imparted velocity gets dissipated.

2.4. Foot rests

Orange colour safety foot rest of minimum 6 mm thick plastic encapsulated shall be as per IS: 10910, on 12mm dia steel bar conforming to IS: 1786, having minimum cross section as 23mm x 25mm and over all minimum length 263 mm and width as 165mm with minimum 112mm space between protruded legs having 2mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufacture's permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15cm cement concrete block 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) complete as per design.

2.5. Boning Staves and Sight Rails

In laying the pipes and fittings/ specials the centre for each manhole / chamber or pipeline shall be marked by a peg. Contractor shall dig holes for and set up two posts (about 100 x 100 x 1800 mm) at each manhole/chamber or junction of pipelines at nearly equal distance from the peg and at sufficient distances there from to be well clear of all intended excavation, so arranged that a sight rail when fixed at a certain level against the post shall cross the centre

line of the manhole/chamber or pipe lines. The sight rail shall not in any case be more than 30 m apart; intermediate rails shall be put up if directed by the Employers Engineer.

Boning staves of 75 mm x 50 mm size shall be prepared by Contractor in various lengths, each length being of a certain whole number of metres and with a fixed tee head and fixed intermediate cross pieces, each about 300 mm long. The top-edge of the cross piece must be fixed below the top-edge of the tee-head at a distance equal to the outside diameter of the pipe or the thickness of the concrete bed to be laid as the case may be. The top of cross pieces shall indicate different levels such as excavation for pipe line, top of concrete bed, top of the pipe etc. as the case may be.

The sight rail of size 250 mm x 40 mm shall be screwed with the top edge resting against the level marks. The center line of the pipe shall be marked on the rail and this mark shall denote also the meeting point of the center lines of any converging pipes. A line drawn from the top edge of one rail to the top edge of the next rail shall be vertically parallel with the bed of the pipe, and the depth of the bed of pipe at any intermediate point may be determined by letting down the selected boning staff until the tee head comes in the line of sight from rail to rail.

The post and rails shall be perfectly square and planed smooth on all sides and edges. The rails shall be painted white on both sides, and the tee-heads and cross-piece of the boning staves shall be painted black.

For the pipes converging to a manhole/chamber at various levels, there shall be a rail fixed for every different level. When a rail comes within 0.60 M of the surface of the ground, a higher sight-rail shall be fixed for use with the rail over the next point.

The posts and rails shall in no case be removed until the trench is excavated, the pipes are laid and the Employers Engineer gives permission to proceed with the backfilling.

2.6. Thrust blocks

The Contractor shall indicate on his detailed drawings what thrust blocks are required to anchor pipe work supplied by him. Particular care shall be taken to ensure that pipe work thrusts are, as far as possible, not transmitted to machinery or other associated apparatus.

Puddle flanges shall be fitted to pipes where the structure through which they pass is required to take thrust resulting from the pipe. Puddle flanges shall also be fitted where a water barrier is required. All puddle flanges shall be clearly shown on the drawings and the resultant thrust clearly indicated. Puddle flanges shall only be fitted with the prior approval of the Employers Engineer.

2.7. Wooden Shoring

Contractor shall suitably design polling boards, waling and struts to meet different soil conditions that might be encountered in excavating trenches/pits. The horizontal and vertical spacing of struts shall be such that not only the sides of trenches shall be prevented from collapse but also easy lowering of pipe in trenches shall be ensured without creating undue obstructions for the excavation of the work. Any inconvenience and/or delay that might be caused in lowering pipes in trenches, as a result of adopting improper spacing of struts by the Contractor, shall be his sole responsibility. No part of shoring shall at any time be removed by Contractor without obtaining permission from the Employers Engineer. While taking out shoring planks the hollows of any form must simultaneously be filled in with soft earth well rammed with rammers and with water.

Th places, where it is found absolutely necessary to do so to avoid any damage which may be caused to buildings, cables, gas mains, water mains, sewers etc. in close proximity of the excavation, by pulling out the shoring from the excavations. The Contractor shall not claim,

on any reason whatsoever, for the shoring which may have been left in by him at his own discretion.

2.8. Steel Plate Shoring

Where thin road surfaces and other services exists,. in such circumstances, the Contractor will be required to use steel trench sheeting or sheet piling adequately supported by timber struts, waling etc., as per the instructions, manner and method directed by the Employers Engineer. Contractor shall supply pitch, drive and subsequently remove trench sheeting or piling in accordance with other items of the Employer Engineer's Requirements.

2.9. Procurement of Butterfly Valves

The valvesnted flanged/ wafer type Butterfly valve as per IS 13095:1991 PN 16/BS:5155 PN16 non-rising stem, as per specifications below:

Pressure Rating	:	PN 16
Type	:	Flanged/wafer/lugged wafer type
Body	:	Ductile Iron ASTM A536 with EPDM linning internally and external Electro-statically applied epoxy resin of 250 microns min.
Disc	:	316 Stainless Steel A STM A351, Type CF8M
Body Seat Ring	:	EPDM
Shaft and hand wheel	:	SS-410
'O' Ring	:	EPDM
Internal hardware	:	SS-316

Below is the list of relevant Indian Standards pertaining to sewerage works:

Table 1: Relevant Indian Standards & Specifications

S. No.	Code or Standard	Description
1	Manual for Sewerage & Sewage Treatment	CPHEEO Manual for Sewerage&sewage Treatment – May-2012
2	SP 7 (Part-9 Section-1) 1983	National Building Code of India
3	SP 35:1987	Hand book on water supply & drainage
4	IS 1172 :1993	Code of Basic requirements for water supply, drainage and sanitation
5	IS. 3370 Part I to IV	Code of practice for concrete structure for the storage of liquids
6	IS 456-2000	Code of Practice for plain and reinforced concrete
7	IS 1893-2002 part I to V	Criteria for earthquake –resistant design of structures
8	IS 13920-1993	Detailing of reinforced concrete Structures subjected to seismic forces
9	IS 1992-1969 / IS 6403-1971	Code for exploration to find the safe bearing capacity
10	IS 2309-1969	Code for Lighting arrestors
11	IS 875 part I to III,1987	Code of practice for design loads for building and structures
12	IS 7357	Code of practice for structural design of tanks
13	IS 1786-1985	High strength deformed steel bars and wires for

S. No.	Code or Standard	Description
		concrete reinforcement
14	IS: 638	Specification for rubber and insertion jointing.
15	IS. 226-1975	Specification for Structural steel
16	IS: 9523	Ductile iron fittings for pressure pipes for water, gas and sewerage
17	IS: 1500	Code for Hardness test for DI pipes
18	IS 3764-1966	Safety code of Excavation Works and related Drilling Operations
19	IS 11906:1986	Recommendations for cement mortar lining for cast iron, Mild steel and Ductile Iron pipes and fittings for transportation of water
20	IS 8062	Code of practice for cathodic protection for steel structures
21	IS 12288:1987	Code of practice for laying of ductile iron
22	IS 14846:2000	Sluice valves for water Works purposes (50 to 1200 mm size)
23	IS 2906:1990	Sluice valves for water Works purposes (350 to 1200 mm size)
24	IS 2685:1971	Code of practice for selection, installation and Maintenance of sluice valves
25	IS 3950:1979	Surface boxes for sluice valves
26	IS 5312	Swing check type reflux(non-return) valves for water Works purposes
27	IS 10446:1983	Glossary of terms relating to water supply and sanitation
28	IS 2951-1965	Recommendation for estimation of flow of liquids in closed conduits.
29	Advisory note on improving Urban Water Supply & Sanitation Services	Guidelines for preparation of DPRs for water supply system by MoUD, 2013
30	Is :4733-1972	Indian Standard Code: Methods of Sampling Test Sewage Effluent
31	IS: 6908-1975	Indian Standard Code: Sewage and Drainage
32	IS :7022 (PT 11)-i 979	Indian Standard Code: Glossary of Terms Relating to Water Sewage and Industrial Effluents PT II
33	IS:1538-(PT-XXIV)-1 982	Indian Standard Code: Pressure Pipes for Water. Gas and Sewage
34	IS 5600: 2002	Indian Standard Code: Pumps-sewage and Drainage-Specification
35	IS 5611 :1987	Indian Standard Code: Code of practice for waste stabilization ponds (facultative type) (first revision)
36	IS: 5600-1970	Indian Standard Code: Specification for Sewage and Drainage Building Elements
37	IS : 4764-1973	Indian Standard Code: Tolerance Limits for Sewage Effluents Discharged In to In land Surface Water
38	IS 6279 :1971	Indian Standard Code: Equipment for gnt removal devices
39	IS 6280:1971	Sewage screens
40	IS 7232:1974	Indian Standard Code: Method for lmhoff cone test
41	IS 7784: Part 1 & 2: Sec 1 to 5	Indian Standard Code: Code of practice for design of

S. No.	Code or Standard	Description
		cross drainage work Part 1 General features
42	IS 4111(Part 1):1986	Code of practice for ancillary Structures in sewerage system: Part I Manholes
43	IS 4111(Part 4):1968	Code of practice for ancillary Structures in sewerage system: Part 4 Pumping stations and pumping mains (rising mains)
44	IS 12251:1987	Code of practice for drainage of building
45	IS 12288:1987	Code of practice for use and laying of ductile iron
46	SP 35(S&T): 1987	Handbook on water supply and drainage with special emphasis on plumbing.
47	IS 458	Pre-cast Concrete Pipes (with and without reinforcement).
48	IS 651	Specification for Salt Glazed Stoneware Pipes and Fittings.
49	IS 783	Code of Practice for Laying Concrete Pipes
50	IS 1729	Cast Iron /Ductile Iron Drainage Pipes and Pipe Fittings Socket and Spigot Series for Over-ground Non-pressure Pipe Line.
51	IS 4885	Specifications for Sewer Bricks
52	IS 12592 (Part I & II)	Pre-cast Concrete Manhole Covers and Frames – Specifications
53	IS-8112: 2013	Specification for 43 grade ordinary Portland cement
54	IS-383: 1970	Specification for Coarse and Fine Aggregates From Natural Sources For Concrete
55	IS:3597 (1998)	Concrete Pipes: Methods of Test
56	IS: 783	Code of Practice for laying of Concrete Pipes
57	IS:376	Safety code for Excavation work
58	IS: 1077	Common Burnt Clay Building Bricks
59	IS:3102	Classification of Burnt Clay Bricks
60	IS: 395	Method of Sampling and Testing Clay Building Bricks
61	IS: 2212	Code of practice for brick work

SECTION-10
List Of Approved Makes

LIST OF APPROVED MAKES

1. DI Pipes	Jindal Saw Ltd Tata Metaliks DI pipes ltd Electrosteel Ltd Electrotherm Ltd
2. uPVC Pipes	Supreme industries Jain irrigation system ltd Finolex Apollo Pipes
3. HDPE(DWC) Pipes	Supreme industries Jain irrigation system ltd Apollo Pipes Alcorr pipes
4. MS Pipes	Essar Steel Surya Global steel tubes Pvt. Ltd. Jindal Tata
5. DI Fittings/specials	Kejriwal casting ltd Kiswok India Pvt Ltd Jindal fittings Ltd Truform Chandranchal Enterprises Pvt Ltd R.G. Industries Electrosteel Ltd
6. GI Pipes	Swastik Pipes ltd Zenith Birla Steels Pipes Vishal Pipes Ltd
7. GI Fittings	Jainson Industries Unique pipe fitting company
8. uPVC Fittings	Vishal Pipes Ltd Apollo Pipes Ltd
9. Horizontal Split Casing Pumps	Kirloskar Mather & Platt Grundfos Worthington Jyoti
10. Submersible Pumps	KSB ABS Kishor Grundfos Willo Eurotek
11. Motors	Kirloskar Siemens

	ABB Crompton Greaves NGEF Jyoti KEC BHEL WEEPL ROOTS
12. Sluice Valves	Kirloskar Indian Valve Company FOURESS VAG AVK
13. Butterfly valve	Kirloskar FOURESS Keystone (Tyco) IVC VAG AVK
14. Swing type non return valves	IVC Glenfield VAG KBL
15. Ball Valves	Jainson Industries L&T
16. HOT Crane	Brady & Morris Engineering Co. Hercules hoists Ltd. Sharp Engineering Pvt. Ltd.
17. EOT Crane	Eddy Cranes Electromech Consolidated Hoist Brady & Morris Engineering Co. Hercules Hoist Ltd. JAPS Project
18. Chain pulley block	Safex Brady & Morris Engineering Co. Hercules hoists Ltd Reva Engineering Indef Engineering
19. Exhaust/ Ceiling Fans	GEC Crompton Greaves Khaitan Bajaj Electricals USHA
20. Electric actuators	Rotork Auma Keystone Limitorque

21. Electromagnetic Flow Meter	Endress hauser krohne Marshall NIVO Control Seimens Xylem
22. Ultrasonic Flow Meter	Endress hauser Krohne Marshall NIVO Control Seimens
23. Ultrasonic type level sensors	Milltronics Vega Dexelbrook Krohne (Forbes Marshall) Xylem Microset
24. Power Transformer	Voltamp KEC Crompton Greaves Bharat Bijlee PS Electricals NGEF Kirloskar BHEL
25. Lighting Fixtures	Philips Bajaj Crompton Wipro
26. Switch fuses and MCCB's	L&T English Electric Siemens Control and switchgear Bhartia Cuttler & hammer Crompton Greaves
27. Miniature Circuit Breakers	Schneider electric Legrand MDS Siemens Merlin Gerin
28. Fire Extinguisher	Kooverji Devshi & Co. Pvt Ltd. Vijay Fire Protection Systems Pvt. Ltd. Steelage Industries
29. Pressure Transmitters	Rosemount Yokogawa ABB Seimens Danfoss
30. Pressure Guage	Manometer India Ltd. General Instrument Co. H.Guru Instruments Pvt. Ltd.

