TENDER DOCUMENT

TENDER No: DLI/ CON/ 737/ 471

FOR

“Design, Engineering and Construction of All Civil and Electrical & Mechanical Works for Intake Well, Pump House, Water Treatment Plant, Over Head Tanks, Supply & Erection of Valves, Specials and Other Accessories, All Pipe Laying, Jointing, Testing & Commissioning, Providing House Hold Connections and O & M for 10 Years for the Complete house hold water supply network Scheme at Singrauli –Waidhen (M.P.) (excluding design, engineering, construction and O&M of water treatment plant)”

VOLUME – II

Additional Conditions of Contract (ACC), Special Conditions of Contract (SSC-I & SCC-II), Technical Specifications, Schematic Drawing and Integrity Pact
ADDITIONAL CONDITIONS OF CONTRACT (ACC)

The following Additional Conditions of Contract shall be read in conjunction with General Conditions & Special Condition of Contract. If there are any provisions in these Additional Conditions of Contract, which are at variance with the provisions of General Conditions/ Special Condition of Contract, the provisions in these Additional Conditions of Contract shall take precedence.

1.0 INTRODUCTION

Singrauli is situated in the north-east border of Madhya Pradesh, on Katni-Garwa road broad gauge railway line & 262km from Katni south station. The work site is situated at Waidhen, Which is district Headquarter of Singrauli & is about 25km away from Singrauli Railway Station. The Singrauli has thermal Power Plants of NTPC, Reliance & other major companies and also headquarters of NCL (Northern Coal Field Ltd.)

This work consist of Design, Engineering and construction of all civil and E&M works for intake well, Pump House, Over head tanks, supply & erection of valves, specials and other accessories, pipe laying, jointing, testing & commissioning, providing house hold connections and O & M for 10 years for the complete scheme at Singrauli – Waidhen (M.P.)

2.0 SCOPE OF WORK INCLUDED IN THE CONTRACT

DETAIL SCOPE OF WORK:-

1. Complete survey of the site, Design & Engineering of the total system including preliminary checking of the Hydraulic design of all Civil and Electro-Mechanical works for all structures like Intake well pump house, Overhead tanks, Thrust Block, Chambers etc.

2. Intake well- 8 m dia. 20.0 mtr ht, RCC Construction of Intake well & 5 mtr height 62.70 MLD Raw water Pump House, approach bridge construction etc.

3. Supplying, installation, erection testing, commissioning etc. including all electrical and mechanical work complete of 3 sets of vertical deep well turbine pumping sets (pumps and motors), discharge 275 lps, 50 m head.

4. Excavation, trenching, bedding, Laying & jointing of Raw water pumping main from Intake well to WTP, testing & Backfilling all as per approved drawing and specifications. Only DI K-9 pipes shall be supplied by EPI. The unloading & stacking of pipes shall be in the scope of contractor. All other suitable joint specials appurtenances, valves, valve chambers, thrust blocks etc. shall be in contractor’s scope.

5. Supplying, installation, erection testing, commissioning of clear water pumping sets (pumps and motors), 3 sets with discharge 262 lps, 105 m head, including all electrical and mechanical work complete.
6. Excavation, trenching, bedding, Laying & jointing of Delivery pipes from WTP to OHT testing & Backfilling all as per approved drawing and specifications. (Only DI K-7 pipes shall be supplied by EPI. The unloading & stacking of pipes shall be in the scope of contractor). All other suitable joint specials appurtenances valves valve chambers, thrust blocks etc. shall be in contractor’s scope.

7. Construction of total 9 nos OHT each with 18m staging ht and 1000 KL capacity.

8. Excavation, trenching, bedding, Laying & jointing of distribution pipes from OHT, testing & Backfilling all as per approved drawing and specifications. (Only HDPE & DI K-7 pipes shall be supplied by EPI. The unloading & stacking of pipes shall be in the scope of contractor). All other suitable joint specials appurtenances valves, valve chambers, thrust blocks etc. shall be in contractor’s scope.

9. Providing house Service Connections including 20 m MDPE pipe 5 m along with excavation, road restoration, meter EEC class all complete approximately 15000 connections Singrauli Waidhen and Bulk meters on Rising main (Raw and Clear water) Feeder main, Outlet of each OHTs SCADA.

10. Providing and commissioning for connection of HT feeder line having length 1.00 km at Singrauli Waidhen.

11. All works for pipe crossing and putting sleeve, if required, at locations like in water body, roads, Railways (Pushing Under railway track), encasing etc. shall be in the scope of contractor.

12. The total safety for existing traffic should be maintained. Road restoration work after completion of work looking into safety in future.

13. Any other work not included above but required for completion of the water supply system.

14. Operation and maintenance of above complete system for a period of 10 years after the date of Handing Over.

15. EPI shall get checked all designs submitted by contractor from any reputed institute. The cost of which shall be borne by contractor. The pre dispatch inspection of all the major supply items shall be carried out by EPI at suppliers premises.

16. The Repairs and replacements in all project components including Pipeline, Electrical installations, valves, specials etc. during O&M Period complete shall also be within the scope of the contractor. The contractor shall ensure that the required quantity with specified quality of water reaches to the farthest end point consumer. EPI will not supply any pipe/any material required for O & M. The cost of the all items, including pipes etc., which needed replacement /repair during O&M shall be borne by the contractor.
3.0 QUALIFICATION OF TENDERERS

To be eligible for this tender the bidders should fulfill the requirements for eligibility as mentioned in the Notice Inviting Tender (NIT) and should submit detailed data and credentials set out in Cl 19.0 of ITT & NIT of the Tender.

The Tenderers are required to fulfill all the eligibility criteria as stipulated in NIT and elsewhere in the Tender documents. The price bid of tenderers who fulfill the eligibility criteria as per evaluation of EPI shall only be opened. The decision of EPI in this regard shall be final & binding on the tenderers.

3.1 Order of Precedence: - In the event of any ambiguity or conflict between the contract documents, the order of precedence shall be in the following order.

(i) NIT, Memorandum, BOQ
(ii) Additional Condition Of contract (ACC).
(iii) Special Condition of Contract (SCC), Technical Specifications & Drawings
(iv) General Condition of Contract (GCC)

4.0 CONTRACTOR confirms that they have read and understood and have copies of the ‘Tender Documents’ and have visited the site and their offer is based on the ‘tender Documents’ and caters to all the works, requirements, etc. thereof.

5.0 DISQUALIFICATION

The tenderers may note that they are liable to be disqualified and not considered for the opening of Price Bid if;

a) Representation in the forms, statements and attachments submitted in the pre-qualification document are proved to be incorrect, false and misleading.

b) They have record of poor performance during the past 10 years such as abandoning the work, rescinding of contract for which the reasons are attributable to the nonperformance of the contractor, inordinate delay in completion, consistent history of litigation / arbitration awarded against the contractor or any of its constituents or financial failures due to bankruptcy etc. in their ongoing / past projects.

c) They have submitted incompletely filled in formats without attaching certified supporting documents and credentials to establish their eligibility to participate in the Tender.

d) If the tenderers attempt to influence any member of the committee. EPI reserves its right to take appropriate action including disqualification of tenderer(s) as may be deemed fit and proper by EPI at any time without giving any notice to the contractor in this regard. The decision of EPI in the matter of disqualification shall be final and binding on the Tenderers.
6.0 SPECIFICATIONS

a) The works detail specifications are as per Bill of quantities & enclosed technical specifications provided in tender documents. The work is to be carried out as per Specifications. The Technical Specifications for the work can be seen at Vol-II technical specifications.

b) The reinforcement steel used shall be corrosion resistant (CRS Steel). Thermo mechanically Treated bars conforming to IS: 1786, Fe 500 grade as required, from approved manufacturers viz SAIL/RINL/TISCO/ equivalent as approved by client shall be used.

c) Ordinary Portland cement / Blast furnace slag cement/ PPC of Grade43/ Grade53 as per design, manufactured by major & reputed plant shall only be used.

In case the contractor uses PPC/slag cement instead of OPC than the cost difference of amount of Rs. 400 per MT (Rupees Four Hundred Only per Metric Tonne) shall be recovered from contractor

7.0 Taxes and Duties:

The contractor shall be responsible for the payment of all Taxes, Duties Statutory levies such as VAT, WCT, Labour Cess, Other Cess, Octroi, Entry Tax, Royalties, Turn Over Tax, Service Tax, and other expenses etc. shall be applicable as per clause no. 13 of GCC and as per clause 8 of section 6 of SCC. Labour cess @ 1% shall be deducted from each RA bill. TDS shall be deducted as per statutory rates as applicable. Income Tax will also be deducted from bills as per rule.

8.0 All men, materials, machinery, tools and plants, infrastructure etc. as required for execution of “Works” shall be provided and arranged by CONTRACTOR for their portion of work. All transportation charges including for cartage of issue material, electricity and water charges and for all expenses such as site offices expenses, labour camp, bank guarantee charges, EPF/CPF/ Statutory contributions preparation of all required design & detailed engineering and all required drawings etc., facilities and other expenses whatsoever, incurred on execution, completion and maintenance of the “Works” as per ‘Tender Documents’, and their own overheads and profit etc. shall unconditionally abide by all conditions for execution of “Works” as per terms, conditions specifications, drawings, documents etc. given in the ‘Tender Documents’ for the completion, handing over, maintenance period etc. for the project.

9.0 EPI shall take Contractors All Risk (CAR) Insurance for the main work. The CONTRACTOR shall take insurance cover at its own cost towards Workman Compensation Act for its own workers, employees and for the plant & Equipment deployed by the CONTRACTOR at the project site and shall furnish documentary proof of the same to failing which no payments shall be released to the CONTRACTOR against work done. THE CONTRACTOR shall assist EPI in follow up with insurance company in case of any claim related to CONTRACTOR’s scope of work. EPI is not liable to pay any claim of the CONTRACTOR of it is not paid by insurance company due to any reasons whatsoever. All insurance including CAR Policy for the O&M Period shall be in the scope of contractor.
10.0 In the event of award of “works”, CONTRACTOR shall submit to EPI Bank Guarantees from a Scheduled Bank towards performance, retention money, security deposit etc. (if applicable) as required by EPI/Client/local authorities as per conditions of the ‘Tender Documents’ (in the prescribed proforma of EPI) for CONTRACTOR’s portion of work.