	Forbes Marshall Bells Controls A.N Instruments General Instrument Pvt. Ltd.
31. Differential Pressure Gauge	Switzer Forbes Marshall General Instrument Co. Manometer India Ltd.
32. Instrumentation and Control cables	Finolex Lapp Cables Udey Pyro Cables Delton Cables Asian Cable Corp.of India Cable Corporation of India
33. CCTV	Pelco Siemens Tata Honeywell
34. PLC/SCADA	Schneider Siemens ABB TATA Eurotech Lotus wireless
35. Leak Detection Equipment AQUAPHON	Gutterman, PARSAN Geophysics,
36. Sensors	Xylem/siemens
37. MCCB -	MDS – Legrand/ABB/GE/L&T
38. Earth leakage relay -	Prok DV or any other approved make
39. MCB -	MDS/Schneider/ Indo Copp
40. Luminaire -	Crompton / WIPRO / Approved equivalent
41. Landscape Luminaire -	K-lite or any other approved make
42. Contactors -	ABB / L&T / Siemens
43. Timer -	L & T / MDS
44. 1.1 KV UG Cable -	Universal/ASIAN/ NICCO

45. PVC insulated wiring cables -	Finolex / Q-Flex / RR KABEL / VARSHA
46. Street light Poles -	Shubham or any other approved fabricator
47. Feeder Pillar -	Dynam/ Load controls / Indus Power Controls
48. Screens -	Eurotek/Jash/Aplab
49. Air Blowers	Air vac/Everest/Eurotek,
50. Bio swirl media	Scogen/deepdarshan
51. Grit mechanism	Voltas/Eurotek/Aplab
52. Anoxic mixers	Aplab/Eurotek/Green tek
53. Surface jet aerators	Seimens/Eurotek/Green tek
54.Disc filter	Eurotek/Alfalaval/seimens
55. Filter press combo	Seimens/Eurotek/Auro/Greentek
56 Centrifuge	Eurotrek/Alfalaval
57 DG set	Cummins/ Kirloskar Green/ Caterpillar/ Penta Volvo /Ashok Leyland /Mahindra & Mahindra/ Perkins/Eurotek
58 Effluent/ Sewage/ Sludge pumps	Kirloskar / Eurotek/ WPIL/ M&P (Wilo)/ Voltas / KSB / FLowmore / Meghraj Machine / Aqua / Kishor/ Beacon
59HV/EHVindoor/ outdoor Circuit Breakers	Crompton / ABB/ Siemens/ Scheinder/Alstom (Areva)/ Jyoti / BHEL/Andrew Yule
60 Electromagnetic Flow meter	ABB/ Siemens/ Endress & Houser/Krohne Marshal/ Electronet/ Nivocontrol/ Mikamachi

FINANCIAL BID

VOLUME - III

SL. NO.	DESCRIPTION	PAGE NOS.
1	FORM OF TENDER	
2	BILLING SCHEDULE FOR INTERIM PAYMENTS	
3	UNIT RATES	
4	REIMBURSABLE AMOUNTS	

FORM OF TENDER (Price Bid)
(To be quoted by the Bidder)

Name of Contract

Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram,Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP ofGreater Visakhapatnam Municipal Corporation" under Smart City Mission

To,
The Managing Director,
Greater Visakhapatnam Smart City Corporation Limited
GVSCCL,
Visakhapatnam

1. Having examined the Conditions of Contract, Specifications, Drawings and Addenda for the execution of the above named Works, we, the undersigned, offer to survey, design, execute and complete such Works and remedy any defects therein in conformity with the Conditions of Contract, Specifications, Drawings, Design Criteria, Scope of Work and Addenda for the sum of

   Rs. .....(in words :Rupees)detailed bid quoted in Annexure -III (Price-Bid)

   or such other sum as may be ascertained in accordance with the said Conditions.

2. We acknowledge that the Volume I, Volume II, Volume III and Volume – IV form part of Tender.

3. We undertake, if our Tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the contract within 8 months as stipulated in the Tender.

4. We agree to abide by this Tender for the period of 120 days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. The contract is not complete and binding between us Unless and until a formal Agreement is prepared and executed for this Tender, together with your written acceptance thereof.

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this .....day of.....2017

Signature .....in the capacity of .....

Duly authorized to sign tenders for and on behalf of .....

Address.....

Occupation. .....

ANNEXURE - I

BILLING SCHEDULE FOR INTERIM PAYMENTS

1.1 Tentative Billing Schedule for Interim Payments :

Sr. No.	Description	%of weightage in the contract price
1	Survey, investigation and preparation of Designs, Drawings and reports of Sewerage System for Network ,House Sewer Connections, up gradation of STPs and replacement of	0.3%
2	Laying of Sewerage network in Jalaripeta and lifting station	11.1%
3	Laying of Sewerage network for the gap portions in ABD area	7.8%
4	Replacement of Sewerage gravity line from Durgalamma temple to the existing 38 MLD STP at Town Kotta Road.	2.5%
5	Replacement of pumps ,panel boards,cables etc to the 9 MLD Sewerage pumping station @pandurangapuram including scada system	2.1%
6	Replacement of pumps ,panel boards, cables etc to the 16 MLD Sewerage pumping station @ShanthiAshramam including scada system	2.6%
7	Replacement of pumps ,panel boards,cables etc to the 38 MLD Sewerage pumping station @ Town kotha road including scada system	3.4%
8	Upgradation of the existing 25MLD capacity sewerage treatment plant (STP) at Appughar as per CPCB norms including scada system	18.6%
9	Upgradation of the existing 38 MLD capacity sewerage treatment plant (STP)at Town kotta road as per CPCB norms including scada system	24.7%
10	Supply of vehicles for sewerage network maintenance in ABD area	2.1%
11	Operation and maintenance cost for 7 years including 2 years defect liability period for Manpower supply	14.72%
11a	1st year .. 11.91%	
11b	2nd year .. 12.63%	
11c	3rd year .. 13.39%	
11d	4 th year .. 14.19%	
11e	5 th year .. 15.04%	
11f	6 th year .. 15.94 %	
11g	7 th year .. 16.9%	
12	Operation and maintenance cost for 7 years including 2 years defect liability period for Electro mechanical and vehicles (excluding power charges and oils for DG sets)	10.07%
12a	1st year .. 11.91%	

12b	2nd year .. 12.63%	
12c	3rd year .. 13.39%	
11d	4 th year .. 14.19%	
11e	5 th year .. 15.04%	
11f	6 th year .. 15.94 %	
11g	7 th year .. 16.9%	
	Total	**100%**

NOTE: 1. For intermediate stage under each of the above items , payment can be made on a pro rata basis.

2. No payment shall be made for ancillary works which do not form part of the scope of work.

Dated this .....day of.....

Signature .....in the capacity of .....

Duly authorized to sign tenders for and on behalf of .....

Address.....

Occupation. .....

ANNEXURE - II

BILLING SCHEDULE FOR INTERIM PAYMENTS

(To be quoted by the Bidder)

Sl. No.	Brief Description of Item	Percentage Payment	
		(In Figures)	(In Words)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
	Total	100%	One hundred percent

The Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED reserves the right to approve / reject the above quoted percentage.

The Bidder shall accept the unit rates as per the following order of priority.

1. APSSR for the year 2017-18
2. As per prevailing Market rate analysis.

The bidders need to submit a detailed quantity and unit costs for all the items involved in the project as a support document for the lumpsum price quoted by them. The rate structure will be reviewed and approved by the Employer / Employer's Representative (Refer

to Clause 11. iii). The approved unit rates will form the basis for payments for addition or reduction in scope of works .

Dated this .....day of.....2017

Signature .....in the capacity of .....

Duly authorized to sign tenders for and on behalf of .....

Address.....

Occupation. .....

ANNEXURE – III PRICE BID

(To be quoted by the Bidder)

Name of the work:
Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram,Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP ofGreater Visakhapatnam Municipal Corporation" under Smart City Mission

Sub Head	**Description**	**Units**	**Amount**	
			In Figure	**In Words**
A.	Project cost (excluding all taxes)	Amount in Rupees.		
	Bid Project Cost (A)			
B	O&M Charges			
B1.	O&M Charges during first year after completion of construction period	Amount in Rupees)		
B2.	O&M Charges during second year after completion of construction period	Amount in Rupees		
B3	O&M Charges during third year after completion of construction period	Amount in Rupees)		
B4	&M Charges during fourth year after completion of construction period	Amount in Rupees)		
B5	O&M Charges during fifth year after completion of construction period	Amount in Rupees		
B6	O&M Charges during sixth year after completion of construction period	Amount in Rupees		
B7	&M Charges during seventh year after completion of construction period	Amount in Rupees		
	Bid Price = (A+B1+B2+B3+B4+B5+B6+B7)	Amount in Rupees		

VOLUME – IV

VOLUME – IV

DESCRIPTION	PAGE NOS.
SECTION 12 MODEL FORMS	
ANNEXURE – A LIST OF KEY PERSONNEL TO BE DEPLOYED	
ANNEXURE – B BANK GUARANTEES	
ANNEXURE – C MACHINERY REQUIRED	
ANNEXURE - D LABORATORY EQUIPMENT AT SITE DURING CONSTRUCTION	
ANNEXURE - E REPORTING REQUIREMENTS	
ANNEXURE - F ADDITIONAL INFORMATION TO BIDDERS	

MODEL FORMS

Data Sheet to be filled by the Bidder. If need be additional sheets can be added.

MODEL FORMS -1

Bidder's Appreciation of the Project

MODEL FORMS -2

Bidder's Organizational Setup for the Project

MODEL FORMS-3

Drawings to be Submitted

MODEL FORMS-4

Management of Design and Engineering Services

MODEL FORMS-5

Construction Methodology of different structural components

MODEL FORMS-6

Proposed Deployment of Key Personnel

Name of Tenderer

Sl. No.	Name of Person	Designation/ Post Held/ Status	Academic Qualifications and Experiences in Similar Works.	Remarks

Signature of Tenderer

MODEL FORMS-7
Proposed Deployment Construction Equipment

Name of Tenderer:

S. N.	Name of Equipment	No. of Units	Kind and Make	Capacity	Age of Mach inery	Present condition of Machinery	Present Location with name and address of organization where machinery is in use	Whether the machinery is hypothecated to any bank or institution
1	2	3	4	5	6	7	8	9

Signature of the Tenderer

MODEL FORMS-8

Proposed Sub-contractors

MODEL FORMS-9

Proposed Sourcing of Import Engineering Materials

MODEL FORMS-10

Proposed Construction Schedule for the Project

MODEL FORMS-11

Quality Control and Quality Assurance System

DECLARATION

I / WE ..... have gone through carefully all the Tender conditions and solemnly declare that I / we will abide by any penal action such as disqualification or black listing or determination of contract or any other action deemed fit, taken by, the Department against us, if it is found that the statements, documents, certificates produced by us are false / fabricated.

I / WE hereby declare that, I / WE have not been blacklisted / debarred / Suspended / demoted in any department in Andhra Pradesh or in any State due to any reasons.

Signature of the Tenderer

STATEMENT – I

Details of value of Civil Engineering works executed in each year during the last ten financial years by the Tenderer.

Sl. No.	Financial Year	Value in Rs.
1. 2. 3. 4. 5.		

a) Attach certificate(s) issued by the Executive Engineer concerned and counter signed by Superintending Engineer showing work wise / year wise value of work done in respect of all the works executed by the Tenderer during last Ten years

OR

b) Certificate from Chartered Accountant supported with Annual Balance Sheet tallying with I.T. Clearance certificate.

Signature of the Tenderer

STATEMENT – II

Details of similar works completed in the Name of the Tenderer during the last ten financial years.

Sl. No	Name of the work	Address of Agt. Concluding Authority	Agreement No. & dated.	Value of Contract	Stipulated period of completion	Actual date of completion
1	2	3	4	5	6	7

Value of work done year wise during the last 'ten' years.										Total value of work done.
1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year	
9	10	11	12	13	14	15	16	17	18	19

Attach certificates issued by the Executive Engineer concerned and countersigned by the Superintending Engineer showing work wise / year wise value of work done and date of completion.

Signature of the Tenderer

STATEMENT – III

Physical quantities executed by the Tenderer in the last ten financial years. [work wise / year wise].

Sl. No	Financial Year	Name of work	Agt. No	Quantities executed / Year wise.					Any other items.
				EWE	R.C.C.	Lining	B.M	M.S.S	
1	2	3	4	5	6	7	8	9	10
1									
2									
3									
4									
5									

Attach certificates in support of the above quantities issued by the Executive Engineer concerned and countersigned by the Superintending Engineer duly showing the quantities executed year wise.

Signature of the Tenderer

STATEMENT – IV

Details of Existing Commitments.

Details of works on hand and, yet to be completed as on the date of submission of the Tender and works for which Tender s have been submitted are to be furnished.

A) Existing Commitments on ongoing works:

Sl. No	Name of work	Address of Agt. Concluding authority	Agt. No. & Date	Value of contract	Stipulated period of completion	Value of work done so far.	Balance Value of works to be completed	Anticipated date of completion	Updated value of balance work
1	2	3	4	5	6	7	8	9	10

Attach certificates issued by the Executive Engineer concerned and countersigned by Superintending Engineer, indicating the balance work to be done, and likely period of completion.

Signature of the Tenderer

B) Details of works for which Tenders are submitted [awarded / likely to be awarded]

Sl. No.	Name of work	Address of Agt. Concluding authority	Estimated value of work	Stipulated period of completion	Date on which tender was submitted	Present stage of Tender.
1	2	3	4	5	6	7

Signature of the Tenderer

STATEMENT - V

1.1.a.i.1.1.1 Availability of Critical Equipment

The tenderer should furnish the information required below, regarding the availability of the equipment, required for construction / quality control.

Sl. No.	Details of Equipment	Number required	Number		
			Owned	Leased	To be procured
1	2	3	4	5	6

Signature of the Tenderer

A declaration regarding the equipment owned shall be produced by the Tenderer on a non-judicial stamp paper of Rs..... as below;

DECLARATION

"I ..... do hereby solemnly affirm and declare that I /we own the following equipment for using on the subject work and also declare that I / We will abide by any action such as disqualification or determination of Contract or blacklisting or any action deemed fit, if the department detects at any stage that I/we do not possess the equipment listed below.

Sl. No.	Details of each Equipment	Year of purcahse	Regn. Number	Capacity	Any other data.	Is it in working condition
1	2	3	4	5	6	7

STATEMENT – VI.

Availability of Key Personnel

Qualification and experience of Key Personnel proposed to be deployed for execution of the Contract.

Sl. No	Name	Designation	Qualification	Total Experience	Working with the Tenderer since.
1	2	3	4	5	6

Signature of the Tenderer

STATEMENT - VII

Information on litigation history in which Tenderer is the Petitioner.

S. No	Case No. / Year	Court where filed.	Subject Matter / Prayer in the case.	Respondents i.e., SE / CE	Present Stage.
1	2	3	4	5	6

Signature of the Tenderer

ANNEXURE – A

Name of Work: Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram,Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP ofGreater Visakhapatnam Municipal Corporation" under Smart City Mission

LIST OF KEY PERSONAL TO BE DEPLOYED

No.	Position	Total Work Experience (Min) [years]	Experience In Similar Work [years]	Qualification
1	Project Manager (1 No.)	20	12	B.E. Civil 12 Exp in sewerage Scheme. (5 years as Project manager should have O&M experience)
A	**Design Phase**			
1	Sewerage expert (1 Nos.)	15	10	B.E. Civil+ 15 years Exp. (10 years in Sewerage should have NRW and 24 x 7 project experience.)
2	Project Engineer (3 Nos – 1 civil, 1 mechanical and 1 instrumentation)	8	5	B.E. Civil /Mechanical/ instrumentation
3	Draftsman (1 No.)	5	5	
B	**Construction Phase**			
1	Construction Manager (1 Nos.)	15	5	B.E. Civil
2	Project Engineer (1 Nos.)	10	8	B.E. Civil+ 10 years Exp. (8 years in sewerage)
3	Quality Assurance (1 No)	10	8	BE Civil with Experience of QA
4	Draftsman (1 No.)	5	3	

PROFORMA FOR BANK GUARANTEES

ANNEXURE - B

PROFORMA – I

Sample Form of Bank guarantee for Bid Security / EMD

'WHEREAS,..... (Name of Bidder) (here in after called "the Bidder") has submitted his Bid dated ..... (date) for the construction of .....

..... (Name of contract) (hereinafter called "the Bid").

KNOW ALL PEOPLE by these presents that We ..... (Name of bank) of ..... (Name of country) having our registered office at ..... (hereinafter called "the Bank") are bound unto (name of employer) (hereinafter called "the Employer") in the sum of ..... for which payment well and truly to be made to the said Employer the Bank binds itself, his successors and assigns by these presents.

THE CONDITIONS of this obligation are:

(1) If after Bid opening the Bidder withdraws his Bid during the period of Bid validity specified in the Form of Bid.

OR

(2) If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of Bid Validity

(a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required: or

(b) fails or refuses to furnish these Performance Security, in accordance with the Instructions to Bidders

We undertake to pay the Employer up to the above amount upon receipt of his first written demand, Without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force upto and including the date ..... days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE……. SIGNATURE OF THE BANK …….

WITNESS……. SEAL……

(Signature, name, and address)

……

The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be same as shown in Clause 1 of the Tender Notice in Volume III of Bid Document.

1. 60 days after the end of the validity period of the Bid. Date should be inserted by the Employer

PROFORMA - II

Sample Form of Bank guarantee for Performance Security

In consideration of the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED (hereinafter called " the Employer") having agreed to exempt ..... (hereinafter called " the said Contractor ") from depositing with the Department in cash the sum of Rs..... (Rupees .....only) being the amount of Performance Security payable by the Contractor to the Department under the terms and conditions of the Agreement dated the ..... day of ..... 2017 and made between the Department of the one part and the Contractor of the other part (hereinafter referred to as "the said Agreement") for ..... as security for due observance and performance by the Contractor of the terms and conditions of the said Agreement, on the Contract furnishing to the Department a Guarantee in the prescribed form of a Schedule Bank in India being in fact these presents in the like sum of Rs..... (Rupees ..... Only).

We ..... Bank/Limited registered in India under ..... Act and having one of our Local Head Office at ..... Do hereby :

1. Guarantee to the Department:

   a) Due performance and observance by the Contractor of terms, covenants and conditions on the part of the Contractor in the said Agreement,

   AND

   b) Due and punctual payment by the Contractor to the Greater Visakhapatnam Municipal Corporation of all sums of money, losses, damages, costs, charges, penalties and expenses payable to the Department by the Contractor under or in respect of the said Agreement.

2. Undertake to pay to the Department on demand and without dispute or disputes raised by the Contractor(s) in any suit or proceeding field in any court of tribunal relating thereto the said sum Rs..... (Rupees ..... only) or such lesser sum as may be demanded by the Department from us our liability hereunder being absolute and unequivocal and agree that –

3. a) The guarantee herein contained shall remain in full force and effect during the subsistence of the said Agreement and that the same will continue to be enforceable till all the dues of the Departmentunder or by virtue of the said Agreement have been duly paid and its claims satisfied or discharged and till the Department certifies that the terms and conditions of the said Agreement have been fully properly carried out by the Contractor.

   b) We shall not be discharged or released from the liability under this Guarantee by reasons of :

   (i) Any change in the constitution of the Bank or the Contractor ;

   (ii) Any agreement entered into between the Department and the Contractor with or without our consent ;

(iii) Any forbearance or indulgence shown to the Contractor;

(iv) Any variation in the terms, convenants or conditions contained in the said Agreement;

(v) Any time given to the Contractor ; or

(vi) Any other conditions or circumstances under which, in law, a surety would be discharged.

c) Our liability hereunder shall be joint and several with that of the Contractor as if we were the principal debtors in respect of the said sum of Rs..... (Rupees .....only).

d) We shall not revoke this guarantee during its currency except with the previous consent in writing of the Government.

e) Notwithstanding anything contained herein before our liability under this guarantee is restricted to _____(Rupees_____).Our guarantee shall remain in force upto

IN WITNESS WHEREOF the Common Seal of .....has been hereunto affixed this .....Day of..... 2010.

The common seal of ..... was pursuant to the resolution of the Board of Directors of the Company dated the ..... day of .....2010.. herein affixed in the presence of .....who, in token thereof, have hereto set their respective hands in the presence of -

1. .....

2. .....

PROFORMA - 3

BANK GUARANTEE FOR MOBILIZATION ADVANCE

To,
The Managing Director,
Greater Visakhapatnam Smart City Corporation Limited,
GVSCCL,
Visakhapatnam.

1. In consideration of the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED ---------- (hereinafter called "the Department"), having agreed to give interest bearing mobilisation advance to Rs._____ (In Words: Rupees _____) as against the total amount of Rs._____ (In Words: Rupees _____) to M/s._____ hereinafter called the said contractor from the demand under the clause of the special conditions of contract agreement No._____ Based on the letter of award No. _____ _____ made between Department and M/s _____ an interest bearing mobilisation advance amounting to a maximum of 5% of the contract sum may be paid against 'Bank Guarantee' from any nationalised bank at 8.5% interest. Such Bank Guarantee should be from Branch of such bank in A.P. only. The mobilisation advance together with accrued interest shall be recovered in equal monthly installments by the time 90% of value of work is completed, the first installment commencing after 15% of the value of work is completed. In case of monthly installment not being recovered in full, the balance-unrecovered advance shall carry an interest of 14% p.a. Similarly if the advance is not fully recovered as above, the balance amount shall carry an interest of 14% p.a. till it is full recovered through R.A. Bills.

   For the work of Providing Sewerage Network in Jalaripeta and network gaps in ABD area and retrofitting of pumping stations at Pandurangapuram,Shantiashramam and Town kottaroad and Retrofitting of STP's at Appughar and Town kotta road and Replacement of Gravity main from Durgalamma Temple to Town Kotta road STP of Greater Visakhapatnam Municipal Corporation" under Smart City Mission" (hereinafter called 'the said agreement') an interest bearing mobilisation advance can be granted on production Bank Guarantee for Rs..... (Rupees .....Only), We State Bank of India the bank constituted under the State Bank of India Act, 1955 having its Central Office at ....., Hyderabad and amongst other places, a Branch at ..... (hereinafter referred to as the Bank) at the request of the said contractor do hereby undertake to pay unconditionally and irrevocably the corporation an amount not exceeding Rs..... (Rupees .....Only) and the interest due thereon from time to time against any loss or damage caused to or suffered or would be caused to or suffered by the corporation by reason of any breach by the said contractor of any of the terms and conditions continued in the said Agreement.

2. We, the Bank do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Corporation stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Corporation by reason of breach by the Contractor(s) of any of the terms and conditions contained in the said Agreement or by reasons of the Contractor(s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.....(Rupees ..... Only).

3. We undertake to pay to the Department, any money so demanded notwithstanding any dispute or disputes raised by the Contractor in any suit or proceeding pending before any court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

   The payment so made by us under this bond shall be a valid discharge of our liability for payment there-under and the Contractor shall have no claim against us for making such payments.

4. We, the Bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Department, under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED on behalf of the Department certifies that the terms and conditions of the said Agreement have been fully properly carried out by the said Contractor and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the date _____ we shall be discharged from all liability under this guarantee thereafter.

5. We, the Bank further agree with the Department that the Department shall have the fullest liberty without our consent and without our consent and without effecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Department against the said contractor and to enforce or forbear from enforcing any or the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor for any forbearance, act or omission on the part of the Department, or any indulgence by the Department to the said contractor or by any such matter or thing whatsoever which under the law relating to the guarantees would, but for this provision, have effect of so relieving us from such liability.

6. This guarantee will not be discharged due to the change in the constitution of the bank or the Contractor.

7. This guarantee is furnished and is deemed to be furnished in -------- and the court's in ---------- will have Civil Jurisdiction.

8. We, the Bank, lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Department in writing.

Notwithstanding anything contained herein before, our liability under the guarantee is restricted to Rs..... (Rupees ..... Only) Our Guarantee shall remain in force till _____. Unless a claim under this guarantee is made before that date i.e. _____ all your rights under the said guarantee shall be forfeited and we shall be relieved and be discharged from all liability there-under.

AFFIDAVIT

I/We have submitted a bank guarantee for the work .....(name of work.)

Agreement

No.....dated.....

.....from.....(Name of the Bank with full address).

To the Managing Director, GREATER VISAKHAPATNAM SMART CITY CORPORATION LIMITED, Visakhapatnam ----------.....(Name of Division) with a view seek exemption from payment of security deposit/performance guarantee in cash. This bank guarantee expires on..... ....

I / We undertake to keep the validity of the bank guarantee intact by getting it extended for time to time at my/our own initiative upto a period of .....months after the recorded date of completion of the work or as directed by the Employer.

I/We also indemnify the Government against any losses arising out of non-encashment of back guarantee, if any.

Deponent

Signature of Contractor

Note: The affidavit is to be given by the Executant before a first class Magistrate.

ANNEXURE – C

MACHINERY REQUIRED

S. No	Type of Equipment	Minimum Nos.
1	Pipe Layer	2 Nos.
2	JCB/ Hitachi	1 Nos
3	Mini Excavator for trenching	2 Nos.
4	Vibrators	2 Nos.
5	Pan Vibrators	2 Nos.
6	Water Tanker	1 Nos.
7	Trucks/Tractor / Tippers	2 Nos.
8	Concrete Hopper miller	2 Nos.
9	Mini Smooth Wheeled Roller (3 to 5 T)	1 Nos.
10	Mini Vibrator Roller (3 to 5 T)	1 No.
11	Pneumatic Pumps for Hydro test	2 Nos
12	Hydraulic testing equipment for pipes	1 Nos

ANNEXURE – D

LABORATORY EQUIPMENT at SITEs DURING CONSTRUCTION.

I. Slump Test Equipments : 2 Nos.

- 15cm X 15cm X 15cm Cubic Moulds : 24 Nos.
- Compressive Strength Testing Equipment : 2 Nos.
- I.S.I Sieves for sand and Metal : 2 Sets.
- I.S.I Servicing for Soils : 2 Sets.
- Necessary Measuring Equipment Required : 1 Set.
- Electric oven : 1 No.
- Field density measuring equipment : 1 No.
- Core cutter equipment. : 1 No.
- Simple balance/Electronic Equipment least count up to 0.01 Grams.

ANNEXURE – E

REPORTING REQUIREMENTS :

The following Reports and Records in four sets are to submitted to the Engineer-in-Charge by the EPC Agency.

(The Reports and Records shall have to be decided according to the nature of the Project and will be approved by the IBM State Level Technical Committee.)

Annexure F Additional Information to Bidders

Scope of Works for Sewerage System

The Scope includes

- Designing of new Sewerage network system for Jalaripeta and with the design specification as provided below.

1. Scope/Responsibility of Contractor to Execute the Work:

- Surveying with bench mark .
- Preparation of the plan and Layout for sewer network and longitudinal sections. Identification of new pipe line networks and replacement of damaged pipe line and under section type.
- Execution : Laying of pipe line construction of manholes, Wet well sumps and pump house as per the approved plan.
- Quality Testing :
  - Required tests of the pipe shall be conducted at the manufacturing company /Factory .
  - Laying of the pipe network shall be as per alignment and gradient .
  - Conduct field test of the sewer line as per the necessary tests mentioned in the CPHEEO manual, IS code in the presence of Engineer in charge and PMC.
- Operation &Maintenance

2. The Scope of Work shall include:

- Detailed Design, plans, L-Section and construction drawings of sewerage system
- Submission of design calculations, plans and drawings for approval to the client
- Construction of Sewerage Network as per approved design and plans
- The contractor shall design and construct the sewerage and industrial system and shall furnish all required tools, plant, instruments, materials including water, electricity, labor, consumables, etc., any and everything necessary for construction of the works, whether or not such items are specifically stated elsewhere in this bid.

- The contractor shall make his/their own arrangements for water and power required for the work and nothing extra will be paid for the same. This will be subject to the conditions that the water used by the contractor (s) shall be fit for construction purposes to the satisfaction of the Employers.

- In general, this work shall include providing, laying, jointing and testing of all straight HDPE and RCC PE lined pipes and specials / fittings, manholes, DI pipe risers, inlet connection, connections to manholes on the peripheral network, etc.

3. Detailed scope:

- Survey work shall be conducted to carry out the longitudinal sections of the sewer lines for the newly proposed area. The pipe lines which are designed and which are identified under section than the design section.
- The discharge demand in the individual sewer pipe line shall be worked out based on the Base year-2018 and ultimate year-2048.
- Pipe should be decided consider in the design, required for ultimate year-2048.
- Based on the ultimate demand the Existing pipe network flows and newly constructed pipe flows shall be jointly consider the the design of combined sewer.
- Accordingly manholes sizes and diameters of the pipe line of common sewers shall be decided.
- If they existing pipes the adequacy of capacity of pipe line shall be decided.
- While considered the section the pipe flow shall be partial flow of (d/D) ratio less than and equal to 0.8.
- While placing the alignment of the pipe line as far as possible shall be maid along the center line of the road.
- Manholes should be so placed the spacing shall be 30m, it should be convenient to connect the house connections.
- Manhole spacing and Diameter, Manhole size shall be proposed as per CPHEEO guide lines.
- Bench mark stone established in the proposed area at various places shall be marked with paint and levels.
- The bench mark stone levels shall be connected with GTS bench mark and conducting check levels as directed by Engineer In charge.
- The Alignment of the sewer lines and Manholes shall be placed such a way there should not be any over flows through manholes to avoid inconvenience to the public and non-silting velocities through the pipe lines shall be maintained.
- Where ever wet well, sewage sumps and pump houses for smooth functioning of the network shall be identified and approved for the total sewer network and additional structure shall be obtained from the competitive authorities and execution can be carried out after above approval only.
- The pipe lines from 160mm to 450mm dia shall be used with HDPE pipe with reference to CPHEEO manual and IS code reference IS..14333, pipes higher dia (more than 450mm) shall be R.C.C NP3(Non pressure grade).
- Pipes Jointing shall be made as per IS code and CPHEEO manual.
- Quality checking shall be done in the manufacturing company in the presence of the engineer in charge and PMC Team.
- Following tests shall be carried out to be checked,
    - Water Test
    - Air testing
    - Smoke test
- All tests shall be carried out before operation of the sewer network.
- The invert levels, Top of the manholes and ground levels at all the manhole points and junctions at the pipe network plan along with the flow directions, Slope of the pipe line and dia of the pipe line. Manholes covers shall be provided with FRP (Fiber Reinforced Plastic) material.

- In order to measure the flow condition the pipe line at main junction of the sewer network shall be provided and no of sensors at main junctions shall be with prior approval and competent authority with Engineer In charge
- as specified in the latest CPHEEO guidelines and CPCB guide lines .

4. Contract Key Activities:

- Asset and operational data collection
- Customer survey and topographic survey of entire area including new area
- Sample flow
- Demand model and hydraulic network model for new area
- Submission of drawing and design for new proposed network for approval of GVSCCL
- Scoping of management information system
- Preparation and approval of Service Improvement Plan up to end of Rehabilitation Period for ABD area
- Detailed rehabilitation and new Infrastructure works implementation plan
- Preparation and approval of Plan
-
- Procurement, construction and rehabilitation of new and old system
- Implementation of agreed network rehabilitation works in ABD area and construction of new in Jalarpeta
- About 3017 new house sewer connections in gaps in the ABD area and new net work in jalaripeta
- Visible leak repair in entire network, including rehab of overflowing manholes and removing back flow in sewerage network
- Rehabilitation of existing network including pipes, valves etc.

5. Design Basis for NEW SEWERGE SYSTEM in Jalaripeta and design for gaps of system in ABD:

5.1.Sewage Generation

The residential sewerage system is estimated considering a return factor of 80%, i.e., 80% of the total net water supplied coming out as sewerage/wastewater. The tentative sewage generation is …… for the area where new network is to be designed, constructed, commissioned and .

5.2.Rate of Infiltration

Infiltration into the sewerage system occurs through defective sewers, manholes, etc. The rate of infiltration into sewers also depends upon the ground water table and permeability of the surrounding soil. Though strict quality control and good workmanship would ensure

minimum infiltration, however as the system condition deteriorates with age, the possibility of infiltration increases.

For the said project, the hydraulic design of sewers, an allowance for infiltration for the project area should be considered as 5000 litre/km/day as per Part-A of CPHEEO Manual.

However in no case the infiltration shall be more than 10% of the total sewage flow per day for Sector-A.