11.0 The CONTRCTOR shall be fully responsible to complete the “Works” in workmen like manner to the satisfaction of the Client and EPI by maintaining high standard of quality and precision as per ‘Tender Documents,’ Agreements, Terms & Conditions, Specifications, Drawings etc. within contractual completion period and within their quoted rates/amount.

12.0 In case CONTRACTOR is awarded the “Works”, they will submit detailed work programme in Bar chart/MS Project within 07 days of issuance of LOI/W.O. If they fail to execute as per agreed schedule of progress of work and as per specified quality and/or lags behind in activities required for timely completion of “works”, as determined by EPI/Client, then EPI shall give 15 days written notice to CONTRACTOR to achieve the specified quality and/or to deploy adequate to the satisfaction of EPI for timely completion of “Works”, then EPI shall have option to withdraw the remaining work partly or in full from CONTRACTOR and get the same executed at the risk and cost of the CONTRACTOR from alternative agency/agencies besides encashment of the guarantees submitted by the CONTRACTOR to EPI. The decision of EPI in this regard shall be final and binding on the CONTRACTOR.

13.0 COMPLETION SCHEDULE

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Period from the date of Start</th>
<th>Description of work to be completed during the period specified under column no. 2 (Milestone)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>From the date of start to end of 2&lt;sup&gt;nd&lt;/sup&gt; month.</td>
<td>Complete survey, Submission of Design &amp; Engineering work and start of civil work in All structures</td>
</tr>
<tr>
<td>2</td>
<td>From the start of 3&lt;sup&gt;rd&lt;/sup&gt; month upto the end of 4&lt;sup&gt;th&lt;/sup&gt; month</td>
<td>Placement of order on E&amp;M items, continuation of civil works, pipe laying etc.</td>
</tr>
<tr>
<td>3</td>
<td>From the start of 5&lt;sup&gt;th&lt;/sup&gt; month upto the end of 14&lt;sup&gt;th&lt;/sup&gt; month</td>
<td>Completion of Civil works, piping etc. required at site &amp; Supply and Installation of Equipment/Materials at site house hold connection and SCADA shall be stated</td>
</tr>
<tr>
<td>4</td>
<td>From the start of 15&lt;sup&gt;th&lt;/sup&gt; month upto the end of 16&lt;sup&gt;th&lt;/sup&gt; month</td>
<td>Testing &amp; commissioning of complete System and start the O&amp;M period of 10 years</td>
</tr>
</tbody>
</table>

Entire work should be completed within a period of sixteen months from the date of LOI.
14.0 Operation and Maintenance Period shall be for 10 years (120 months) after successful completion of the works.

An amount of 25% of each RA bill (In addition to retention money of 5%) shall be retained against O&M. The amount retained against O&M shall be released on yearly basis during O&M period @ 2% pa with an increase of 5% in every succeeding year till the 10th year of O&M. The payment against the O&M shall be made every year on satisfactory upkeep and running of the system.

The CONTRACTOR shall post adequate competent engineers and supervisory staff at site for day-to-day execution and supervision of its works, etc. during the entire duration of the contract including maintenance/defect liability period and Operation & Maintenance period (O & M) of 10 Years. The minimum number and level of engineers, supervisors and other personnel at to be deployed by the CONTRACTOR should be as directed by EPI. In case the CONTRACTOR fails to deploy adequate number of personnel at site/office, EPI after giving seven days notice shall engage the required personnel solely at the risk and cost of the PARTY and debit the cost of the same to the account of CONTRACTOR. EPI shall exercise overall management, monitoring and coordination of project. EPI shall not post any staff during maintenance/defect liability period for which the CONTRACTOR shall make suitable arrangement to the satisfaction of EPI/client.

**During Construction**

I) Project Manager with degree in corresponding discipline of engineering with 10 years experience – One No.

II) Graduate Engineer with 5 years experience – 03 nos.

ii) Diploma Engineer with 5 years experience – 06 nos

In case the contractor fails to employ the technical staff as aforesaid during construction period, EPI shall deploy the same & recover the following amounts from Contractors’ Bill in the case of each person.

i) Graduate Engineer with 05 years experience – Rs. 60,000/- p.m.

ii) Diploma Engineer with 05 years experience – Rs. 30,000/- pm.

**During O & M**

The Bidder shall employ following minimum Manpower for the O&M of the project. (Bidder shall be employing other staff as per requirement following is only the minimum staff).

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Particulars</th>
<th>Minimum Qualification</th>
<th>Experience</th>
<th>No. of personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Project Manager</td>
<td>B.E.</td>
<td>5 years</td>
<td>01</td>
</tr>
<tr>
<td>2.0</td>
<td>Dy. Project Manager</td>
<td>Diploma</td>
<td>5 years</td>
<td>02</td>
</tr>
<tr>
<td>2.0</td>
<td>Electrician</td>
<td>ITI (Elect.)</td>
<td>3 years</td>
<td>05</td>
</tr>
<tr>
<td>3.0</td>
<td>Fitter</td>
<td>ITI</td>
<td>3 years</td>
<td>03</td>
</tr>
</tbody>
</table>
In case the contractor fails to employ the technical staff as aforesaid during O & M period, EPI shall deploy the same & recover the following amounts from Contractors’ Bill in the case of each person.

i) Project Manager- Rs. 1,00,000/- p.m.
ii) Deputy Project Manager– Rs. 60,000/- pm.
iii) Electrician –Rs. 25,000/-pm
iv) Fitter- Rs. 25,000/-pm

15.0 In case the project execution is delayed beyond the contractual scheduled completion period due to any reason attributable to the Contractor, the staff and site office expenses of EPI for extended period shall be paid by the CONTRACTOR to EPI at the rate of Rs.2,00,000/- per month. This shall be in addition to the facilities provided by the CONTRACTOR to EPI and the Liquidated Damages/ Compensation for delay/Penalties etc. if any, levied by Client.

16.0 The CONTRACTOR shall be responsible for timely completion of the “Works” within the contractual completion period. Total Liquidated Damages and Compensation for delay, shall be applicable as per cl 46 of section-3 and cl 13 of section-6 of SCC-I and shall be recovered from CONTRACTOR’s bills or other dues.

17.0 The CONTRACTOR shall have EPF Code number, CST-TIN, Service Tax, VAT –TIN/ Sales tax on Works contract number, Service tax registration number, PAN (Permanent Account Number of Income Tax) etc. and shall be responsible for depositing EPF subscription and contribution for labour and staff employed by it on the “Works” and Service tax, other taxes, duties and dues etc. as per statutory requirements and documentary evidence of same shall be provided to EPI . The CONTRACTOR shall also be responsible for labour welfare and for arranging labour and other licenses/permits/clearance etc. for the project at their own. In case EPI has to take labour license or and other licenses, all expenditure towards the same shall also be borne by the CONTRACTOR. The CONTRACTOR shall comply with all the requirements as per labour laws/acts. All the records in this regard shall be maintained by CONTRACTOR as per statutory requirements and rules and shall be produced by the CONTRACTOR on demand if required.

18.0 The CONTRACTOR shall be responsible for obtaining all approvals from Client with regard to quality of materials & workmanship and measurements etc. for their portion of work. All such approvals shall be in the name and title of EPI. The CONTRACTOR shall be responsible for reconciliation of issued material, if any. Any shortfall in issue materials shall be made good/recovered from CONTRACTOR at actual expenditure plus financing and handling charges @ 10%

19.0 The CONTRACTOR will not deal directly with Client and all the correspondence in matters regarding bills, claims, interpretation of the specifications, conditions and all matters related to the contract with Client, Client’s Consultants, all other agencies including Government and Statutory bodies etc. shall be done through EPI only. CONTRACTOR shall prepare and submit expeditiously all bills, claims, details, clarifications, documents, information, etc. as required by EPI /Client for proper execution and successful completion of the “Works”
20.0 If desired by EPI, CONTRACTOR shall be available/associate with EPI in meetings with Client for its portion of work. CONTRACTOR shall furnish all information and clarifications as and when required by EPI/Client.

21.0 The CONTRACTOR shall plan and execute the “Works’ in his scope of work in such a manner that the other works, connected with the “Works” of the CONTRACTOR, but not included in the CONTRACTOR’s scope of work, do not get affected/delayed.

22.0 The CONTRACTOR shall deploy sufficient plant & equipment of the required and in good working condition for completion of the works in stipulated time with required quality, the equipment should either be owned by the CONTRACTOR or hired/leased. The deployment of equipment by CONTRACTOR shall be as decided by EPI and the same shall not be less than the minimum deployment stipulated by the Client, if any for execution of “Works” and as per schedule agreed with EPI. The CONTRACTOR shall make arrangement for regular maintenance including preventive and breakdown maintenance and maintain stock of essential spares at site/near to site so as to ensure minimum breakdown time of equipment. The equipment once brought to site shall not be allowed to be removed without the consent of EPI. In case the CONTRACTOR fails to deploy sufficient equipment to the satisfaction of EPI or in case of prolonged breakdown of equipment, EPI at its sole discretion shall arrange the required equipment and debit all the related costs including ten percent overheads of EPI and shall recover the same from the due payments of CONTRACTOR, including from its bank guarantees available with EPI.

23.0 CONTRACTOR shall ensure compliance with all Central, State and Local Laws, Rules, Regulations etc. as applicable or may be applicable during the course of execution, maintenance etc. of the “Works” and shall indemnify against any claim or damages whatsoever on such accounts. The CONTRACTOR shall keep EPI indemnified at all times against infringement of any Patent or Intellectual Property rights.