5.3. Design Period

Sewerage projects are designed to meet the future requirement of a stipulated design period. This period, with regard to certain components of the project, depend on their useful life or the facility for carrying out extensions whenever required, so that expenditure far ahead of its utilization is avoided and capital expenditure incurred on the project does not remain idle due to underutilization of these facilities. For the purpose of designing such systems, a 30-year project period is recommended. The design period normally considered for various components is as under:

- Sewers and it's appurtenances : 30 years
- Pumping Mains : 30 years
- Mechanical and Electrical Components : 15 years

5.4.Peak Factor

As far as the design of sewerage network is concerned, it is the hourly variation in consumption of water that matters. The fluctuations in consumption are accounted for, by considering the peak rate of consumption as rate of flow in the design of sewerage network. The flow in sewers varies considerably from hour to hour and also seasonally, but for the purposes of hydraulic design it is the estimated peak flow that is adopted. The peak factor or the ratio of maximum to average flows, depend upon contributory population and the following values shall be adopted as suggested in manual and as tabulated below:

Table2: Peak Factors for Contributory Population for Per Capita Sewage Flow

Contributory Population	Peak Factor
For population less than 20,000	3.00
For population range of 20,000 to 50,000	2.50
For population range of 50,000 to 750,000	2.25
For population above 750,000	2.00

5.5.Sewerage Network and Manholes

The sewerage network will collect the sewerage from plots and convey it to the Sewage Treatment Plant (STP) located within the Project area. The sewer network shall be designed in such a fashion so as to minimize any pumping requirement but in unavoidable circumstances Intermediate sewage pumping stations may be provided at places, if required.

Contractor has to design the complete sewerage network system for the Sector-A Project area.

The implementation limit of this network will be from the Property connection point inside the plot boundaries to the inlet points of the intermediate sewage pumping station, if any and/or directly to STP premises by gravity system to the best possible extent. The design and construction of property sewerage chamber for connection is in scope of the present contract.

The scope for this item includes designing of the gravity sewer system, providing, supplying, lowering, laying and jointing of sewer including excavation, backfilling, and bedding of pipes for domestic sewage collection. The scope of services includes supply of water for hydraulic testing and carrying out hydraulic test for network and manholes. The layout drawing for Residential Sewerage network system is given in ……..

The tentative details of the sewerage network system are as follows:

Table 1 – Tentative Details of Residential/Domestic Sewerage Network

S. No.	Description	Value
1	Sewer Pipe Diameter	As per design but not less than 110 mm dia DWC(HDPE)SN8
2	Total Length of Sewerage network	Refer the Drawings

The scope for Manholes includes designing and constructing Sewer manholes, drop manholes and scrapper manholes as per the type design in Construction of Circular manhole chambers constructed with Cement Concrete Bricks (Autoclaved as mentioned in CSSR Bldgs 2016-17) as per Drawings necessary coping in R.C.C. M-20 fixing PVC encapsulated D.I / C.I Steps or Lugs, providing and fixing SFRC manhole frames and covers over manholes etc. complete, including epoxy paint to be applied to inner surface of RCC manholes, including all civil Works like excavation, backfilling, RCC Works etc.

5.6.Property Connections

Service pipes for the property connections should be laid up to plot boundaries in the Project area. The service pipe details are as defined below:

Table 4 - Tentative Details of Property Connections

S. No.	Description	Value
1	Total Number of property sewer connections	3017
2.	Connection pipe OD	110 mm OD UPVC pipes for individual houses and 160mmOD UPVC pipes for group houses , apartments and commercial establishments .

5.7. Hydraulics of Sewage Network

The Manning's Formula for Gravity Flow will be used to design the sewerage network; The Manning's Formula for circular conduits is expressed as under:

$$V = [(1/n)] \times [R^{2/3} S^{1/2}]$$

For Circular Conduits,

$$V = (1/n)\ (3.968 \times 10^{-3}) D^{2/3} S^{1/2}$$

And,

$$Q = (1/n)\ (3.118 \times 10^{-6}) D^{2.67} S^{1/2}$$

Where,

- Q : Discharge in l/s
- S : Slope of hydraulic gradient
- D : Internal diameter of pipe line in mm
- R : Hydraulic radius in m
- V : Velocity in m/s
- n : Manning's coefficient of roughness

5.8.Coefficient of Roughness

The coefficient of roughness is based on type of sewer material proposed for the sewage conveyance. The coefficient of roughness "n" for HDPE pipe as indicated in CPHEEO sewerage manual, 2013 as 0.010. However, it shall be considered as 0.011 for design purpose considering 30yrs design period. Similarly, the coefficient of roughness "n" for RCC & DI pipes is considered as 0.011 as indicated in CPHEEO sewerage manual, 2013.

5.9. Design Capacity of Sewers

Sewers shall be designed to carry estimated peak flows generated in the design year and would be designed 80% full at ultimate peak flow. This is to ensure proper ventilation and prevent septicity of sewage. No sewer pipe shall run at any time more than 80% full.

Minimum and Maximum Velocity in Sewer

Considering typical values of particle size and specific gravity, minimum partial flow velocities is considered at present peak flows and at design peak flows. The maximum velocity shall be considered in order to prevent scouring.

A velocity of 0.6 m/s would be required to transport sand particles of 0.09 mm size with a specific gravity of 2.65. Thus the sewers are designed on the assumption that although silting might occur at minimum flow, it would be flushed out during peak flows. Erosion of sewers is caused by sand and other gritty material in the sewer and also by excessive velocity. Velocity in a sewer is recommended not to exceed 3 m/s and same is in table below:

Table 2: Maximum and Minimum Velocity in Sewer

S. No.	Criteria	Velocity (m/s)

1	Minimum velocity at initial peak flow	0.6
2	Minimum velocity at ultimate peak flow	0.8
3	Maximum velocity	3.0

5.10. Slope in Sewerage System

Minimum slopes that will be considered for design of collection network are as in table below:

Table 3: Minimum Slopes

S. No.	Sewer Size (Mm)	Minimum Slope (1 In)
1	150	170
2	200	250
3	250	360
4	300	450
5	375	670
6	450	830
7	>=525	1000

5.11. Bedding

As per IS 7634 (Part 2) : 2012 clause no. 6.2, Polyethylene pipe requires no special bed preparation for laying the pipe underground, except that there shall be no sharp objects around the pipe. However, while laying in rocky areas suitable sand bedding should be provided around the pipe and compacted. Be noted all HDPE pipes shall be provided with minimum 6 inches of uniform river natural graded sand bedding free from any foreign /sharp etc. material which may damage the outer surface of the HDPE pipe. The HDPE bedding specification shall be referred from Annexure B IV above.

The type of bedding to be used depends on the bedding factor as per Part A of CPHEEO Manual, Nov 2013 & mentioned in subsequent table:

5.12. Manhole size, depth and type

The channels in manholes at junctions and bends shall be smooth with gradual transitions to avoid turbulence and deposition of solids. Manholes are usually constructed directly over the line of the sewer. They are circular, rectangular or square in shape. Manholes should be of such size that will allow necessary cleaning and inspection. As per IS-4111: 1986 “Circular type manholes are much stronger than rectangular and arch type manholes and thus these are favored over rectangular as well as arch type manholes”. Therefore circular manholes shall be proposed on all sewer lines for all depths starting from 0.9m. Diameter of manhole varies with change in depth of manhole. Poly elastomeric MS flats footrest shall be suggested for entry into manholes.

Table 4: Manhole Sizing

Range of Depths, m	Manhole Size

above 0.90 m and up to 1.65 m	900 mm dia.
above 1.65 m and up to 2.30 m	1200 mm dia.
above 2.30 m and up to 9.0 m	1500 mm dia.
above 9.0 m and up to 14.0 m	1800 mm dia.

5.13. Spacing of Manholes

- As per IS – 4111: 1986, For inspection, cleaning and testing of sewers, manholes should be built at every change of alignment, gradient or diameter, at the head of all sewers and branches and at every junction. This shall be kept in mind while designing the system.
- The sewer shall be in a straight line between two manholes.
- Maximum distance between service manholes should not be more than 30 m.
- Manhole spacing is limited to 30m for sewers having service connections. For Outfall sewers with no service connections the spacing can be increased, with prior approval of Employers Engineer.

5.14. Cover Frame

- As per IS-4111: 1986, the size of manhole covers should be such that there should be clear opening of not less than 560 mm diameter for manholes exceeding 0.9 m depth.
- Manhole cover and frame will be SFRC (Steel Fiber Reinforced Concrete) conforming to the IS 12592.

Table 6: Manhole Cover Details as per IS 12592

Manhole Type	Load withstanding capacity	Suitable Locations
E.H.D (Extra Heavy Duty)	35.00 MT	For all roads in present work

Scope of work for Sewage Treatment plants

6. Up gradation of Sewage Treatment Plant

Retrofit of STP is covered in the scope of contract; It includes civil, electromechanical units and adopting simple PLC/ SCADA system for the treatment plant.

Up gradation of Sewage Treatment Plants

The scope under this contract comprises of Data collection and studies, Design, Engineering, Manufacture, Supply, Transportation to site, Storage, Construction, Installation/Erection, Testing, Commissioning and putting into successful operation of the complete Facility on basis including all Civil, Structural and Architectural, Mechanical, Electrical, Control & Instrumentation and all Infrastructural work covering lighting, drains, all preparatory & temporary works for the purpose of meeting the entire scope of works for

- **25 MLD Extended Aeration based STP**
- **38MLD Extended Aeration based STP**

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.

The scope of works covers:

- The Bidder shall be responsible for the Design, engineering, manufacturing, shop fabrication, assembly, testing and inspection at supplier's works, packing, dispatch, shipping, delivery at Indian port/unloading at Indian port/delivery from Indian port to site in case of imported equipment and delivery/unloading at site for indigenous equipment, unloading and storing at site, insurance up to time of take -over/hand over by Employer at the need of O&M period, handling at site, complete erection, start-up, commissioning, successful performance testing and handing over of the full Package, warranty, and defect liability period on EPC basis .

- Site clearance
- The Bidder shall include in its scope all the equipment, works and services necessary for complete, safe and reliable operation and maintenance of the facility in accordance with the terms of the Contract, even if certain works are not expressly stated in any part of the Tender Documents. Power meter for energy measurement.
- Upgrading the plant compliance with CPHEEO manual and CPCB guide lines
- Rehabilitation as defined below in the specifications
- Throughout these Tender Documents, the terms "Bid" and "Tender" and their derivatives ("Bidder/Tenderer", "Bidding/ Tendering", etc.) are synonymous, and Day means calendar day of twenty-four (24) hours. Singular also means plural. "Bidder" or "Applicant" and "Bid" or "Application" for the purpose of interpretation of Instructions to Bidders shall mean the same. Any other term not defined herein should be interpreted in a manner as defined in General Condition of Contract.
- All pressure containing equipment and components shall be designed, fabricated, tested, and inspected in accordance with project specification and ASME Section VIII, Div 1. Material certification to BS-EN-10204:2004 shall be supplied for all items.
- Inspection and Quality Control of all equipment and civil work, Erection, Commissioning, trial run, along with all consumables and manpower, project management and monitoring for timely submission of design documents and drawings and timely execution of the project with demonstration of performance guarantee parameters including supply of all measuring instruments and manpower.
- Training of client Operating and Maintenance personnel.
- The Bidder’s proposal shall include details and references of the recorded operational reliability of the key equipment and systems to be provided.
- The Contractor shall ensure that all designs and equipment for which he is responsible are safe. Nothing in this requirement shall remove the Contractors obligation from drawing the attention of the Employers Representative to any feature of the Works which is not consistent with safety, or to prevent him making proposals for incorporating equipment or designs which would increase the safety of the site and plant.
- The installation layout and system design shall not allow any item of plant to be so positioned that danger to operating personnel could arise during normal operation and maintenance. Particular attention shall be paid to the position of pipes, air vents, electrical cables and rotating machinery.
- All rotating shafts, couplings, gears, flywheels, belt drives or other moving parts shall be fully guarded. Guards shall be designed to provide ready access to bearings, grease points, thermometer sockets/instrument probes and other check points and to allow safe routine observation and servicing to be executed without the need to dismantle any part of their structure.

- However, prior to commencement of the work, the Contractor shall submit the following:

1. Layouts, general arrangements, dimensional elevations and cross-sectional drawing for all the project components, equipment, structures and facilities of the works.
2. Flow diagrams, hydraulic gradient diagram, Process & Instrumentation Diagrams, Piping isometric, composite layout and fabrication drawings, Piping engineering Diagrams, pipe and fittings schedules, valve schedules, pipe support schedules.
3. Technical data sheets and calculations for all bought out and manufactured item
4. Detailed design calculations including sizing calculations for all system and equipment like pump, pumping station equipment's, piping, valves, Electrical systems, Control and Instrumentation systems and civil works.
5. Characteristic Curves/ Performance Correction Curves.
6. Hydraulic & Mechanical design calculations
7. Comprehensive list of all terminal points which interface with Employer's facilities, giving details of location, terminal pressure, temperature, fluid handled & end connection details, forces, moments etc.,
8. Power distribution scheme indicating the equipment's rating
9. Protection system diagrams.
10. Cables schedules, termination and interconnection diagrams
11. Instrument schedule, measuring point list, I/O list, Interconnection & wiring diagram, functional write-ups, and installation drawings for field mounted instruments, logic diagrams, control schematics, wiring and tubing diagrams of panels and enclosures etc. Drawings for open loop and close loop controls (both hardware and software).
12. List, type, data sheets and valve schedule of motors and actuators, Alarm and annunciation/Sequence of Event (SOE) list and alarms & trip set points.
13. Sequence and protection interlock schemes
14. Type test reports
15. Control system configuration diagrams and card circuit diagrams and maintenance details
16. Detailed software manuals & source software listing
17. Detailed flow chart for digital control system and Mimic diagram layout, Inputs
18. Foundation Plan and Loading Data for Civil Design and drawings.
19. Model study reports wherever applicable
20. Functional & guarantee test procedures and test reports
21. Documentation in respect of Quality Assurance System as listed out elsewhere in this Specification
22. Single line Diagram, Schematic, control, wiring, duty cycle diagram and relay settings of all electrical panels/cubicles/cabinets

6.1.Workability and Maintenance

Facilities and equipment shall be arranged and spaced sufficiently to enable satisfactory operation and maintenance of the Plant. Access around all equipment shall be provided, in accordance with Good Utility Practices, to allow effective inspection, maintenance and removal of equipment.

Aisle ways adjacent to equipment and lay-down areas shall be sufficient to facilitate all aspects of major maintenance and Plant overhaul. General arrangement drawings shall be provided, clearly identifying the outline of all major Plant equipment, their weights and associated floor loading capacity and lay down location.

Space should be provided at the front and rear of the skid to allow the use of mobile equipment and access to pressure vessels for membrane replacement or leakages repairs.

Permanent lifting devices should be provided for maintenance of heavy equipment, they should be sized to lift the heaviest equipment in the said process unit.

The lay down areas for all major facilities shall have adequate space for direct heavy transport, as well as trailer access and direct mobile crane access. Platforms shall be provided around equipment as required for maintenance work, testing, inspection and safe operation. Platforms where provided, shall be sized to facilitate safe ergonomic operation of manual valves and equipment between waist and shoulder level of an average height man. Those parts of the facility where maintenance activities will be performed shall be provided with permanent arrangements for slinging or handling during maintenance and overhaul.

All automatic valves and major equipment should be at ground level or accessible by permanent platforms. The marking and test specification of safe working load values on lifting equipment shall be in SI units.

All platforms to be visited on a daily basis shall be provided with stairways, except where a permanent access ladder is the only feasible means of access. All interior and exterior platforms gratings and/or checker plate shall be of GRP. All Handrails shall be SS-304 Schedule 10 made of 32NB pipes/tubes with top and intermediate rows of pipes running parallel to each other and the height of railing not less than 1100mm.The distance between 2 vertical posts shall not be more than 1.5 meters. The post shall also be of 32 NB. Handrails shall be replaced in totality in both plants

Platforms shall be constructed using a suitable grade of GRP grating, to the relevant ISO, British Standards or ASME Standards and shall cater for the relevant loadings for maintenance. Generally, no frequently accessed platform shall be less than 1m wide and all platforms shall be extended up to the equipment, valves and instrumentation that they serve. All edges of floors, platforms and walkways shall be provided with curbs or kicking strips.

Sufficient space should be provided to ensure easy inspections and maintenance of all the equipment.

6.2.Project Introduction

- The projects shall require the Upgradation of existing sewage treatment plant The scope of works shall be but not limited to
- Design, Erection and Commissioning for up dgrading existing25 MLD and 38 MLD Sewage Treatment Plant Based on Extended Aeration process

to meet the required water quality.

- Operation and Maintenance of all these facilities for the period after rehab and up gradation of Treated Sewage Storage and Pumping station within the plant premises
- RCC jacketing and grouting supposed to be carried out by contractor as per the project requirement for repairing/rehabilitation of the civil works in existing STP
- The bidder is advised to visit the site for assessment of repair. No extra cost shall be paid.
- Completeness of the Offer
- The scope under this contract comprises of Data collection and studies, Design, Engineering, Manufacture, Supply, Transportation to site, Storage, Construction, Installation/Erection, Testing, Commissioning and putting into successful operation of the complete Sewage Treatment Plant on including all Civil, Structural and Architectural, Mechanical, Electrical, Control & Instrumentation and all Infrastructural work covering lighting, drain, all preparatory & temporary works for the purpose of meeting the entire scope of works.

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, endeavour 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.

6.3.Scope of Project

. The location map of 25 MLD and 38 MLD is enclosed in Appendix C.

The scope of works covers:

- The Bidder shall be responsible for the Design, engineering, manufacturing, shop fabrication, assembly, testing and inspection at supplier's works, packing, dispatch, shipping, delivery at Indian port/unloading at Indian port/delivery from Indian port to site, if any in case of imported equipment and delivery/unloading at site for indigenous equipment, unloading and storing at site, insurance up to time of take -over/hand over by Employer at the need of O&M period, handling at site, complete erection, start-up, commissioning, successful performance testing and handing over of the full Package, warranty, and defect liability period on EPC basis.
- Submission of process design, design calculations, plant lay out and hydraulic flow diagram, Process & Instrumentation diagram, electrical &

mechanical equipment drawings including equipment installation drawings, supporting calculations & technical information, instrumentation & control system, Erection of all mechanical, electrical items including , testing, commissioning, performance testing of process units & trial run for a period of three months, illumination of the entire STP, laboratory, supply of pumps for transferring the treated sewage from treated water tank.

- Boundary wallwith top bar bending fencing for the required perimeter of site.
- Disposal of sludge to designated landfill as per statutory requirements.
- Conduction of 120 hours performance guaranteed test to perform the guarantees for treated sewage and others (power, chemicals consumption) after successful commissioning and stabilization of sewage treatment plant.
- The Bidder shall include in its scope all the equipment, works and services necessary for complete, safe and reliable operation and maintenance of the Plant in accordance with the terms of the EPC Contract, even if certain works are not expressly stated in any part of the Tender Documents.
- The scope of work shall include but not be limited to following:
  - ✓ Construction of Internal Roads, if required, including connecting road to site from existing road to have a separate and independent entry to plant/site.
  - ✓ Storm water Drainage within battery limits and extension up to nearest drain/point of disposal, drinking water & sanitation water system for operating & maintenance personnel, yard lighting, fencing, etc.
  - ✓ Construction of permanent boundary walls and/or fence, if required and internal fencing, entry gates and lighting including any temporary fencing required during construction
  - ✓ Solar Street lighting
  - ✓ Ventilation system for all buildings and units, Fire Fighting System, Tools & Tackles for handling of equipment during maintenance.
  - ✓ Commissioning spares
  - ✓ Laboratory in complete for efficient operations of the plant.
  - ✓ Site services as required for the construction and commissioning of the Plant including start-up and handover
  - ✓ Lay-down areas, warehouses, workshops for site construction and pre-fabrication purposes, vehicles, mobile equipment etc.
  - ✓ Inspection and Quality Control of all equipment and civil work, Erection, Commissioning, trial run, along with all consumables and manpower, project management and monitoring for timely submission of design documents and drawings and timely execution of the project with demonstration of performance guarantee parameters including supply of all measuring instruments and manpower.
  - ✓ Material of Construction: For any proprietary or generic design, the Material of Construction shall be as per the tender document – (e.g. Pipes, Plates, Valves etc)

- ✓ The purpose facilities shall require minimum skilled man power for the operation and maintenance and shall have a complete PLC based operation of all units in proposed plant.
- ✓ **Automation & Control**
    - PLC based automation system with application software. Automation to control blowers, VFDs, limit switches and Instrumentations in anoxic tank ,aeration tank and other units of sewage treatment plant, including I/Os with 20 % spares, power supplies, UPS, etc. complete.
    - Stand alone/ or integrated PLC panel having Suitable PLC.
    - Ultrasonic level transmitter on all sump/ tank.
    - Flow meter in rising main of raw sewage transfer pumps to equalization tank, pump main of MBR Feed Pumps.
    - Digital energy meter along with CT's and protective switchgears on each MCC which shall be connected on MODBUS communication with PLC to have all parameters like, Voltage, current, Power Factor, active and reactive power.
    - HMI Panel to comprise of up-to-date standard PC with monitor, printer, mouse, RS-view, RS-links (gateway version), entire process and operator software with dynamic flow charts, pictures, screens, alarms, historical trends, reports etc.
    - SCADA based operation of Pre Treatment including Screening, Grit Chambers, Anoxic tanks, Aeration tanks Sludge Dewatering System, Polyelectrolyte dosing system including the complete plant.
    - Flow Diagram & P & ID diagrams

      Any other items of work which have not been specifically mentioned in specifications but are necessary for the plant as per engineering practice and safety norms and operation and guaranteed performance of the entire plant shall be deemed to be included within scope of work of this specifications and shall be provided by the Contractor without any extra cost to the Employer.

6.4.DESIGN PARAMETERS OF SEWAGE TREATEMENT PLANT

The parameters for design the sewage treatment plant shall be as below:

Parameters	Raw Sewage	Treated Sewage (Guaranteed by the Bidder)	Unit
Flow	25		MLD
Peak Factor Consider	2.0		
BOD_5	300	<10	mg/l

COD	480	<30	mg/l
Total Suspended Solids	450	20	mg/l
Ph	6.5 – 8.5	6.5 – 8.5	
Total alkalinity as $CaCO_3$	300 - 400 mg/L		mg/l
Total Kjeldahl nitrogen	45-50 mg/L		mg/l
Ammonical Nitrogen	35-40 Mg/l	<1	mg/l
Total Nitrogen as N		<10	Mg/l
Total Phosphorus	5 – 7 mg/l	<1	mg/l

The scope of work begins with the Receiving Chamber of 25MLDand 38MLD plant with necessary piping work of adequate sizing, valves, appurtenances, etc. which is included in scope of work of this project. Raw Sewerage line upto the receiving chamber is also under the present contract. Therefore the Invert Level of the incoming pipe as designed and approved by AITL shall be taken as inlet to the plant.

6.5.Performance of SEWAGE Treatment Plant

The sewage treatment plant shall be designed for continuous operation and shall have a turndown ratio without manual intervention of at least two to one. It shall be possible with manual intervention to reduce the flow through the plant to 50 % of full capacity without affecting the quality of the treated sewage.

6.6.Works Life Expectancy

The Contractor shall design the Works for a life expectancy as follows:

- Concrete structures 50 years;
- Mechanical plant 15 years;
- Electrical plant 15 years;
- Control panels 15 years;
- External instrumentation systems 15 years;
- Computer systems 10 years.
- Piping 30 years
- Chemical Tanks 30 years for GRP/FRP

6.7.General Arrangement of Plant

- The Contractor shall ensure that the whole of the Works as installed is safe for use by the operating and maintenance staff, and by any other persons having access thereto. Guards, electrical safety devices, thermal insulation, noise-supervision devices, written notices, safety colors and the like shall be provided where necessary during erection permanently. The equipment layouts shall provide easy and safe assess to all operating devices, free from

hazardous obstructions. Nothing in this Specification shall remove the Contractor's obligation from drawing the attention of the Employer's Representative to any feature of the Works which is not consistent with safety, or prevent him making proposals for incorporating equipment or designs which would increase the safety of plant equipment

- A set of special tools and tackles which are necessary or convenient for erection, commissioning, maintenance and over hauling of the equipment shall be supplied. The tools shall be shipped in separate containers clearly marked with the name of equipment for which are intended.
- The following general rules but not limited to below shall be followed in arranging and Designing the Plant units:
- Sufficient room (of not less than 2.0 m wide) shall be allowed between items of Plant and adjacent Plant or fixed structures to permit safe and convenient access for operation and maintenance; for provision of appropriate structure foundations. In case of the areas that require movement of heavy equipment for installation and replace, sufficient access shall be provided to move heavy vehicles.
- an area adjacent to all mechanical plant shall be provided as a maintenance lay down area;
- fixed runways, lifting eyes or other means shall be provided to permit the removal of Plant Equipment that may logically be required to be removed during the course of its normal operational life for maintenance or any other purpose;
- The Pumps should be designed for positive suction .Pumps shall generally comply with the requirements of standard codes as cited in the tender documents. Pumps shall be so selected as to have a maximum capacity of not less than 125% of the rated capacity. Pump sets shall be suitable for the required duty conditions and shall be designed and constructed for 24-hours' continuous duty at full load. The pumps shall be designed for continuous operation at any point of the head capacity curve between 25% and 125% of pump rated flow without undue vibration or overheating areas where leakage is likely to occur whether in normal use or during maintenance shall be provided with underground drain line or covered RCC drainage channels which shall direct spillage either to a suitable drain or to a sump from where it can be pumped to drain.
- plant where necessary shall be provided with removable acoustic coverings to limit the noise produced during normal operation to the limits detailed in the General Requirements;
- Plant shall be arranged and the building shall be designed to permit the removal/relocation of Plant items. The Plant layout shall be such that no flooding of units is allowed even during heavy monsoon and should be accesable at all times.
- All the units shall have drain valves. The drain valves of diameter less than 250mm shall be manually operated and higher than 250mm valve shall be electrically operated. For the valves located below ground level extended spindle shall be provided for ease of operation.
- Equipment Bases: Steel base plate with proper corrosion restraint paint/protection shall be provided for all rotating equipment which is to be installed on a concrete base, unless otherwise specifically agreed to by the Employer's Representative. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections. Bases shall be appropriately painted for protection against corrosion.
- All motors shall have running indication.
- Aeration blowers shall be located inside the blower room with necessary acoustic hoods complying with statutory and safety norms.
- Main control room housing PLC/SCADA shall be located in such a manner so that that entire STP is preferably visible to the operator through glazed windows.
- Knife Gate valves shall be provided for Raw Sewage and sludge application.

- Doors, Windows and Ventilators shall be of aluminium glazed type.
- EOT shall be provided for Centrifuge Building, Blower room, etc. as required of adequate capacity (minimum 1.5 times the weight of the heaviest equipment).
- Adequate measure shall be taken to prevent dry running of the pump. Every sump and tank shall be provided with ultrasonic level transmitter. The level of tanks and sumps shall be displayed on control room panel.
- Contractor should design the plant in such a manner that the Vehicular approach shall be provided from entry and exist point of Sewage treatment plant up to the centrifuge building, Blower Room for execution and Operation and maintenance point of View.
- Flushing connections shall be provided for all sludge handling units and sludge lines.
- Access to platforms shall be by stairs/ ladders. Access shall be by stairway if unit required frequent attention of operating personnel.
- Common delivery header and suction header of pumps (and blowers) shall be provided with a blind flange on one end.
- Sludge handling system with bricket making to be provided and storage area also bebe properly designed with flooring & roof.
- Proper Odour Control system for the whole unit shall be designed and provided.
- The whole area should have a well-designed Landscapes, tree plantations, Tiled path ways, Proper Safety hand railings at all Units, area lighting for the whole plant area and well-designed storm water drainage system.
- Chemical House including storage area, Testing Laboratory with all required equipment's, testing chemicals/agents required for regular testing and testing kits etc;
- The following Lab equipment's shall be provided
- Chemical pipework shall be secured to racks or trays to be fixed to duct walls or walls of tanks and buildings as necessary. The method of securing the pipes to the racks shall be by clips or something similar, facilitating ease of removal in such a way that individual runs can be changed without dismantling adjacent pipes.
- All chemical pipes shall be colour banded and suitably labelled to enable individual lines to be identified throughout their run. Particular attention shall be paid to the layout of the chemical pipework, which shall be functional and neat in appearance. Generally, where pipework is installed in ducts, it shall be supported not less than 150 mm clear of the floor.
- When selecting materials for pipework, the Contractor shall give consideration to the deteriorating effect of some of the synthetic materials due to the action of ultra-violet light. Where such materials are employed, they shall be shielded from direct sunlight. All the exposed MS piping should be Zinc Epoxy coated as base then painted 2 coats with pproved color to suit to the type of carriage liquids.

6.8.SEWAGE Treatment Plant Staffing Requirements

The bidder shall provide all the necessary minimum operating staff and maintenance personnel as noted below to operate the Works for a total period of 48 months.

The O&M staff shal have the min. following personnel

Plant manager-1 No

Process Engineer-1 No

Mechanical Enginner-1 No

E&I Enginner-1 No

Mechanical Operators- 4 Nos

Electrical Operators -4 Nos

Required Security Staff

Shall have storage space for six months of chemical storage.

The Contractor shall provide a detailed proposed staffing schedule before the anticipated start of the 30 day operation period for each of the sections of the Works. The schedule shall cover all categories of staff from the works superintendent to cleaners, including adequate numbers of maintenance staff.

The staffing schedule shall be prepared for operating the Plant on a 24 hour per day basis with three equal shifts of 8 hours during the complete 48 month O&M contract period.

6.9.TREATMENT SCHEME

The treatment process preceded by preliminary treatment units. The plant itself consists of an Aeration tank, Anoxic tank a secondary settling tank, a sludge return line and an excess sludge waste line leading to a sludge Thickener , sludge dewatering(belt filter press) including chlorination. The BOD removal in the process is 95-98%.

The process employs low organic loading, long aeration time, high MLSS concentration and low F/M. The BOD removal efficiency is high. Because of long detention in the aeration tank, the mixed liquor solids undergo considerable endogenous respiration and get well stabilized. The excess sludge does not require separate digestion and can he directly dried on sand beds. Also the excess sludge production is a minimum. The effluent standards shall be comply with CPCB guidelines BOD-10 mg/lit and COD-20mg/lit.

1.10 PROCESS DESIGN CRITERIA AND SCOPE FOR UPGRADATIONUNITS OF SEWAGE TREATMENT PLANT-25 MLD

(1) Replacement of Rising main at STP Inlet works:

Replacement of 3.5 m existing rising mainof 1000mm dia will be replaced by 1000 mm dia. D.I. pipe K9. Internally CC lined of 5.0 Mtrs. in length including fittings and bends at the Inlet chamber
Cleaning required at inlet tank to remove accumulated sand and silt .

(2) Revamping of existing Collection mechanism to Grit removal system :

The existing collection mechanism has to be utilized for providing Grit removal system as an alternative. The existing structure shall be provided with fixed half bridge with center mechanism placed on a supporting centre pier.

New centre pier to be constructed at the centre of tank, to support the mechanism weight additional pillar to be provided below the existing tank.

One number Grit classifier chamber with mechanism of 400mm dia SS 304 shaft to be provided and placed at 180 degree both sides of tank, along with organic return pump chamber with all wetted parts in SS 304.