24.0 EPI is an ISO: 9001 and ISO: 14001 Company. The conditions of the ISO as applicable should be followed by the CONTRACTOR for implementation & maintaining the established procedures of EPI for this purpose. Following documents have been provided by EPI to CONTRACTOR & CONTRACTOR confirms receipt of the same:-

   a. Quality & Environmental Policy

   b. Objectives & Targets.

   c. Operational control procedures

   d. Operational Control Procedures

   e. Noise.

   f. Wastage
25.0 The work executed by CONTRACTOR shall be subject to audit and quality control checks from Quality Control Division & Technical audit of EPI, Client Inspecting Agency of the Client and Chief Technical Examiner of Central Vigilance Commission, Govt. of India. In the eventuality of any defect/sub standard works as brought out in the report or noticed otherwise at any time during execution, maintenance period etc., the same shall be made good by the CONTRACTOR without any cost to EPI. In case CONTRACTOR fails to rectify the defect/sub- standard work within the time period stipulated by EPI, shall get it rectified at the risk and cost of CONTRACTOR and shall recover the amount from the dues of the CONTRACTOR. All documents required to be submitted to these agencies for the scope of work of contractor will be provided on demand of EPI. The contractor shall properly maintain records of all documents related to approvals, material & test records, labour attendance and all other statutory requirements for any time inspection by the above agencies.

26.0 The work shall also be inspected by third party agency appointed by Singrauli Municipal Corporation (owner) in every quarter at bidders cost. (Please also refer clause no. 6, Vol-II under SCC-II)

27.0 In case, at a later stage, it is found that the CONTRACTOR has submitted incorrect, false details and credentials resulting in apprehensions on the capabilities of CONTRACTOR with regard to quality & timely completion of works, financial capabilities etc. EPI can terminate this agreement solely at its option. In this eventuality the CONTRACTOR shall be liable for the losses suffered by EPI and further CONTRACTOR shall have no claim on EPI, whatsoever.

28.0 All other terms and conditions shall be as per the Tender documents of Client and the same shall be applicable between EPI and the CONTRACTOR on mutatis mutandis basis. The above terms and conditions shall supersede the terms and conditions contained in the Tender Documents of the Client in case of variance in any condition. However, if EPI is granted some concession or exempted from certain obligations by client, by virtue of EPI being a Public Sector Company, the same concessions/exemptions shall not be applicable to the CONTRACTOR. The decision of EPI in this regard including interpretation of terms & conditions shall be final & binding on CONTRACTOR.

29.0 PRIORITY OF WORK

The contractor has to deploy resources and plan the work accordingly and nothing extra shall be payable to the contractor on this account. The contractor has to ensure safety of the occupants and sufficiently barricade the area so as to avoid any hazard to occupants.

30.0 The relevant and required documents in respect of VAT assessment / service tax assessment for EPI for availing exemption / deductions by EPI are to be submitted along with each RA bill failing which the VAT Tax levied / suffered by EPI is to be borne by the contractor and will be recovered from the forthcoming bills. The bills are to be submitted in the format required under the respective tax acts indicating input tax.

31.0 The final bill payment to the PARTY shall be made when PARTY submits VAT clearance certificates, EPF clearance certificate, all other clearances, approvals, certificates etc. as per agreement of EPI with the client for the “Works” and as per statutory requirement.
32.0 The final bill will be submitted by the contractor within 90 days from the date of acceptance of completion of work accompanied by the following documents:

a) Completion certificate issued by the Engineer-in-Charge specifying the handing over of the work including list of inventories (fittings & fixtures).

b) Computerized stage wise payment schedule.

c) No claim certificate by the contractor.

d) No claim certificate from the sub-agencies / venders engaged by the contractor.

e) As built’ drawings.

f) Periodical services and measurement books.

g) Drawings for layout of underground cables and details showing location of sluice valves, electric cable joints etc.

h) All operation and maintenance manuals.

i) All statutory approvals from various state / central govt. local bodies, if required for completion & handing over of the work as included in scope of Contractor.

j) Manufacture’s guarantee of various machines / equipments installed as part of works.

k) NOC from labour department, PF Department.

33.0 In case of any discrepancy between the downloaded tender and the approved hard copy, the approved hard copy shall hold good for contractual as well as legal purposes.

The tenderer shall furnish a declaration to this effect that no addition/deletion/corrections have been made in the downloaded tender document being submitted by him and it is identical to the tender document appearing on the Web-Site and with the Standard DRAFT Tender Document available in the office inviting the tenders.

If any tenderer withdraws his tender before the said period or issue of letter of acceptance/intent, whichever is earlier, or makes any modifications in the terms and conditions of the downloaded tender which are not acceptable to the EPIL, then the EPIL shall, without prejudice to any other right or remedy, be at liberty to forfeit entire amount of Earnest Money as aforesaid.

34.0 Facilities to be provided by the contractor

The sub-clause 28.3 of the clause no. 28 of General Conditions of Contract (GCC) for Furnished Office Accommodation & Mobility and Communication to be Provided by Contractor to EPI, Client shall be replaced and read as under:-
The contractor shall make his rates in Bill of Quantities

<table>
<thead>
<tr>
<th>I. OFFICE WITH FACILITIES – The contractor is to provide office with following facilities till defect liability period.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>A (i) PORTA CABIN OFFICE ACCOMODATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnished office with one conference/ meeting room at one or more locations as per direction of Engineer-in-Charge with basis amenities like Toilets, Drinking water arrangement, lights, other facilities for winter and summer season etc. for EPI, Client Engineer &amp; Staff &amp; maintenance of it till Defect Liability Period. If the same is not required by EPI a recovery of Rs. 50000/- per month will be made from contractor. If the contractor fails to provide office one time non refundable recovery of Rs 20,00,000/-</td>
</tr>
<tr>
<td>Sq. ft.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(ii) FURNITURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office &amp; meeting tables</td>
</tr>
<tr>
<td>Office Chairs</td>
</tr>
<tr>
<td>Executive Table &amp; Chair</td>
</tr>
<tr>
<td>Steel Almirah</td>
</tr>
<tr>
<td>File Cabinet</td>
</tr>
<tr>
<td>If the above furniture are not provided by contractor a recovery of non refundable one time Rs. 1,00,000/- will be made.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B) OFFICE EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Computer with processor Intel Pentium Core I5-processor, Memory- 4 GB DDR3 RAM, 1 TB HDD, DVD Writer, Key board, Mouse, 18-19 inch LED Monitor, Modem/ Router with internet connection, Microwsoft Windows 8 – OS, Microwsoft–Office, 3 years onsite warranty</td>
</tr>
<tr>
<td>Computer along with operator is not provided by contractor or not required by EPIL as recovery of Rs 20000/- per month will be made.</td>
</tr>
<tr>
<td>Set</td>
</tr>
<tr>
<td>b) Laser / Scanner multifunctional Printer A4 size</td>
</tr>
<tr>
<td>c) Internet Facilities</td>
</tr>
<tr>
<td>d) Refrigerator (165 Ltrs) or any other gadget of equivalent cost as decided by EPI</td>
</tr>
<tr>
<td>e) Aqua Guard (Drinking water) or any other gadget of equivalent cost as decided by EPI</td>
</tr>
<tr>
<td>f) Air Conditioner with cooling &amp; heating (1.5 ton capacity)</td>
</tr>
<tr>
<td>g) Photocopy machine(CANON NP3050 or equivalent model) or any other gadget of equivalent</td>
</tr>
</tbody>
</table>
h) Digital Camera-10 MP

| Running & maintenance of the equipments mentioned above are to be done by the contractor at his own cost. | No. | 1 |

If the above furniture are not provided by contractor a recovery of non-refundable one time Rs. 3,00,000/- will be made.

C) CONSUMABLES

| Consumables like Stationary, ink etc. shall be provided by Tenderer till end of defect liability period. (Stationary items are inclusive of visiting cards, rubber stamps, letter pads, photocopies papers & other items of daily office use). Amount shall be restricted to Rs. 7000/- per month. If the same is not required by EPIL a recovery of Rs7000/- per month will be made. | Deleted | Deleted |

D) CONVEYANCE AND OTHER FACILITIES

| Vehicle (Brand New) Four wheel drive Scorpio DX vehicle or equivalent with Driver service. Accessories valuing Rs 40,000/- each vehicle. Monthly running shall be restricted to 3000 Kms each. | Nos. | Deleted |

E) TELEPHONE WITH STD FACILITIES AND INSTRUMENTS

| a) Office Telephone (Fixed/ WLL Line) as decided by Site –in -charge) | No. | 1 |
| b) Mobile Phone | Nos. | 2 |
| Monthly operational expenditure on account of all telephones / broad band shall be restricted to. Rs. 6000 per month | - | - |
| The cost of each Mobile Phone instrument shall be restricted to Rs. 15,000/- | - | - |
| G) Office Boy Cum-Cook on full time basis for EPI. If the same is not provided by contractor or not required by EPIL a recovery of Rs. 10,000/-per month will be made from contractor. | No | 1 |

The above gadget facilities should be brand new and of repute make and all formalities shall be provided and maintain properly (including payment of water and electricity bills etc for office accommodation only) by the tenderer at the project site or at any other office related with execution of this project till completion of work, handing over, defect liability period in all respect at his own cost. The tenderer shall also make stand by arrangement for water and electricity to ensure uninterrupted supply. The equipment/ items shall be the property of tenderer at the end of contract. The tenderer shall be responsible for watch and ward of site office and other facilities etc. In case of theft/damage of any equipment/items, the tenderer shall immediately replace the same with a maximum period of two days.

**Note:** In case the above facilities are not provided by the tenderer within 10 (ten) days of award of work or replacement is not provided within the specified period, EPI shall arrange the same at the risk and cost of the party and make the recoveries from the bills of the tenderer for the same. The decision of EPI shall be final and binding on the tenderer in this regard.
The tenderer shall provide ‘Sign Board(s)’ as per design approved by EPI and /or Client.
SPECIAL CONDITIONS
OF
CONTRACT
SPECIAL CONDITIONS OF CONTRACT (SCC-I)

DEFINITIONS AND INTERPRETATION

1. In the Contract as hereinafter defined, the following words and expressions shall have the meaning hereby assigned to them, except where the context otherwise requires:

(a) "Employer" means the authority who will employ the Contractor and the legal successors in title to the Employer but not, except with consent of the Contractor, any assignee of the Employer.