Bridge for collection mechanism shall be MSEP Epoxy coated and centre mechanism to be chosen wisely to address the excess torque developing from raking grit. Centre cage connected to centre mechanism and Rake arm. Rake arm connected to Rake blades. Number of rake blades has to be chosen, so that there shall be overlap of minimum 250 mm between two blades.
Organic return pump shall be pumping the return liquid back to main stream.

Degriting tank mechanism ,Classifier and washing of grit

Removing different type of grit, clay, sand, metal etc. From tank mechanism, classifier and washing of grit etc. including cleaning the tank and disposing of the sludge/grit to landfill designated, is part of scope and no extra cost shall be paid.

It shall incorporate following.

- Removing different type of grit, clay, sand, metal etc. From tank mechanism: The different type of grit, clay, sand, metal etc. Settled in a tank shall be scrapped a collection point by a scrapper mechanism.
- It shall be designed for continuous operation. The mechanism will be coupled to a suitable motor gear- box assembly.
- The collected grit shall be elevated to the top of tank by the help of a classifier. While the grit is being elevated from the tank bottom, suitable arrangement for grit washing by plain tap water shall be made.
- All moving parts shall be abrasion resistant.

Grit classifier

The grit mechanism will be suitable for installation in a round tank and will comprise of the following:

- Grit collection mechanism.
- Organic return pump.
- Classifier cum washing mechanism.

The grit contained in waste water is usually removed in grit traps by gravity or centrifuge force to protect downstream equipment.

Classifier Mechanism

The classifier mechanism shall comprise of a screw driven by a suitable motor. The material of construction of the mechanism shall be SS 316 and the diameter shall be minimum 400 mm. The length of screw shall be such that the grit can be elevated up to the discharge end. SS puddle pipe shall be provided in the concrete trough at the discharge point of wet grit. Classifier Mechanism: The mechanism shall consist of the following: 1) Chain and sprocket with guard. 2) Reciprocating rake with hangers or screw mechanism. 3) A.C. Motor. 4) Local push button shall be provided.

Organic return Pump

Vertical Propeller pump with suitable motor, starter, etc.Shall be provided. The design of the pump and the piping on the inlet and outlet side has to be such that there are minimum numbers of bends as they are liable to be choked with organic matter.
One set of push button shall be provided near the pump set and one starter in the terminal sewage pumping station. The suspended organic matter washed in the de- gritting system will be returned to the distribution chamber. Impeller shall be of SS CF8M and shaft shall be of SS 316.

In the event of tripping of working grit removing equipment (motor), the sizing of this equipment (including motor) shall be done in such a way that it shall take the overhead to remove the excess grit collected after starting of the tripped grit removal equipment.

Design Criteria

Nos. of Unit	:	1
Design flow		
Average flow	:	25 MLD
Peak Flow	:	50 MLD
Transverse velocity at surface	:	0.6-0.8 m/sec
Depth-to-width ratio	:	1.5:1 to 2:1
Detention period at Peak Flow	:	3-5 min
Assumed size of grit particle	:	0.15 mm and above
Specific gravity of particle	:	2.65
Surface overflow rate (SOR)	:	Less than 2.4 cm/sec
Organic Material in grit		< 3%
Inlet arrangement	:	Sluice/ Open channel gates
Outlet	:	Over the Weir

(4) Electromagnetic flow meter:

for 25 MLD peak flows

(5)Anoxic Tank

Design Criteria

Design flow	:	25MLD
Nos. of anoxic tank	:	1

Retention time	:	2 hrs
No of zones in each tank	:	2
SWD	:	4.2 m
Free Board	:	0.3 m
Anoxic zone size	:	23mx11.5mx3.9m
Anoxic Tank size	:	23mx23mx3.9m

(6) Anoxic mixers

Design flow	:	25MLD
Type	:	Triton Air-O2 mixer
Mixing power requirement	:	10w/cum
Motor	:	7.5 hp
No	:	4(two in each anoxic tank)
MOC wetted parts	:	SS316

7**) Recirculation pumps (Anoxic tanks):**

Design flow	:	25MLD
Type	:	Submergible sewage
Capacity	:	396 cum/hr
No	:	4
MOC	:	CI/SS

(8) Surface jet Aerators(for Aeration tank)

:

Design Criteria

Design flow	:	25MLD
Nos. Of aeration tanks(Existing)	:	8
Design MLSS	:	4000 -4500mg/L (Max.)

Free Board	:	0.5 M
F/ M	:	0.1 – 0.15(kg BOD/Kg MLSS/day)
Type of Aeration	:	Aspirator/jet aeration
No of units for jet aeration	:	8 nos of 40 HP each
Operating DO	:	The operating Dissolved oxygen in the aeration tank shall be considered 3.5 mg/l So that good nitrification can be carried
		Online DO meter shall be provided for measurement of Dissolve Oxygen in the

The minimum oxygen demand shall be taken 1.2 Kg/kg BOD and 4.57 Kg/ kg of TKN to be oxidized for designing. The oxygen yield in the anoxic tank should be considered when calculating the total oxygen demand.

9) Combi unit(Filter press cum thickener)

Design flow	:	25MLD
Sludge type	:	Biological sludge
Sludge capacity	:	30 m3/hr
Quantity of machine	:	2 nos
Dry matter	:	up to 600 kg/hr.
Belt Width	:	1200 mm
Belt speed	:	2-10 m/min
Drive power		3.3 kW
Weight not more than		4990 kg

9(a) Additional units for Combi unit

Design flow	:	25MLD
Dosing pump	:	

Capacity	:	30 m3/hr
Power	:	5.5 kw
No of unit	:	2
Compressor	:	
Capacity	:	150 l/min
Pressure		10Bar
Power		1.5 kw
Wash water pump		
Capacity		15 cum/hr
Pressure		0.6 mpa
Power		4.0 kw
Polymer station PLC based		
Polymer solution of 2000l/h		Conc0.05 to 0.5%
Power		2.2 kw
Dosing pump(screw pump)		
Capacity		1600l/h
Power		1.5 kw
Note:		Control system required for comb unit

10) RAS pumps for STP

Design flow	:	25MLD

Capacity of each pump	:	500 m3/hr
Head	:	10m
No of unit	:	3
Type		Non clog horizontal

11) Disc filter

Type of Waste water	:	Sewage
Plant Capacity	:	25 MLD
Average flow	:	1041.6 cum/hr
Operating hours	:	24
Inlet TSS	:	40mg/lit
Outlet TSS	:	10mg/lit
Effective Filter loading rate at average flow	:	11 cum/sqm/hr
Total Surface area required for Avg Flow		95 sqm
Area required for one disc		6sqm
No. of working Machines		1 w
Diameter		2.2 m
No. of Discs for machine		16 discs

Note:
All Electrical and structural units for Disc filter and mass concreting of the units (if required) should be done by contractor

12) **Chlorinator with chlorine dosing (Min 5 ppm)**

Plant Capacity	:	25 MLD
Vacuum type wall mounted chlorinator 10 Kg/hr consists of vacuum regulator control valve assembly, flow meter assembly, Water/Chlorine Pressure gauges, ejector assembly with mixing chamber all wall mounting accessories, Annealed copper coil 2 mtr long with end fitting cylinder/tonner key 1 No. Ammonia Solution Ammonia	:	1
Booster pump of 10 m3/hr capacity and water pressure of 3 kg./cm2 considering back pressure 0.25 kg./cm2 with 20 mtr 4 core cable, dual motor starter	:	1
Booster pump & Ejector inlet and outlet piping Size 2" Sch 40 UPVC/PVC 30 mtr with fitting		1
New empty tonner of 928 kg capacity complete with CCE department certificate		1
Electronic digital Chlorine gas leakage detector with 2 sensor range 0-100 ppm complete set		1
Chlorine gas leakage arresting kit for tonner complete set		1
Tonner lifting and shifting sling. 3	:	1
Roller support for tonners	:	1
Supervision for installation and commissioning. For 5 days	:	1

13)Instrumentation

Probes to measure the inlet parameters BOD, COD, TSS at inlet tank	:	1
Probes to measure the outlet parameters BOD, COD at outlet (TW tank	:	1
Probes to measure minimum pH at inlet tank and outlet (TW tank)	:	1
Probes to measure the outlet characteristics and for minimum ammonia	:	1
Screens get connected with PLC scada refurbishment of control panel to suit auto jam removal	:	1
Online TSS meter at clarifier outlet to chlorine tank	:	1
portable DO meter at aeration	:	1

(13) Laboratory, Control Room and MCC Room

A laboratory with suitable area with necessary laboratory equipment, chemicals and glass wares shall be provided. The control room with and MCC room of suitable size shall be provided. The existing if any shall be upgraded.

The Laboratory / operator room/ SCADA and MCC Panel rooms shall be located at a suitable place.

The building shall be RCC framed structure with brick wall panels. The brick walls, plastering, painting, plinth protection etc. shall be as per civil specification.

All the rooms shall be provided with doors of the standard sizes and Aluminum windows/ventilators glazed with aluminum grill. The outer doors, windows, shall be provided with aluminum fittings. All the outer doors, window, ventilators shall be provided with wire gauge shutters in additions to glazed paneled shutters.

Laboratory

The laboratory hall at First floor shall be provided with RCC tiled platform projecting 750 mm from the wall at about 750 mm height from floor level along the walls of room which will be used for keeping the bottles of chemicals and will be provided with glazed tiles. The white glazed tiles shall be provided on the walls all along the RCC tiled platform up to 60 cm height above the platform. The space underneath the platform is provided with shutters with door fittings. There shall be three laboratory sinks in stainless steel of reputed make of good quality installed in the RCC platform suitably and one wash basin installed along the opposite wall in each hall. The floor of laboratory shall be provided with glaze tiles or marbles. The Contractor should also provide for supply of laboratory equipment, instruments, glass ware, chemicals and miscellaneous items.

It shall have the equipment, storage space and chemicals for the following chemical and bacteriological routine analyses:

- Temperature
- BOD
- COD
- pH
- conductivity
- alkalinity
- turbidity
- suspended solids
- total dissolved solids
- residual chlorine
- ammonia
- nitrate and nitrite
- phosphate
- e-coli counts

The testing methods shall be as simple as possible and the equipment as robust as possible. The methods shall be described in a test manual.

The first floor slab and the roof slab shall be in concrete suitably designed for loading as per relevant IS code of practice.

The administrative block shall be provided with the following:

Personal Computer: 01 No of latest Configuration, with latest Microprocessors, 17" Screen Monitor, - 1 for Laboratory, 1 of SCADA Room.

Printer 01 No: HP or equivalent- All in one

14) DG Set

DG sets shall be installed by contractor for Treatment plant, Street lighting etc. Contractor shall submit a layout for placement of DG set with enclosure, fuel tanks, diesel filling arrangement, AMF, control panels, exhaust chimneys etc. on a plinth in an enclosed well ventilated shed with a shutter, which shall be normally kept locked. Design and layout for such a shed shall be subject to approval of Engineer.

All civil works, concerning the installation of DG sets shall be in contractor's scope

15) Transformers

All distribution transformers shall be of dry type in case of Indoor Installation and Oil type in case of outdoor installation for ratings 33/11kV , 33/0.433kV or 11kV/433V with Dyn11 vector group. LV star winding shall be solidly grounded. Distribution transformer shall be chosen from standard ratings, typically 250, 500, 630, 800 or 1000 KVA.

Upgradationof 38 MLD STP:

1) Upgradation of Mechanical Detritor Tank(Grit chamber):

Design Criteria

Nos. of Unit	:	2
Design flow		
Average flow	:	38 MLD
Peak Flow	:	76 MLD
Transverse velocity at surface	:	0.6-0.8 m/sec
Depth-to-width ratio	:	1.5:1 to 2:1
Detention period at Peak Flow	:	3-5 min
Assumed size of grit particle	:	0.15 mm and above
Specific gravity of particle	:	2.65
Surface overflow rate (SOR)	:	Less than 2.4 cm/sec
Organic Material in grit		< 3%
Inlet arrangement	:	Sluice/ Open channel gates
Outlet	:	Over the Weir

2) Electromagnetic flow meter:
No-2

for 38 MLD peak flows

3) **Anoxic Tank**

Design Criteria

Design flow	:	38MLD
Nos. of anoxic tank	:	1
Retention time	:	2 hrs
No of zones in each tank	:	2

SWD	:	5.2 m
Free Board	:	0.3 m
Anoxic zone size	:	28.0mx9.0mx5.2m
Anoxic Tank size	:	28.0mx18.0mx5.2m

4) Anoxic mixers

Design flow	:	38MLD
Type	:	Triton Air-O2 mixer
Mixing power requirement	:	10w/cum
Motor	:	7.5 hp
No	:	6(two in each anoxic tank)
MOC wetted parts	:	SS316

5**) Recirculation pumps (Anoxic tanks):**

Design flow	:	25MLD
Type	:	Submergible sewage
Capacity	:	396 cum/hr
No	:	6
MOC	:	CI/SS

6) Aeration Tank.

At present existing aeration tanks are not working due to the damaged diffuser system and clogging of membranes As result the existing diffuser system will be replaced by new proposed fine bubbler diffuser system.

Specifications for Specifications for Diffusers	
Capacity	19 MLD(one tank of 38 MLD plant)
Type of diffuseres	Tubular non clog
size	Dia 63 mmx1000m long
Moc of membrane	Silicon
Moc of diffuser	High strength plastic polymer
Moc of clamp and nipple	SS304

End connection for air entry	3/4 inch BSPT
Temperature	40 to 60degree
Slit	Less than 1 mm
Effective area	0.19 sqm
Area of influence zone	2.0 to 2.5 sqm
Range through put	3.0 to 8.0 cum/hr
Min through put	2.0cum/hr
Max hrough put	10.0 cum/hr
Maximum allowable pressure	0.7 kg/cm2
O2 transfer efficiency	6%

Specifications for Bio swirl media	
Plant Capacity	38MLD
Type	Spiral suspended media
Surface Area	580sqm per cum
Sp gr	1.01 to 1.04
No of peices per cum	10000
Area of surface area	More than 100%
Fluid zone	Bottom half of the tak
MOC	Plastic resin

(7) Return sludge pump &Motor:

No	2
Pump	Submersible with Non Clog Impeller
Submersible with Non Clog Impeller	500 m3/hr
Head @ duty point(m)	10 m
Efficiency	80-87%
Rated speed	1000 rpm
Submersible Cable Type	Dual PVC sheathed, Round type , Copper Conductor(Std)
Pump set installation Orientation	Vertical

8) Air blowers :

No	6

Capacity	5750 cum/hr
Inlet/outlet size	300nB
Motor	180 to 200 HP
Fluid	air
Temp	40to 50degree cent
Pressure	0.6 kg/cm2
Sound level	100 dB
Rated speed	1550 rpm

(9) Agitator for sludge sump:

Specifications	
Motor Rating :	3 HP
No	2
Sump size:	1.2mdiax1.65m Ht
Tank Capacity considered	2000 Lit; Tank size: 1250mm Dia. X 1650mm HT
Motor	ABB/BBL/CGL/KBL/Siemens or equivalent MakeSTD. TEFC suitable for 415V +/-10%, 50 HZ+/-5%, 3 phase, 4-pole, IP-55, F-class insulation, EFF2, Temp rise limit Class-B, Flange mounted, Non Flame proof
Shaft: Dia	30mmX1400mm long. Below mounting plate, MOC:SS304
Impellers	Pitch blade turbine/propeller/Hydofoil, MOC: SS 304
Connection between Motor& Gear box	Direct couple

(10) Centrifuge feed pumps :

No of pumps		(2W+1S)
Type of pump		progressing
Centrifuge operation		12 hrs/day
Capacity per pump	Cum/hr	26.5
Pump efficiency	%	35.0
Motor efficiency	%	95.0
VFD efficiency	%	90.0

11) Disc filter

Type of Waste water	:	Sewage
Plant Capacity	:	38MLD

Average flow	:	1583 cum/hr
Operating hours	:	24
Inlet TSS	:	40mg/lit
Outlet TSS	:	10mg/lit
Effective Filter loading rate at average flow	:	10.9 cum/sqm/hr
Total Surface area required for Avg Flow		145 sqm
Area required for one disc		6sqm
No. of working Machines		1 w
Diameter		2.2 m
No. of Discs for machine		24 discs

Note:
All Electrical and structural units for Disc filter and mass concreting of the units (if required) should be done by contractor

(12) Centrifuge :

Hydraulic capacity		To handle 38 MLD flows
No of units working	:	1
Type	:	Solid Bowl
Input TSS	%w/w	2.5
Input VSS/ TSS	%	74
Dewatered Sludge	% w/w	15
Solids capture required	%	90

Motor for Centrifuge	
Bowl/Main Drive	The Bowl drive is driven by means of an electric motor via VBelt pulleys in combination with a Variable Frequency Drive(VFD
Output	18.5 kW
Rotation speed	2930 RPM

Type of protection		IP 55
Overload Safety of Motor		VFD

13) Chlorinator with chlorine dosing (Min 5 ppm)

Plant Capacity	:	25 MLD
Vacuum type wall mounted chlorinator 10 Kg/hr consists of vacuum regulator control valve assembly, flow meter assembly, Water/Chlorine Pressure gauges, ejector assembly with mixing chamber all wall mounting accessories, Annealed copper coil 2 mtr long with end fitting cylinder/tonner key 1 No. Ammonia Solution Ammonia Tourch 1 No.	:	1
Booster pump of 10 m3/hr capacity and water pressure of 3 kg./cm2 considering back pressure 0.25 kg./cm2 with 20 mtr 4 core cable, dual motor starter	:	1
Booster pump & Ejector inlet and outlet piping Size 2" Sch 40 UPVC/PVC 30 mtr with fitting		1
New empty tonner of 928 kg capacity complete with CCE department certificate		1
Electronic digital Chlorine gas leakage detector with 2 sensor range 0-100 ppm complete set		1
Chlorine gas leakage arresting kit for tonner complete set		1
Tonner lifting and shifting sling. 3	:	1
Roller support for tonners	:	1
Supervision for installation and commissioning. For 5 days	:	1

14)Instrumentation

Probes to measure the inlet parameters BOD, COD, TSS at inlet tank	:	1
Probes to measure the outlet parameters BOD, COD at outlet (TW tank	:	1
Probes to measure minimum pH at inlet tank and outlet (TW tank)	:	1
Probes to measure the outlet characteristics and for minimum ammonia	:	1
Screens get connected with PLC scada refurbishment of control panel to suit auto jam removal	:	1
Online TSS meter at clarifier outlet to chlorine tank	:	1
portable DO meter at aeration	:	1

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A laboratory with suitable area with necessary laboratory equipment, chemicals and glass wares shall be provided. The control room with and MCC room of suitable size shall be provided. The existing if any shall be upgraded.

The Laboratory / operator room/ SCADA and MCC Panel rooms shall be located at a suitable place.

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All the rooms shall be provided with doors of the standard sizes and Aluminum windows/ventilators glazed with aluminum grill. The outer doors, windows, shall be provided with aluminum fittings. All the outer doors, window, ventilators shall be provided with wire gauge shutters in additions to glazed paneled shutters.

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- total dissolved solids
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- e-coli counts

The testing methods shall be as simple as possible and the equipment as robust as possible. The methods shall be described in a test manual.

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15) DG Set

DG sets shall be installed by contractor for Treatment plant, Street lighting etc. Contractor shall submit a layout for placement of DG set with enclosure, fuel tanks, diesel filling arrangement, AMF, control panels, exhaust chimneys etc. on a plinth in an enclosed well ventilated shed with a shutter, which shall be normally kept locked. Design and layout for such a shed shall be subject to approval of Engineer.

All civil works, concerning the installation of DG sets shall be in contractor’s scope

Project back ground and Existing details :

1.0 Introduction

The Greater Visakhapatnam Smart City Corporation Limited (GVSCCL), is a Special Purpose Vehicle (SPV) created for the sole purpose of implementation of the projects conceptualized for the Visakhapatnam Smart City, and in accordance with this purpose GVSCCL intends to implement a project involving Proposed and Upgradationof Existing Sewerage System including Sewerage network ,STP and Pumping stations in the Area Based Development (ABD) and Old city Area . The project is proposed to be undertaken in the (EPC) mode .

1.1. About Vishakhapatnam

Vishakhapatnam, popularly known as Vizag, is a port city and is Andhra Pradesh's largest, both in terms of population and economy. It is also the 3rd largest city on east coast of India, after Chennai and Kolkata. Vizag is often called "The Jewel of the East Coast". The city is nestled among the hills of the Eastern Ghats and faces the Bay of Bengal. It has the only natural harbour on the east coast of the country. It is a popular tourist destination and is known for its lush pristine beaches, gentle hillocks and thriving flora and fauna.

Visakhapatnam is the administrative capital of the district of the same name (Visakhapatnam district) in Andhra Pradesh. The city has the headquarters of the Eastern Naval Command of Indian Navy. Visakhapatnam Port is one of the largest ports in India is also its fifth busiest sea port of the country.

1.2 Greater Visakhapatnam Municipal Corporation (GVMC)

Visakhapatnam is one of the earliest municipalities of Andhra Pradesh. The Vizag (Visakhapatnam) Municipality was set up as early as in 1858, in order to full fill the basic infrastructural needs of the people of the city. The Vizag Municipality grew in its Municipal limits due to incorporation of new areas and was converted to a Municipal Corporation in the year 1979.

The areas of the erstwhile Visakhapatnam Municipal Corporation along with the Gajuwaka Municipality and 32 villages (includes few Panchayats) were converged to form the Greater Visakhapatnam Municipal Corporation (GVMC) through a Government of Andhra Pradesh Order on November 21, 2005.

GVMC's current limits are spread across 625 sq.km and includes 72 wards, Anakapalle and Bheemili. As per 2011 census, the city's population is approximately 1.9 million.

1.3 Visakhapatnam Smart City

Through the Smart Cities Challenge, the Government of India took the first step towards realizing its vision of building 100 smart cities in the country. Visakhapatnam emerged as a light house city (one of the top 20 cities) and was ranked 8th in a nationwide competition between 100 cities.

The city is now working on implementing the projects that were proposed in its Smart City Proposal (SCP), including Up gradation designated area within the city known as the Area Based Development (ABD) that is 1,650 acres in area and has a population of around 80,000.

1.4 The Greater Visakhapatnam Smart City Corporation Limited

The Greater Visakhapatnam Smart City Corporation Limited (GVSCCL) – a Special Purpose Vehicle (SPV) was incorporated on 11th of March 2016, with the sole purpose of implementing the projects proposed under the SCP of Visakhapatnam.

1.5 The Project

GVSCCL, under the implementation of the Smart City Mission projects in Visakhapatnam has mooted the project of Proposed and Upgradationof Existing Sewerage System including Sewerage network ,STP and Pumping stations in the Area Based Development (ABD) and Old city Area. The bid documents prepared for the project are available at www.gvmc.gov.in as well as on www.apeprocurement.gov.in

1.5.1 Brief Scope of Work

The scope of work for the selected developer for the project will broadly includes upgradation of the existing STPs and sewerage pumping infrastructure and the management, operation maintenance thereof; laying of missing links in the sewerage network in Area Based Development in Visakhapatnam; and Provision of sewerage system in Jalaripeta in Visakhapatnam.

1.5.2 Components of the Project

The project is envisaged to comprise of the following major components:

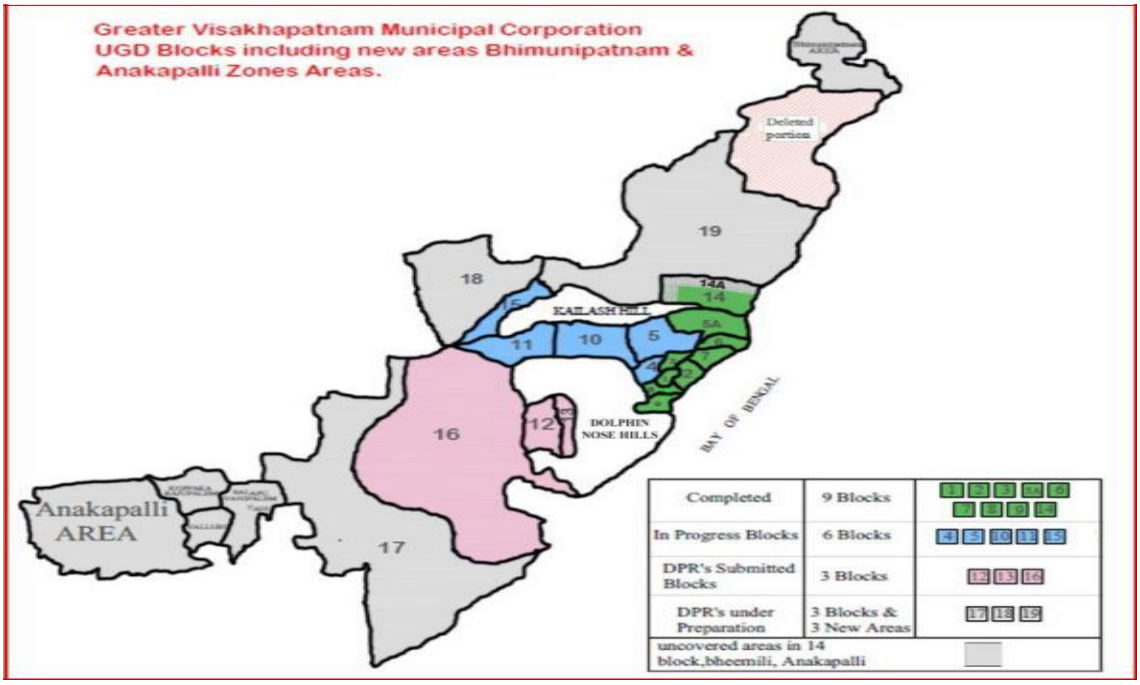
- Upgradation of the existing 38 MLD capacity sewerage treatment plant (STP) near Lakshmi Talkies .
- Upgradation of the existing 25MLD capacity sewerage treatment plant (STP) at Appughar
- Upgradationof the treatment to treat the sewerage such that the treated sewerage effluent meets the water quality requirements of CPCB and CPHEEO standards.
- Up gradation of Sewerage pumping stations of 9 MLD @pandurangapuram and 16 MLD @shantiAshram
- Replacement of 1.0 Km Sewerage gravity line from Durgalamma temple to the existing 38 MLD STP.
- Laying of 7.5 km sewerage network in Jalaripeta, in Visakhapatnam
- Laying of missing links amounting to 8.6 km in the rest of ABD of Visakhapatnam
- Supply of vehicles for sewerage network maintenance in ABD area
- Operation and maintenance of sewerage network, pumping stations and STPs in the ABD area and Town kotha road

2.0 EXISTING SEWERAGE FACILITIES IN VISAKHAPATNAM

2.1 Sewerage Zones

The sewerage system is divided into 20 blocks (excluding Anakapalle and Bheemili) shown in Figure 2-1. After the completion of 4th phase a total of 14 sewerage blocks would be covered under UGD network.

Figure 2-1: UGD Blocks in GVMC



2.2 Sewerage Network in ABD

ABD Area is around 7 sq km with population of around 80,000 and 70km of road length .The existing sewer net work in the area is 44 km and the existing sewer manholes shall be 2207.The ABD area consists of 17,18,19 and 20wards. The topography in project area is sloping towards Beach road at South -East direction and the elevation difference in the ABD area varies from 4.5 m to 60m.

The Existing Sewer dia varies from 160 mm to 1000 mm and the pipe material shall be stoneware, HDPE and RCC NP3.The existing condition of the sewer net work in the ABD area is a barrier to optimum development and growth of the area. The site is not within (or) adjacent to environmentally sensitive areas such as cultural heritage ,protected area, wetland and buffer zones.

The Existing sewage network in the ABD area ,which consists of three categories of sewers namely primary ,secondary and trunk sewers was designed. The primary sewers which will collect sewage from residential areas were laid by the access roads, the secondary sewers which will collect sewage from the primary sewers were laid by the minor and major roads ,while the trunk sewers which will collect sewage from the secondary sewers and sewage will be transported to the pumping stations further pumping to the STP.

At present 70 percent of the house connections connected to the sewerage system and the remaining 30percent connected to the existing storm water network further discharged into

the Sea at South -East . Majority of the sewage flow shall be connected to the 9 MLD Pandurangapuram pumping station within the ABD Area and the part of the network shall be connected to the 16 MLD Shanti Ashram pumping station at outside the ABD Area. Ultimately all the pumping stations will connect to the 25 MLD STP at Appughar, which is outside the ABD area.

2.2.1 Missing Links in the Sewerage Network in the rest of ABD

A detail study has been carried out and identified around 8.6 km of missing links identified within the ABD area.

The Existing Sewer network and Missing Links in ABD is illustrated in Appendix I

2.3 Associated Sewerage Pumping Infrastructure

There are two sewage pumping stations associated to the catchment which ultimately pumping the sewage to 25 MLD STP at Apughar.