(b) "Contractor" means the person or persons, firm or company whose TENDER has been accepted by the Employer and includes the Contractor's personal representatives, successors and permitted assignees.

(c) "Engineer" means the Engineer designated as such in Contract, the Engineer appointed from time to time by the Employer and notified in writing to the Contractor to act as Engineer for the purposes of the Contract in place of the Engineer so designated.

(d) "Engineers Representative" means any resident engineer or Executive of the engineer, or any clerk of works appointed from time to time by the Employer or the Engineer to perform the duties set forth in the Contract hereof, whose authority shall be notified in writing to the Contractor by the Engineer.

(e) "Works" shall include both permanent Works and Temporary Works.


(g) "Contract Price" means the sum named in the Letter of Acceptance subject to such additions therefore or deductions there from as may be made under the provisions hereinafter contained.

(h) "Constructional Plant" means all appliances or things of whatsoever nature required in or about the execution or maintenance or the Works but does not include materials or other things intended to form or forming part of the Permanent Works.

(i) "Permanent Works" means the permanent works to be executed and maintained in accordance with the Contract.

(j) "Specification" means the specifications referred to in the TENDER and any modifications thereof or addition thereto as may from time to time be furnished or approved in writing by the Engineer.

(k) "Drawings" means the drawings referred to in the Specification and any modification of such drawings approved in writing by the Engineer and such other drawings as may from time to time be furnished to be approved in writing by the Engineer.

(l) "Site" means the land and other places on, under, in or through which the Permanent Works or Temporary Works designed by the Engineer are to be executed and any other lands and places provided by the Employer for working space or any other purpose as may be specifically designated in the Contract as forming part of the site.

(m) "Approved" means approved in writing including subsequent written confirmation of previous verbal approval and "approval" means approval in writing, including as aforesaid.

Singular and Plural

(n) Words importing the singular only also include the plural and vice versa where the context requires.

Heading or Notes
The headings and marginal notes in these Conditions of Contract shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

Cost

The Word “Cost” shall be deemed to include overhead costs whether on or off the Site.

2.0 ENGINEER AND ENGINEER’S REPRESENTATIVE

Duties and Powers of Engineer and Engineer's Representative

2 (1) The Engineer shall carry out such duties in issuing decision, certificates and orders as are specified in the Contract. In the event of Engineer being required in terms of his appointment by the Employer to obtain the specific approval of the Employer for the execution of any part of these duties, this shall be set out in section 3 of Special Conditions of Contract.

2 (2) The Engineer's Representative shall be responsible to the Engineer and his duties are to watch and supervise the works and to test and examine any materials to be used or workmanship employed in connection with the works. He shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract not except as expressly provided hereunder or elsewhere in the Contract, to order any work involving delay or any extra payment by the Employer, nor to make any variation of or in the works.

The Engineer may from time to time in writing delegate to the Engineer’s Representative any of the powers and authorities vested in the Engineer and shall furnish to the Contractor and to the Employer a copy of all such written delegations of powers and authorities. Any written instruction or approval given by the Engineer’s Representative to the Contractor within the terms of such delegation, but not otherwise, shall bind the Contractor and the Employer as though it had been given by the Engineer. Provided always as follows :-

(a) Failure of the Engineer’s Representative to disapprove any work or materials shall not prejudice the power of the Engineer thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

(b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's Representative he shall be entitled to refer the matter to the Engineer, who shall thereupon confirm reverse or vary such decision.

ASSIGNMENT AND SUB-LETTING

(3) The Contractor shall not assign the Contract or any part thereof or any benefit or interest therein or there under otherwise than by a charge in favour of the Contractor’s bankers of any monies due or to become due under this Contract.

(4) The Contractor shall not sub-let the whole of the works Except where otherwise provided by the Contract, The Contractor shall not sub-let any part of the Works Provided always that the provision of labour on a piece work basis shall not be deemed to be a sub-letting under this Clause.

CONTRACT DOCUMENTS

5.(1) Language’s and law

(a) The language or languages in which the Contract documents shall be drawn up shall be English.

(b) The Country or State the law of which is to apply to the Contract and according to which the Contract is to be constructed, shall India & Madhya Pradesh.

Documents Mutually Explanatory

(2) Except if and to the extent otherwise provided by the Contract the provisions of the Conditions of Contract sections 2 and 3 shall prevail over those of any other document forming part of the Contract Subject to the foregoing the several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of
ambiguities or discrepancies the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor Instructions thereon. Provided always that if in the opinion of the Engineer, compliance with any such instructions shall involve the Contractor in any cost, which by reason of any such ambiguity or discrepancy could not reasonable have been foreseen by the Contractor the Engineer shall certify and the Employer shall pay such additional sum as may be reasonable to cover such costs.

**Custody of Drawings**

6.(1) The Drawings shall remain in the sole custody of the Engineer, but two copies thereof shall be furnished to the Contractor free of charge. The Contractor shall provide and make at his own expense any further copies required by him. At the completion of the contract the Contractor shall return to the Engineer all Drawings provided under the Contract.

**One copy of the Drawings to be kept on Site.**

(2) One copy of the Drawings furnished to the Contractor as aforesaid, shall be kept by the Contractor on the site and the same shall at all reasonable times be available for inspection and use by the Engineer and the Engineer's Representative and by any other person authorized by the Engineer in writing.

**Disruption of Progress**

(3) The Contractor shall give written notice to the Engineer whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawing or order, including a direction, instruction or approval is issued by the Engineer 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.

**Delay and Cost of delay of Drawings**

(4) If, by reason of any failure or inability of the Engineer to issue within a time reasonable in all the circumstances any drawing or order required by the Contractor in accordance with sub-clause (3) of this Clause, the Contractor suffers delay then the Engineer shall take such delay into account in determining any extension of time to which the Contractor is entitled under Clause 44 hereof. However the Contractor shall not be entitled to any compensation for such delay, except extension of time.

**Further Drawings and Instructions**

7. The Engineer shall have full power and authority to supply to the Contractor from time to time during the progress of the Works such further drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and maintenance of the Works. The Contractor shall carry out and be bound by the same.

**GENERAL OBLIGATIONS**

**Contractors general Responsibilities**

8.(1) The Contractor shall subject to the provisions of the Contract and with due care and elegance, execute and maintain the works and provide all labour and material, including the supervision thereof. Constructional plant and all other things, whether of a temporary or permanent nature required in and for such execution and maintenance, so far as the necessity for providing the same is specified in or is reasonable to be inferred during the Contract.

(2) The Contractor shall take full responsibility for the adequacy stability and safety of all site operations and methods of construction provided that the Contractor shall not be responsible except as may be expressly provided in the Contract for the design or specification of the permanent works or for the design or specification of any Temporary Works prepared by the Engineer.

**Contract Agreement**
The Contractor shall when called upon so to do enter into and execute a Contract Agreement to be prepared and completed by Contractor, in the form annexed with such modification as may be necessary.

**Performance Bond (Deleted)**

If required for the due performance of the Contract, the TENDER shall contain an undertaking by the Contractor to obtain, when required, a bond or guarantee of an insurance company or bank, or there approved securities to be jointly and severally bound with the Contractor to the Employer, in a sum not exceeding that stated in the letter of Acceptance for such bond or guarantee, the said insurance company or bank or securities and the terms of the said bond or guarantee shall be such as shall be approved by the Employer. The obtaining of such bond or guarantee or the provision of such securities and the cost of the bond or guarantee to be so entered into shall be at the expense in all respects of the Contractor, unless the Contract otherwise provides.

**Inspection of Site by the contractor / Third Party inspection:**

The Employer shall have made available to the Contractor with the TENDER documents data relevant to the works and the TENDER shall be deemed to have been based on such data, but the Contractor shall be responsible for his own interpretation thereof.

The Contractor shall also be deemed to have inspected and examined the site and its surroundings and information available in connection therewith and to have satisfied himself so as is practicable before submitting his TENDER, as to the form and nature thereof, including the climatic conditions, the extent and nature of work and materials necessary for the completion of the Works, the means of access to the Site and accommodation required and in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his TENDER. The TENDER as submitted by the Bidder is strictly as per his own assessment regarding site conditions and material, labour, T & P availability. No claims whatsoever shall be entertained by the employer in this regard.

**Sufficiency of TENDER**

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his TENDER for the Works and of the rates and prices of various Quantities and the Schedule of Rates and Prices, if any, which TENDER rates and prices shall, except in so far as it is otherwise provide in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and maintenance of the Works. If, however, during the execution of the Works the Contractor shall encounter physical conditions, other than climatic conditions on the Site, or artificial obstructions, which conditions or obstruction could, in his opinion, not have been reasonable foreseen by an experienced contractor the Contractor shall forthwith give written notice thereof to the Engineer's Representative and if in the opinion of the Engineer, such conditions or artificial obstructions could not have been reasonably foreseen by an experienced contractor, than the Engineer shall certify and the Employer shall pay the additional cost to which the Contractor shall have been put by reason of such conditions, including the proper and reasonable cost. However the Engineers decision shall be final & binding.

**Works to be done to the Satisfaction of the Engineer**

Save insofar as it is legally or physically impossible the Contractor shall execute and maintain the works in strict accordance with the Contract to the satisfaction of the Engineer and shall comply with and adhere strictly to the Engineer's Instruction and directions on any matter whether mentioned in the Contract or not, touching or concerning the Works of the Contract and shall take instructions and directions only from the Engineer or subject to the limitations referred to in Clause-2 hereof from the Engineer's Representatives.

**Programme to be Furnished**

(1) Within the time stated in section-3 of the contract, the Contractor shall after the acceptance of his TENDER, submit to the Engineer for his approval a programme showing the order of procedure in which he proposes to carry out the works. The
contractor shall whenever required by the Engineer or Engineer’s Representative, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of the works.

(2) If at any time it should appear to the Engineer that the actual progress of the works does not conform to the approved programme referred to in sub-clause (1) of this Clause, the Contractor shall produce, at the request of the Engineer, a revised programme showing the modifications to the approved programme necessary to ensure completion of the Works within the time for completion as defined in Clause 4.3 hereof.

(3) The submission to and approval by the Engineer or Engineer’s Representative of such programmes or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities under the Contract.

15. **Contractor’s Superintendence**

The Contractor shall give or provide all/necessary superintendence during the execution of the works and as long thereafter as the Engineer may consider necessary for the proper fulfilling of the Contractor’s obligations under the Contract. The Contractor, or a competent and authorized agent or representative approved in writing by the Engineer, which approval may at any time be withdrawn, is to be constantly on the works and shall give his whole time to the superintendence of the same. If such approval shall be withdrawn by the Engineer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned after receiving written again on the works in any capacity and shall replace him by another agent approved by the Engineer. Such authorized agent or representative shall receive instructions from the Engineer or subject to the limitations of Contract hereof, the Engineer’s Representative.

16.0 **Contractor’s Employees**

The contractor shall provide and employ on the site in connection with the execution and maintenance of the works.

(a) Only such technical Executives as are skilled and experience in their respective callings and such sub-agents, foremen and leading hands as are competent to give proper supervision to the work they are required to supervise and

(b) Such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the works.

17.0 **Excepted Risks**

The “excepted risks” as war, hostilities (whether war be declared or not), invasion act by foreign enemies, rebellion, revolution, insurrection of military, civil war, earthquakes and inundation by flash floods due to cyclones, storms or unless solely restricted to employees of the Contractor or of his sub contractors and arising form the conduct of the works, commotion or disorder or use of occupation by the Employer of any part of the permanent Works of a cause solely due to the Engineer’s design of the works or 6uthoriz traditions or form any nuclear waste from the combustion of nuclear fuel radio-active foxier explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds of any such operation of the forces of nature as an experienced contractor could not foresee or reasonably make provision for or insure against all of which are herein collectively referred to as “the excepted risks”

18.0 **Insurance on Works, etc.**

Without limiting his obligations and responsibilities under this Contract hereof, the Contractor shall insure in the joint names of the Employer and the Contractor against all loss or damage from whatever clause arising other than the excepted risks for which he is responsible under the terms of the Contract and in such manner that the Employer and Contractor are covered for the period stipulated in Contract hereof and are also covered during the period of Maintenance for loss or damage arising from a cause, occurring prior to the commencement of the period of maintenance and for any loss or damage occasioned by the contractor in the cause of any operations carried
out by him for the purpose of complying with his obligations under the relevant clause of this
Contract:

(a) The works for the time being executed to the estimated current contract value
thereof, or such additional sum as may be specified in the Special conditions of
Contract together with the materials for incorporation in the works at their
replacement value.

(b) The constructional Plant and other things brought on to the Site by the Contractor
to the replacement value of such Constructional Plant and other things.

Such insurance shall be effected with an insurer and in terms approved by the Employer,
which approval shall not be unreasonably withheld and the contractor shall whenever
required produce to the Engineer or the Engineer’s Representative the policy of
insurance and the receipts for payment of the current premiums.

19.0 Damage to Persons and property

(1) The Contractor shall, except if and so far as the Contract provides otherwise, indemnify
the Employer against all losses and claims in respect of injuries of damage to any
persons or material or physical damage to any property whatsoever which may arise out
of or in consequence of the execution and maintenance of the works and against all
claims, proceedings, damages, costs charges and expenses whatsoever in respect of or
in relation thereto except any compensation or damages for or with respect to :-

(a) The permanent use of occupation of land by the works or any part thereof.

(b) The right of the Employer to execute the works or any part thereof on, over,
under, in or through any land.

Injuries or damage to persons or property which are the unavoidable result of
execution or maintenance of the works in accordance with the Contract.

(d) Injuries or damage to persons or property resulting from any act or neglect of the
Employer, his agents servants or other contractors, not being employed by the
Contractor, or for or in respect of any claims, proceedings, damages, costs, charges and
expenses in respect thereof or in relation thereto or where the injury of damage was
contributed to by the Contractor, his servants or agents such part of the compensation as
may be just and equitable having regard to the extent of the responsibility of the
Employer, his servant or agents or other contractors for the damage or injury

(2) Indemnify by Employer

The Employer shall indemnify the Contractor against all claims, proceedings, damages,
costs, charges and expenses in respect of the matters referred to in the provision to sub-
clause (1) of this clause.

20.0 Third party Insurance

(1) Before commencing the execution of the Works the contractor, but without limiting his
obligations and responsibilities under Clause-19 hereof, shall insure against his liability
for any material or physical damage, loss or injury which may occur to any property,
including that of the Employer, or to any person, including any employee of the Employer
by or arising out of the execution of the works or in the carrying out of the Contract,
otherwise than due to the matters referred to in the provision to Clause-19 (1) hereof

(2) Minimum amount of Third party Insurance

Such Insurance shall be effected with an insurer and in terms approved by the Employer which
approval shall not be unreasonably withheld, and for at least the amount stated, in the Appendix
to the TENDER. The Contractor shall, whenever required, produce to the Engineer or the
Engineer’s Representative the policy or policies of Insurance and the receipts for payment of the
current premiums. The Contractor shall submit certified copies of the premiums paid to the
Engineer regularly. Failure to do so shall invite action under provision of clause 22 hereof.

(3) Provision to Indemnify Employer
The terms shall include a provision whereby in the event of any claim in respect of which the Contractor would be entitled to receive claim under the policy being brought or made against the Employer, the insurer will indemnify the Employer against such claims and any cost, charges and expenses in respect thereof.

21.0 Accident or Injury to Workmen

(1) The Employer shall not liable for or in respect of any damages or compensation payable as per law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the Employer his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, save and except as aforesaid, and against all claims proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

(2) Insurance against Accidents, etc., to Workman

The Contractor shall insure against such liability with an insurer approved by the Employer, which approval shall not be unreasonably with held, and shall continue such insurance during the whole of the time that any persons are employed by him on the Works and shall, when required produce to the Engineer or the Engineer’s Representative such policy of insurance and the receipt for payment of the current premium. Provided always that in respect of any persons employed by any sub-contractor the Contractor’s obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub contractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy but the contractor shall require such sub contractor to produce to the Engineer or the Engineer’s Representative when required such policy of insurance and the receipt for the payment of the current premium.

22.0 Remedy on contractor’s Failure to Insure

(1) If the Contractor shall fail to effect and keep in force the insurances referred to clause hereof or any other insurance which he may be required to effect under the terms of the contract then and in any such case the Employer may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time and deduct the amounts paid by the Employer as aforesaid from any monies due or which may become due to the Contractor, or recover the same as a debt due from the Contractor.

(2) The Contractor shall give all notices and pay all fees required to be given or paid by any National or State Statue ordinance, or other Law, or any regulation or bye law of any local or other duly constituted authority in relation to the execution of the works and by the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the works.

23.0 Compliance with Statutes, Regulations, etc.

(1) The Contractor shall confirm in all respects with the provisions of any such Statue ordinance or Law as aforesaid and the regulations or bye laws of any local or other duly constituted authority which may be applicable to the works and with such rules and regulations of public bodies and companies as aforesaid and shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such statue Ordinance or law, regulation or bye law.

(2) The Employer will repay or allow to the contractor all such sums as the Engineer shall certify to have been properly payable and paid by the Contractor in respect of such fees.

24.0 Fossils, etc.

All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archeological interest discovered on the site of the works shall as between the Employer and the Contractor be deemed to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or things and shall
immediately upon discovery thereof and, before removal acquaint the Engineer’s Representative of such discovery and carry out at the expense of the Employer. The Engineer’s Representative’s orders as to the disposal of the same.

25.0 Patent Right and Royalties
The contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Constructional plant, machine work, or material used for or in connection with the works or any of them and form the against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. Except where otherwise specified the Contractor shall pay all tonnage and other royalties rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the works on may of them.

26.0 Interference with traffic and Adjoining Properties
All operations necessary for the execution of the works shall so far as compliance with the requirements of the contract permits be carried on so as not to interfere unnecessarily or improperly with the convenience of the public or the access to use and occupation of public or private roads and footpaths to or of properties whether in the possession of the employer or of any other person. The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings damages, costs, charges and expenses whatsoever arising out of or in relation to any such matters in so far as the Contractor is responsible therefore.

27.0 Extraordinary Traffic
The Contractor shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his sub contractors and in particular shall select routes choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of plant and material from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such highways and bridges.

28.0 Special Loads
Should it be found necessary for the Contractor to move one or more loads or Constructional Plant, machinery of pre-constructed units or parts of units or work over part of a highway or bridge, the moving whereof is likely to damage any highway or bridge unless special protection or strengthening is carried out, the Contractor shall before moving the load on to such highway or bridge give notice to the Engineer or Engineer’s Representative of the weight and other particulars of the load to be moved and his proposals for protecting or strengthening the said highway or bridge. Unless within fourteen days of the receipt of such notice and Engineer shall by counter notice direct that such protection or strengthening is necessary then the Contractor will carry out such proposals or any modification thereof that the Engineer shall require and unless there is an item or are items in the Bill of Quantities for pricing by the Contractor of the necessary works for the protection or strengthening aforesaid the costs thereof shall be paid by the Employer to the Contractor.

29.0 Settlement of Extraordinary Traffic Claims
If during the execution of the works or at any time there after the Contractor shall receive any claim arising out of the execution of the works in respect of damage or injury to highways or bridges he shall immediately report the same to the Engineer and thereafter the Employer shall negotiate the settlement of all sums due in respect of such claim if and so far as any such claims or part thereof shall in the opinion of the Engineer be due to any failure on the part of the Contractor to observe and perform his obligations under sub clause (1) and (2) of this Clause then the amount certified by the Engineer to be due to such failure shall be paid by the Contractor to the Employer.

30.0 Waterborne Traffic
Where the nature of the works is such as to require the use by the Contractor of water-borne transport the foregoing provisions of this Clause shall be construed as though “highway” included a lock, dock, sea wall or other structure related to a waterway and “vehicle” included craft and shall have effect accordingly.