2.3.1 Existing Condition in the 16MLD Capacity Pumping Station at Shanti Ashram

The Pumping Station at Shanti ashram was made operational in the year of 1998 with layout Covering Area Approx.2,500 sq.m. The pumping caters to wards 7,8,9,10,11(p),14(p)and 16(p) as catchment. The Existing pumping station conditional assessment shown below:

Table 2-2: Existing Condition Assessment at 16MLD Pumping Station

Sr. No	Unit Description	Size/capacity	Quantity	Present Condition	Remarks
1	Inlet Chamber	1.5mx3.0mx4.3m	1	OK	General Cleaning Required
2	Mechanical Coarse Screen	-	1	Ok	General Cleaning Required
3	Grit chamber	36sq m x 4.7m	1	OK	General Cleaning Required
4	Wet well pump House	61sq m x 5.4m	1	OK	General Cleaning Required
5	Wet well pumps	1600cum/hr-(1W-1S): 2 Nos 600cum/hr --(1W-1S): 2 Nos	4	OK	Replacement of Existing pumps with energy efficiency pumps
6	PLC &Panel board and Scada	-	1		Replacement of PLC& Panel board required and scada system shall be proposed
7	DG set	320 KV outdoor unit	1		Needs to be proposed

The 16 MLD Pumping Station Layout is Illustrated in Appendix I

2.3.2 Existing Condition in the 9MLD Capacity Pumping Station at Pandurangapuram

The Pumping Station at pandurangapuram was made operational in the year of 1998-99 and layout Covering Area Approx 1200 Sq.m. The pumping station will have covered wards 16(p) 16(p),17,11(p),18)and19(p) under the catchment. The pumping station conditional assessment shown below:

Table 2-3: Existing Condition Assessment at 9MLD Pumping Station

Sr.No	Unit Description	Size/capacity	Quantity	Present Condition	Remarks
1	Collection Chamber	4.0mx1.5 mx5.0m	1	Ok	General Cleaning Required
2	Coarse screens	1.2mx1.0mx0.5m	1		Needs to be proposed
3	Grit chamber	11.5 m x5.5 m x 5.5m	1	OK	General Cleaning Required
4	Wet well pump House	13.0m Ø x5.4 m	1	OK	General Cleaning Required
5	Wet well pumps	600cum/hr-2 Nos and40HP -2 Nos	4	OK	Replacement of existing pumps with energy efficiency pumps required
6	PLC &Panel Boards	-	1		Replacement of PLC& Panel required
7	Scada system	-	1		Needs to be proposed

The 9 MLD Pumping Station Layout is Illustrated in Appendix I

2.4 Existing Condition of Sewerage Treatment near ABD

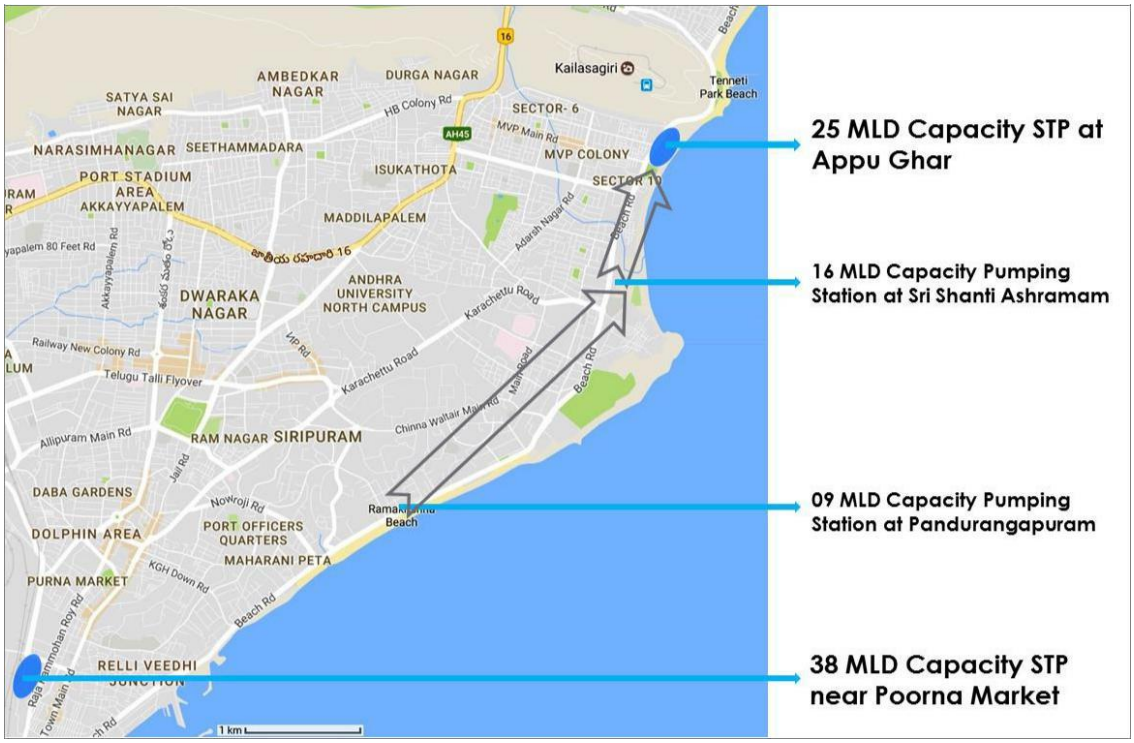
Presently, two Sewerage Treatment Plants (STPs) exist near the ABD (Area Based Development) of Visakhapatnam, namely, the 25 MLD STP at Appu Ghar and 38 MLD STP near Laxmi Talkies. Both plants are secondary treatment facilities having Extended Aeration process.

Two pumping stations pump raw sewerage into the 25MLD STP. One pump is of 9 MLD capacity, located at Pandurangapuram and the other pump is of 38 MLD capacity. Figure below illustrates the existing condition.

Both the plants are currently under-utilized in the sense that only about 19-20 MLD of sewerage is being treated in each of them.

With the existing treatment technology, the quality of water required by industries for use in their processes, is not being met the treated sewerage effluent. As a result, the treated sewerage effluent is let out into the sea.

Figure 2-2: Existing Condition



2.4.1 Existing Condition of 25 MLD Capacity STP at Appu Ghar

The commencement of STP at Appughar in year 2001 covering area 6 Acre. having sewer line networks of length 162 kms and HSC's of around 44000. Treatment plant is basically a Conventional ASP based Extended Aeration Plant. The Treated effluents from STP will be discharged through the Sea out fall of 600 mm dia and 500 m length Approx. The sewage sludge from the site shall be transported periodically to the dumping yard at kapulapadu, 15 km away from the STP. The Existing Plant details and Technical information of STP are discussed below

Table 2-4: Existing Details of 25MLD STP at Appughar

Installed Capacity	Location	Wards Covered	Current Utilization	
MLD		No's	MLD	%
25	*Apughar*	7,8,9,10,11P,14P,16P,17,18,19	*21*	*84*

Table 2-5: Sewerage Characteristics at I*nlet*

BOD_5	150 to 300 mg/lit
COD	300 to 500 mg/lit
TSS	450 mg/lit
Ph	6.5 – 8.5
Total alkalinity as $CaCO_3$	300 - 400 mg/L
Total Kjeldahl nitrogen	45-50 mg/L
Ammonical Nitrogen	35-40 Mg/l
Total Nitrogen as N	
Total Phosphorus	5 – 7 mg/l
TDS	600-1000 mg/l

Table 2-6: Exiting Units and Condition at 25MLD STP at Appughar

Sr.No	Description	Size/capacity	Quantity	Existing Condition
1	Raw Sewage Collection Sump	12.0m Diax1.6m	1	OK
2	Raw Sewage main	1000 mm dia(5 m length)	1	To be replaced
3	Mechanical screen chamber near detritors	1.0 m x 6.0 m 1.0m swd	1	OK
4	Mechanical detritor	Absent	2	Needs to be proposed
5	Aeration tank	24.60 m x 24.60 m x 3.9 m swd	8	Extra aeration required for the tank
6	Secondary clarifier	46.0mØ x 1.6mSWD	1	OK
7	Sludge Sump cum pump house	8.0m x 3.0m x24.0M swd	1	RAS pumps needs to be replaced
8	Thickener	Absent	1	Needs to be proposed
9	Sludge dewatering and filtration system	Absent	1	Needs to be proposed
10	Clarified water Tank	Absent	1	OK
11	Chlorine contact chamber	15.0mx10.0mx2.25m	1	OK
12	Sludge Drying Beds	40.0mx15.0m	8	Not OK, ,needs to be removed
13	Chlorine Tonner Room		1	Not OK, needs to be replaced
14	Anoxic tank and associated civil ,electro and mechanical units		lot	Needs to be proposed

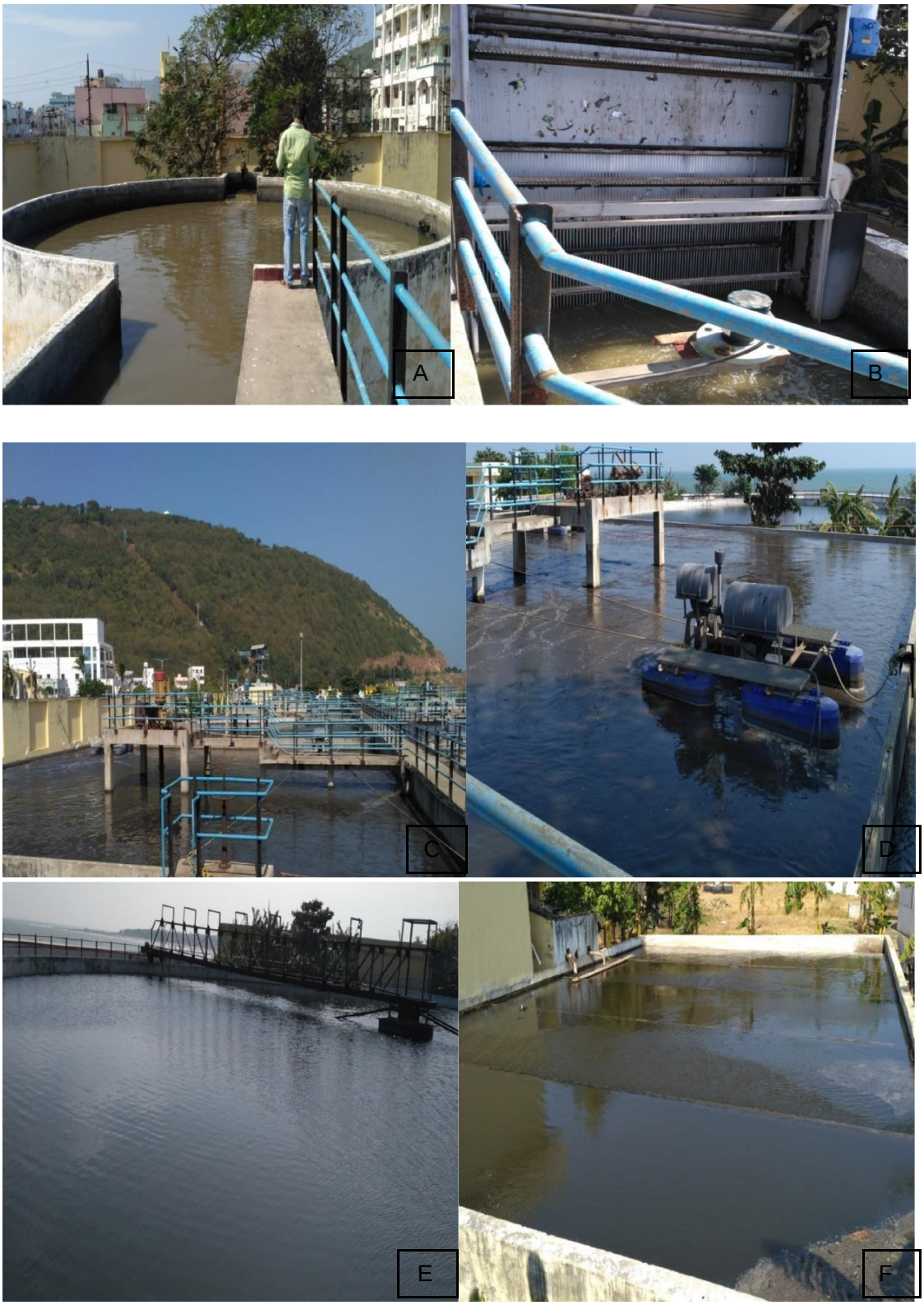
13	Return sludge pumps	237m3/hr @ 10MWC	3	Three pumps To be replaced with higher capacities
14	Sludge carrying pipe from clarifier to sump		1	OK
15	PLC Scada &instrumentation		lot	Needs to be proposed
16	Laboratory equipment		lot	To be replaced
17	Chlorination &Chlorine booster pump		1	To be replaced with new system

Table 2-7: Sewerage Characteristics at outlet

BOD	60 mg/lit
COD	100 mg/lit
TSS	100 mg/lit
TDS	950 mg/lit

With reference to daily effluent quality Report analysis, the parameters such as BOD, COD, and TSS are not compliance with new guide lines of Central Pollution Control and CPHEEO Sewerage manual.

Figure 2-3: Site Photographs



(A) Inlet Sump (B) Mechanical Screen (C & D) Aeration Tanks (E) Clarifier (F) Chlorine Contact Chamber

2.4.2 Existing Condition of 38 MLD Capacity STP near Lakshmi Talkies

The commencement of STP at Old city in year 2009 covering area 13.1 Acre. Treatment plant is basically a Conventional ASP based Extended Aeration Plant. The Treated effluents from STP will be discharged through Lavender Canal further Connected to Sea. The sewage sludge connected to the sludge dewatering system is treated at site. The Existing Plant details and Technical information of STP are discussed below

Table 2-8: Technical Information of 38MLD STP

Installed Capacity	Location	Wards Covered	Current Utilization	
MLD		No's	MLD	%
38	Lakshmi Talkies	11p,14p16p,19p, 20, 21, 22, 24, 25, 26, 27, 28, 29	*21.5*	*57*

Table 2-9: Sewerage Characteristics at inlet

BOD_5	150 to 300 mg/lit
COD	300 to 500 mg/lit
TSS	450 mg/lit
Ph	6.5 – 8.5
Total alkalinity as $CaCO_3$	300 - 400 mg/L
Total Kjeldahl nitrogen	45-50 mg/L
Ammonical Nitrogen	35-40 Mg/l
Total Nitrogen as N	
Total Phosphorus	5 – 7 mg/l
TDS	600-1000mg/l

Table 2-10: Exiting Units and Condition

Sr.No	DESCRIPTION	Size/capacity	Quantity	*Existing Condition*
1	Raw Sewage Collection Sump	4.0mx5.0mx3.5m	1	OK
2	Manual screens in collection tank		1	Working In Condition
3	Mechanical screen chamber near detritors	1.0 m x 6.0 m x 1 .0m swd	2	Two are working and Needs maintenance
4	Mechanical detritor	11.9 m x11.9 m x 0.7 swd	2	Needs to be replaced
5	Aeration tank	60.0 m x 42.5 m x 5.0 m swd	2	Uneven distribution of the Grid and diffusers are damaged. Require to replace All diffusers.
6	Secondary clarifier	40.0mØ x 3.0mSWD	2	Requires over hauling for gear box and rak arm should be replaced with new scrapper blades.

Sr.No	DESCRIPTION	Size/capacity	Quantity	*Existing Condition*
7	Sludge sump Agitatotrs	5.0m x 4.0m x2.0M swd	2	Not in working condition needs to be replaced
8	Thickener	12.0mØ x4.0m swd	1	Requires over hauling for gear box and rak arm should be replaced with new scrapper blades.
9	Centrifuge building	8.0mx6.0m	1	OK
10	Clarified water Tank	18.4mx22.0mx2.35m	1	OK
11	Chlorine contact chamber	22.9mx22.1mx1.9m	1	OK
12	Air blowers	5500 m3/hr @ 5MWC (4W –2 S)	6	2 working at low efficiency and 4 not working.
13	Return sludge pumps	500 m3/hr @ 10MWC (2w – 2s)	4	2 working at low efficiency and 2 not working.
14	Organic Return pump	0.5 HP pumps (1w – 1s)	2	To be replaced
15	Agitators in sludge sump	7.5HP (1w – 1s)	2	To be replaced
16	Centrifuge feed pump	3.0HP (1w – 1s)	2	To be replaced
17	Centrifuge	25 HP	1	Working in low Efficiency and shall be replaced
18	Agitators in Dosing Tank	1 HP To be replaced	2	To be replaced
19	Polymer dosing pump	0.5 HP	2	To be replaced
20	Chlorinator and chlorine system		1	To be replaced with new system
21	Sewage pumps at PS0 pumping station at STP Area	40HP-4 Nos, 35HP-2 Nos,30HP-4 Nos and 20HP-2 nos		Needs to be replaced
22	Electro-Magnetic flow meter		2	To be replaced
23	Chlorine booster pump	12.5HP	1	To be replaced
24	Panel Boards		1	To be replaced
25	Supply delivery and termination of common 11kv, 630A, 25KA VCB for 1000 kva transformer		lot	Needs to be proposed
26	DG set	620 kv	1	Needs to be proposed
27	Lab and MCC Room	8.0mx6.0m	1	Laboratory equipment shall be replace with new
28	Sludge dewatering with filtration unit	-	1	Needs to be proposed
29	PLC Scada	-	-	Scada System shall be proposed

Table 2-11: Oulet Characteristics

BOD	50 to 60 mg/lit
COD	100 mg/lit
TSS	80 mg/lit
TDS	1000 mg/lit

With reference to daily effluent quality Report analysis, the parameters such as BOD, COD, and TSS are not compliance with new guide lines of Central Pollution Control and CPHEEO sewerage manual

The layout drawing for Existing 38 MLD STP is provided in Annexures

DRAWINGS