31.0 Opportunities for other Contractors

The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to any other contractors employed by the Employer and their workmen and to the workmen of the Employer and of any other duly constituted authorities who may be employed in the execution on or mean the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the works. If however, the Contractor shall, on the written request of the Engineer or the Engineer’s Representative, make available to any such other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible or permit the use by any such of the Contractor’s scaffolding or other plant on the Site or provide any other service of whatsoever nature for any such, in the opinion of the Engineer be reasonable.

32.0 Contractor to keep Site Clear

During the progress of the works the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall store or dispose of any Constructional Plant and surplus materials and clear away and remove from the Site and wreckage, rubbish or Temporary works no longer required.

33.0 Clearance of Site on Completion

On the completion of the Works the Contractor shall clear away and remove from the Site all Constructional Plant, Surplus materials, rubbish and Temporary Works of every kind and leave the whole of the Site and Works clear and in a working like condition to the satisfaction of the Engineer.

LABOUR

Model rules relating to Labour, camps please see Annexure 'A'.

34.0 Engagement of Labour

(1) The Contractor shall make his own arrangements for the engagement of all labour, local or otherwise, and save insofar as the Contract otherwise provides, for the transport, housing, feeding and payment thereof.

Supply of Water

(2) The Contractor shall, so far as reasonably practicable having regard to local conditions, provide on the Site, to the satisfaction of the Engineer’s Representative an adequate supply of drinking and other water for the use of the Contractor’s staff and work people.

Alcoholic Liquor or Drugs

(3) The Contractor shall not, otherwise than in accordance with the Statutes, Ordinance and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor, or drugs or permit or suffer any such importation sale, gift, barter or disposal by his sub-contractors, agents or employees.

Arms and Ammunition

(4) The Contractor shall not give, barter or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

Festivals and Religious Customs

(5) The Contractor shall in all dealings with labour in his employment have due regard to all recognized festivals, days of rest and religious or other customs.

Epidemics
In the event of any outbreak of illness of an epidemics nature the Contractor shall comply with and carry out such regulations orders and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

**Disorderly Conduct etc.**

The contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst his employees and for the preservation of peace and protection of persons and property in the neighborhood of the Works against the same.

The Contractor shall be responsible for observance by his sub-contractors of the foregoing provisions

**Compliance to Labour laws & Regulations**

The Contractor shall comply with all Labour laws and Government regulations applicable at the site of work and shall indemnify the Government in respect of all claims arising out of non-compliance thereof by the Contractor.

**35.0 Returns of Labour, etc.**

The contractor shall deliver to the Engineer's Representative, or at his office a return in detail in such front and at such intervals as the Engineer may prescribe showing the supervisory 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 Constructional Plant as the Engineer's Representative may require.

**36.0 MATERIALS AND WORKMANSHP**

**Quality of Materials and Workmanship and Tests**

1. All materials and workmanship shall be of the respective kinds and in accordance with the respective codes and standards as described in the Contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests as the Engineer may direct at the place of manufacture or fabrication or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining measuring and testing any work and the quality, weight or quantity of any materials used and shall supply samples or materials before in advance in the Works for testing as may be selected and required by the Engineer.

2. Cost of Tests not provided for except for the following, if any test is ordered by the Engineer which is either:
   a) not so intended by or provided for, or
   b) (in the cases above mentioned) is not so particularized or
   c) though so intended or provided for is ordered by the Engineer to be carried out by an independent person at any place other than the site or the place of manufacture or fabrication of the materials tested.

Then the cost of such test shall be borne by the Contractor if the test shows the workmanship or materials not to be in accordance with the provisions but otherwise by the Employer.

**37.0 Inspection of Operations**

The Engineer and any person authorize by him shall at all times have access to the Works and to all Workmanship's and places where work is being prepared or from where materials, manufactured articles of machinery are being obtained for the Works and the Contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

MUNICIPAL CORPORATION SINGRAULI shall nominate a third party inspection agency like RITES. The expenses of third party inspection shall be borne by Contractor.

**Examination of Work before Covering up**
15 No work shall be covered up or put out of view without the approval of the Engineer or the Engineer's Representative and the Contractor shall afford full opportunity for the Engineer or the Engineer's Representative to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The work/foundations is or are ready or about to be ready for examination and the Engineer's Representatives shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or of examining such foundations.

Uncovering and Making Openings.

(2) The Contractor shall uncover any part or parts of the Works or make openings in or through the same as the Engineer may from time to time direct and shall reinstate and make good such part of parts to the satisfaction of the Engineer. If any such part or parts have been covered up or put out of view after compliance with the requirement of sub clause (1) of this Clause and are found to be executed in accordance with the Contract, the expense of uncovering making openings in or through reinstating and making good the same shall be borne by the Employer, but in any other case all costs shall be borne by the Contractor.

38.0 Removal of Improper Works and Materials.

(1) The Engineer shall during the progress of the Works have power to order in writing from time to time.

(a) the removal from the Site, within such time or times as may be specified in the order, of any materials/equipments which in the opinion of the Engineer are not in accordance with the contract.

(b) the substitution of proper and suitable material/equipments and

I the removal and proper re-execution notwithstanding any previous feas or interim payment thereof of any work which in respect of materials or workmanship is not in the opinion of the Engineer in accordance with the Contract.

Default of Contractor in Compliance

(2) In case of default on the part of the Contractor in carrying out such order the Employer shall be entitled to employ and pay other persons to carry out the same and all expense consequent thereon or incidental thereto shall be recoverable form the Contractor by the Employer, of may be deducted by the Employer from the monies due or which may become due to the Contractor.

39.0 Suspension of Work

(1) The Contractor shall, on the written order of the Engineer, suspend the progress of the works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work, so far as is necessary in the opinion of the Engineer. The extra cost incurred by the Contractor in giving effect to the Engineer's instructions under this Clause shall be borne and paid by the Employer unless such suspension is:

(a) otherwise provided for in the contract, or

(b) necessary by reason of some default on the part of the Contract

I necessary by reason of climatic conditions on the Site, or

(d) necessary for the proper execution of the works or for the safety of the works or any part thereof in so far as such necessity does not arise from any act or default by the Engineer or the Employer or from any of the excepted risks defined in Clause 20 hereof. Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice of his intention to claim to the Engineer within Twenty eight days of the Engineer's order. The Engineer shall settle and determine such extra payment and/or extension of time under Clause 41 before to be made to the Contractor in respect of such claim as shall, in the opinion of the Engineer be far and reasonable.
Suspension Lasting more than 90 days

(2) If the progress of the work or any part thereof is suspended on the written order of the Engineer and if permission to resume work is not given by the Engineer within a period of ninety days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) or the sub-clause (1) of this Clause, the Contractor may serve a written notice on the Engineer requiring permission within twenty-eight days from the receipt thereof to proceed with the works, or that part thereof to proceed with the works, or that part thereof in regard to which progress is suspended and, if such permission is not granted within that time the Contractor by a further written notice so served may, but is not bound to, elect or treat the suspension where it affects part only of the Works as an omission of such part under clause 51 hereof or where it affects the whole Works, as an abandonment of the Contract by the Employer.

40.0 COMMENCEMENT TIME AND DELAYS.

Commencement of Works
The Contractor shall commence the Works on Site within the period named in the TENDER after the receipt by him of a written order to this effect from the Engineer and shall proceed with the same with due expedition and without delay except as may be expressly sanctioned or ordered by the Engineer, or by wholly beyond the Contractor's control.

41.0 Possession of Site
(1) Save in so far as the Contract 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, the Employer will with the Engineer’s 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 and proceed with the programme referred to in Clause 14 hereof if any, and otherwise in accordance with such reasonable proposals of the Contractor as he shall by written notice to the Engineer, make and will, from time to time as the Works proceed, give to the Contractor 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 dispatch in accordance with the said programme or proposals, as the case may be. If the Contractor suffers delay or incurs cost from failure on the part of the Employer to give possession in accordance with the terms of this Clause, the Engineer shall grant an extension of time for the completion of the Works and no claim on this account shall be entertained.

42.0 Time for Completion
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 the provisions of Clause 48 hereof within the time stated in the Contract calculated from the last day of the period named in the Appendix to the TENDER as that within which the Works are to be commenced or such extended time as may be allowed under clause 44 hereof.

43.0 Extension of Time
If the Contractor shall desire an extension of time for completion of the work on the grounds of his having been unavoidably hindered in its execution or any other ground he shall apply in writing to the Divisional ./Sub-Divisional . within 30 days of the date of hindrance on account of which he desires such extension as aforesaid and the Divisional ./Sub-Divisional ., with whom he has signed the Agreement shall if in his opinion (which shall be final) reasonable grounds are shown therefore, may authorize such extension for a period not exceeding 3 months. Any further extension shall be subject to prior sanction of the COMMISSIONER MUNICIPAL CORPORATION SINGRAULI provided always where the Divisional ./Sub-Divisional . has recommended the grant of the extension/permited the contractor to carry out the work reserving the right of the
Department to impose the liquidated damages (as provided for under the agreement) the running bills shall continue to be paid to him.

Provided further if any extension applied for is proposed to be refused, the competent authority shall give the contractor an opportunity to heard before taking final decision.

44.0 **No Night or Sunday Work**

Subject to any provision to the contrary contained in the Contract none of the permanent Works shall, save as hereinafter provided be carried on during the night or on Sundays, if locally recognized as days of rest or their locally recognized equivalent without the permission in writing of the Engineer's Representative, except when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer's Representative. Provided always that the provision of this Clause shall not be applicable in the case of any work for which it is customary to carry out by rotary or double shifts.

45.0 **Rates of Progress**

If for any reason, which does not entitle the Contractor to any extension of time, the rate of progress of the Works or any section is at any time, in the opinion of the Engineer, too slow to ensure completion by the prescribed time or extended time for completion the Engineer shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as are necessary and the Engineer 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 the Engineer under this Clause, the Contractor shall seek the Engineer’s permission to do any work at night or on Sundays. If locally recognized as days of rest of their locally recognized equivalent such permission shall not be unreasonably refused.
46.0 Compensation for Delay

The time allowed for the carrying out the work, as entered in the TENDER form shall be strictly observed by the contractor and shall be deemed to be essence of the contract and shall be reckoned from the fifteenth day after the date on which the order to commence the work issued to the contractor, for a work where completion is beyond 6 months.

For works, for which the completion period is up to six months:

The period will be reckoned immediately from the date of issue of the order to commence the work issued to the contractor. The work shall throughout the stipulated period of contract be proceeded with all due diligence keeping in view that time is the essence of the contract. The contractor shall be bound in all cases, in which the time allowed for any work exceeds one month to complete 1/8th of the whole work before 1/4th of the whole time allowed under the contract has elapsed, 3/8th of the work before 1/2 of such time has elapsed and 3/4th of the work before 3/4 of such time has elapsed. In the event of the contractor failing to comply with the above conditions, the Engineer shall levy on the contractor, a compensation of amount equal to:

1. 1/8 percent of the value of work per week in respect of work costing above Rs. 10,00,000 and up to Rs. 25,00,000.
2. 1/16 percent of the value of work per week in respect of work costing Rs. 25,00,000 and above.

The total amount of compensation under the provision of the clause shall be limited to 5 percent of the estimated value of whole work & liquidated damages for each default and not by way of penalty and the sum of Rs. 20000 per day for every complete day of such default.

The delay in departmental assistance in completing the contract will be taken duly in to account while recovering any compensation for the delay as prescribed above. Where the Engineer-in-Charge decides that the contractor is liable to pay compensation for not giving proportionate progress under this clause and the compensation is recommended during the intermediate period such compensation shall be kept in deposit and shall be refunded if the contractor subsequently makes up the progress for the lost time, within the period of contract including extension granted, if any.

47.0 Certification of Completion of Works.

(1) When the whole of the Works have been substantially completed and have satisfactorily passed any final test that may be prescribed in the Contract the Contractor may give a notice to this effect to the Engineer or to the Engineer’s Representative accompanied by an undertaking to finish any outstanding work during the Period of Maintenance. Such notice and undertaking shall be in writing and shall be deemed to be a request by the Contractor for the Engineer to issue a certificate of Completion in respect of the Works. The Engineer shall within twenty one days of the date of delivery of such notice either issue to the Contractor, with a copy to the Employer, a Certificate of Completion stating the date on which in his opinion, the works were substantially completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the work which, in the Engineer’s opinion requires to be done by the Contractor before the issue of such certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the works specified therein. The Contractor shall be entitled to receive such Certificate of Completion within twenty one days of completion to the satisfaction of the Engineer of the works so specified and making good any defects so notified.

Certification of Completion of stages

(2) Similarly in accordance with the procedure set out in sub clause (1) of this Clause the Contractor may request and the Engineer 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
any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and occupied or used by the Employer.

If any part of the Permanent Works shall have been substantially completed and shall have satisfactorily passed any final test that may be prescribed by the Contract, the Engineer may issue a Certificate of Completion in respect of that part of the Permanent works before completion of the whole of the works and upon the issue of such Certificate, the Contractor shall be deemed to leave undertaken to complete any outstanding work in that part of the works during the period of Maintenance.

Provided always that a Certificate of Completion given in respect of any section or part of the Permanent Works before completion of the whole shall not be deemed to certify completion of any ground or surfaces requiring re-installment unless such Certificate shall expressly so state.

**48.0 MAINTENANCE AND DEFECTS**

**Definition of Period of Maintenance**

15 In these conditions and expression “Period of Maintenance” shall mean the period of maintenance named in the Appendix to the TENDER, calculated from the date of completion of the works certified by the Engineer in accordance with Clause 48 hereof or in the event of more than one certificates having been issued by the Engineer under the said Clause from the respective dates so certified and in relations to the period of maintenance the expression the “works” shall be construed accordingly.

**Execution of Work of Repair etc.**

(2) To the extent that the works shall at or as soon as practicable after the expiration of the period of Maintenance be delivered to the Employer in the condition required by the Contract. For wear and tear excepted to the satisfaction of the Engineer the Contractor shall finish the work, if any, outstanding at the date of completion as certified under Clause 45 hereof as soon as practicable after such date and shall execute all such work of repair, amendment, reconstruction, rectification and making good defects, imperfections shrinkages or other faults as may be required of the Contractor in writing by the Engineer during the period of maintenance or within fourteen days after its expiration as a result of an inspection made by or on behalf of the Engineer prior to its expiration.

**Cost of Execution of work of Repair etc.**

(3) All such work shall be carried out by the Contractor at his own expense if the necessity thereof shall in the opinion of the Engineer be due to the use of materials or workmanship not in accordance with the Contract or to neglect or failure on the part of the Contractor to comply with any obligation expressed or implied on the Contractor’s part under the contract. If in the opinion of the Engineer such necessity shall be due to any other cause the value of such necessity shall be due to any other cause the value of such work shall be ascertained and paid for as if they were additional work.

**Remedy on Contractors Failure to Carryout Work Required.**

(4) If the Contractor shall fail to do any such work as aforesaid required by the Engineer then the Engineer shall employ and pay other persons to carry out the same and if such work is work which in the opinion of the Engineer the Contractor was liable to do at his own expenses under the Contract then all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the Employer or may be deducted by the Employer from any monies due or which may become due to the Contractor.

**49.0 Contractor to Search the defects**

The Contractor shall if required by the Engineer in writing search under the directions of the Engineer for the cause of any defect imperfection or fault appearing during the progress of the works or in the period of maintenance if such defect imperfection or fault shall be one for which the Contractor is liable under the Contract the cost of the work carried out by the Contractor in searching as aforesaid shall be borne by the Contractor.
and he shall in such case repair rectify and make good such defect imperfection or fault at his own expense in accordance with the provisions of Clause 49 hereof.

50.0 ALTERATIONS, ADDITIONS AND COMMISSIONS

Variations

(1) The Engineer shall make any variation in writing of the form of quality or quantity of the works or any part thereof that may, in his opinion be necessary and for that purpose or it for any other reason it shall in his opinion be desirable he shall have power to order the Contractor to do and the Contractor shall do any of the following.

(a) Increase or decrease the quantity of any work included in the Contract.
(b) omit any such work.
(c) change the character or quality or kind of any such work
(d) change the levels, lines, position and dimensions of any part of the works, and
(e) execute additional work of any kind necessary for the completion of the work and no such variation shall in any way vitiate or invalidate the contract but the value, if any of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

Orders for Variations to be in Writing.

(2) No such variations shall be made by the contractor without an order in writing of the Engineer provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities. Provided also that if for any reason the Engineer shall consider it desirable to give any such order verbally, the contractor shall comply with such order and any confirmation in writing of such verbal order given by the Engineer whether before or after the carrying out of the order shall be deemed to be an order in writing within the meaning of this Clause. Provided further that if the Contractor shall within seven days confirm in writing to the Engineer and if such confirmation shall not be contradicted in writing within fourteen days by the Engineer it shall be deemed to be an order in writing by the Engineer.

51.0 Valuation of Variations.

(1) Except as mentioned in this TENDER all extra or additional work done or work omitted by order of the Engineer shall be valued at the rates and prices set out in relevant latest SOR of MP UADD without any escalation. If the SOR does not contain any rates or prices applicable to the extra or additional work then suitable rates or prices shall be agreed upon between the Engineer, Contractor and approved by the competent authority. In the event of disagreement, the MUNICIPAL CORPORATION SINGRAULI shall fix such rates or prices as shall in their opinion be reasonable and proper and shall be final & binding. The quantum of such work shall not be more than 10% of the agreement amount.

Claims

(2) The Contractor shall send to the Engineer's Representative once in every month an account giving particulars as full and detailed as possible of all claims for any additional payment to which the Contractor may consider himself entitled and of all extra or additional work ordered by the Engineer which he has executed during the preceding month.

No final or interim claim for payment for any such work or expense will be considered which has not been included in such particulars. Provided always that the Engineer shall be entitled to authorize payment to be made for any such work or expense not with standing the Contractor's failure to comply with this condition if the Contractor has at the earliest practicable opportunity notified the Engineer in writing that he intends to make a claim for such work.

52.0 PLANT, TEMPORARY WORKS AND MATERIALS

Plant, etc., Exclusive Use for the Works
15 All Constructional Plant, Temporary Works and materials provided by the contractor shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the works and the Contractor shall not remove the same or any part thereof except for the purpose of moving it from one part of the Site to another without the consent in writing of the Engineer which shall not be unreasonably withheld.

**Removal of Plant etc.**

15 Upon completion of the works the Contractor shall remove from the site all the said constructional plant and Temporary Works remaining there of and any unused materials provided by the Contractor of his own expenses.

**Employer not liable for Damage to Plant etc.**

(1) the Employer shall not at any time be liable for loss or damages to any of the said Constructional Plant, Temporary works or materials save as mentioned in Clause 17 and 62 hereof.

53.0 **Environmental Conditions:**

(1) The contractor shall take all necessary measures and precautions and otherwise ensure that the execution of the works and all associated operations on site or off-site are carried out in conformity with statutory and regulatory environmental requirements including those prescribed elsewhere in this document.

(2) The contractor shall take all the measure and precautions to avoid any nuisance or disturbance arising from the execution of the works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. The provision of this sub clause shall however be disregarded in respect of emergency work required for saving life or property or the safety of the works.

(3) In the event of any soil or debris or silts from the sites being deposited on any adjacent land, the contractor shall immediately remove all such soils, debris or silt and restore the affected area to its original state.

54.0 **Fuel and Chemical Storage :**

(1) All fuel and chemical storage shall be sited on an impervious base within an embanked area and secured by fencing. The storage area shall be located away from any water course or wetland. The base and walls of the embankment shall be impermeable and of sufficient capacity to contain 110% of the volume of tanks. Filling and refueling shall be strictly controlled and subjected to format orders procedures.

(2) All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use.

(3) The contents of any tank of drum shall be clearly marked.

(4) Measures shall be taken to ensure that no contamination happens or discharges enter any drain or water courses.

55.0 **Earthworks:**

Surplus excavation materials and topsoil shall, wherever possible be used to reinstate quarries or borrow pits or other areas s may be approved by the Engineer-in-Charge. Such material should be spread in such a manner as to limit subsequent erosion and shall be re-vegetated as existing ground cover dictates.

56.0 **Environmental Enhancement:**

(1) On completion of the works, the contractor shall reinstate all areas with natural vegetation which was disturbed during the course of work, to its original position to the satisfaction of the Engineer-in-Charge.

(2) The contractor shall remove all old tyres and internal tubes from within the limits of site and subject to the agreement of adjacent land owners from an additional area of 75 mtr. Either side of the road center line. The contractor shall dispose off all materials in a manner approved by the Engineer-in-Charge.
Where directed by the Engineer-in-Charge the contractor shall improve and reinstate the land on which informant road side service areas have been established by removing all debris and contaminated soil regarding to natural ground levels and reestablishing the natural vegetation where appropriate. All debris and contaminated materials shall be disposed off from site as approved by the Engineer-in-Charge.

57.0 MEASUREMENT

(1) Quantities

The quantities indicated in TENDER are estimated quantities and shall not be treated as final quantities to be executed by Contractor for the fulfillment of his obligation under this contract. However, the Contractor shall submit a detailed bill of quantities based on the detailed design and drawings which will be the estimated quantities of the work, based on which Billing breakup and milestone for payment shall be decided by Engineer In Charge.

(2) Works to be Measured

The Engineer shall, except as otherwise stated, ascertain and determine by measurement the quantum of work carried out and as per approved billing breakup the value in the terms of the Contract. He shall when he require any part or parts of the Work to be measured, give notice to the Contractor’s authorized agent or representative, who shall forthwith attend or send a qualified agent to assist the Engineer or the Engineer’s Representative in making such measurement and shall furnish all particulars required by either of them. Should the Contractor not attend or neglect or omit to send such agent, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of the work. For the purpose of measuring such permanent work as is to be measured by records and drawings, the Engineer’s Representative shall prepare records and drawings month by month of such work and the Contractor as and when called upon to do so in writing shall within fourteen days, attend to examine and agree such records and drawings with the Engineer’s Representative and shall sign the same when so agreed. If the Contractor does not so attend to examine and agree such records and drawings, these shall be taken to be correct unless the Contractor shall, within fourteen days of such examination, lodge with the engineer’s Representative for decision by the Engineer notice in writing of the respects in which such records and drawings are claimed by him to be incorrect.

(3) Method of Measurement

The work shall be measured, notwithstanding any general on local custom except where otherwise specifically described or prescribed in the Contract.

58.0 PROVISIONAL SUMS

Definition of “Provisional Sums”

Provisional Sums mean a sum so designated in the Bill of Quantities for the execution of the work or the supply of goods, material or services or for contingencies, which sum may be used in whole or in part or not at all, at the direction and discretion of the Engineer. The Contract Price shall include only such amounts in respect of the work, supply or services to which such Provisional Sums relate as the Engineer shall approve or determine in accordance with this Clause.

Use of Provisional Sums

(2) In respect of every Provisional Sum the Engineer shall have power to order.

(a) Work to be executed including goods, materials or services to be supplied by the Contractor. The Contract price shall include the value of such work executed or such goods materials or services supplied determined in accordance with Clause 52. Hereof.

(b) Work to be executed or goods materials or services to be supplied by the nominated Sub-Contractor as hereinafter defined. The Sum to be paid to the Contractor therefor shall be determined and paid in accordance with Clause 59 (4) hereof.
Goods and materials to be purchased by the Contractor. The Sum to be paid to the Contractor thereof shall be determined and paid in accordance with Clause 59(4) hereof.

**Production of Vouchers, etc.**

(3) The Contractor shall, when required by the Engineer produce all quotations invoices vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums.

### 59.0 NOMINATED SUB-CONTRACTORS

#### (1) Definition of “Nominated Sub-Contractors”

All specialists, merchants, tradesman and others executing any work or supplying any goods, materials or services for which Provisional Sums are included in the Contract, who may have been or be nominated or selected or approved by the Employer or the Engineer and all persons to whom by value of the provisions of the Contract the Contractor is required to sublet any work shall in the execution of such work or the supply of such goods materials or services be deemed to be sub contractors employed by the contractor and are referred to in this Contract as “nominated Sub-Contractors”.

#### (2) Nominated Sub-Contractors, Objection to Nomination.

The Contractor shall not be required by the Employer or the Engineer or to be deemed to be under any obligation to employ any nominated Sub-Contractor against whom the Contractor may raise reasonable objection or who shall decline to enter into a Sub-Contract with the Contractor containing Provisions.

(a) That in respect of the work goods, materials or services the subject of the sub-contract, the nominated Sub-Contractor will undertake forwards the Contractor the like obligations and liabilities as are imposed on the Contractor towards the Employer by the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages cost, charges and expenses whatsoever arising out of or in connection therewith or arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities, and

(b) that the nominated Sub-Contractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Sub-Contractor, his agents, workmen and servants and from and against any misuse by him or them of any Constructional Plant or Temporary works provided by the Contractor for the purpose of the Contract and from all claims as aforesaid.

#### (3) Design Requirements to be Expressly Stated

If in connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the Permanent Works or of any equipment or plant to be incorporated therein such requirement shall be expressly stated in the Contract and shall be included in any nominated Sub-Contract. The nominated Sub-Contract shall specify that the nominated Sub-Contractor providing such services will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damage, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities.

#### (4) Payments to Nominated Sub-Contractors

For all work executed or goods, materials, or services supplied by any nominated Sub-Contractor, these shall be included in the Contract Price.

(a) the actual price paid or due to be paid by the Contractor on the direction of the Engineer, and in accordance with the Sub-Contract.

(b) the sum, if any entered in the Bill of Quantities for labour supplied by the Contractor in connection therewith, or if ordered by the Engineer pursuant to Clause 58 (2) (b) hereof, as may be determined in accordance with Clause 52 hereof.
in respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provisions have been made in the Bill of Quantities for a rate to be set against the relevant Provisional Sum, at the rate inserted by Contractor against that item or, where no such provision has been made, at the rate inserted by the Contractor in the Appendix to the TENDER and repeated where provision for such is made in a special item provided in the Bill of Quantities for such purpose.

(5) **Certification of Payments to Nominated Sub-Contractors.**

Before issuing, under Clause 60 hereof, any certificate, which includes any payment in respect of work done or goods, materials or services supplied by any nominated Sub-Contractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retentions included in the previous certificate in respect of the work or goods, materials or services of such nominated Sub-Contractor have been paid or discharged by the Contractor in default whereof unless the contractor shall:

(a) inform the Engineer in writing that he has reasonable cause for withholding or refusing to make such payments and

(b) produce to the Engineer reasonable proof that he has so informed such nominated Sub-Contractor in writing.

**Contractor in writing**

The Employer shall be entitled to pay to such nominated Sub-Contractor direct upon the certificate of the Engineer, all payments less retentions provided for in the Sub-Contractor which the Contractor has failed to make to such nominated Sub-Contractor and to deduct by way of set off the amount so paid by the Employer from any sums due or which may become due from the Employer to the Contractor. Provided always that, where the Engineer has certified and the Employer has paid direct as aforesaid, the Engineer shall in issuing any further certificate in favour of Contractor deduct from the amount thereof the amount so paid, direct as aforesaid but shall not withhold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

(6) **Assignment of Nominated Sub-Contractors Obligation**

In the event of the nominated Sub-Contractor as hereinbefore defined having undertaken towards the Contractor in respect of the work executed or the goods, materials or services supplied by such nominated Sub-Contractor, any continuing obligation extending for a period exceeding that of the period of Maintenance under the Contract the Contractor shall at any time after the expiration of Period of Maintenance assign to the Employer at the Employer's request and cost the benefit of such obligation for the un-expired duration thereof.

**CERTIFICATES AND PAYMENT**

(1) Unless otherwise provided payments shall be made at monthly intervals in accordance with the condition set out in Section in the Clause numbered 26.

(2) Where advances are to be made by the Employer to the Contractor in respect of Constructional plant and materials the conditions of payment and repayment shall be as set out in Section-3, Special conditions of contract.

(3) No certificate other than the Maintenance Certificate referred to in Clause 62 hereof shall be deemed to constitute approval of the Works.

(4) The Contract shall not be considered as completed until a Maintenance Certificate shall have been signed by the Engineer and delivered to the Employer stating that the works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer within twenty-eight days after expiration of the Period of Maintenance or if different periods of Maintenance shall become applicable to different sections or parts of the Works, the expiration of the latest such period, or as soon thereafter as any works ordered during such period pursuant to Clause 49 and 50 hereof shall have been completed to the satisfaction of the Engineer and full effect shall be
given to this Clause notwithstanding any previous entry on the works or the issue of the Maintenance Certificate shall not be a condition precedent to payments to the Contractor of the second portion of the retention money in accordance with the conditions set out in Section 3 in the Clause numbered 26.

(5) **Cessation of Employer’s Liability**

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the contract or the execution of works, unless the Contractor shall have made a claim in writing in respect thereof before the giving of the Maintenance Certificate under this Clause.

(6) **Unfulfilled Obligations**

Notwithstanding the issue of the Maintenance Certificate the Contractor and Subject to sub clause (2) of this Clause the Employer shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issue of the Maintenance Certificate which remain unperformed at the time such Certificate is issued and for the purpose of determining the nature and extent of any such obligation the Contract shall be deemed to remain in force between the parties hereof.

**61.0 REMEDIES AND POWERS**

**Default of Contractor**

(1) If the Contractor shall become bankrupt or have a receiving order made against him or shall present his petition in bankrupt or shall make an arrangement with or assignment in favour of his creditors or shall agree to carry out the Contract under committee of inspection of his creditors or, being a XXXXXXX shall go into liquidation (other than a voluntary liquidation for the purposes of amalgamation or reconstruction) on if the contract or shall assign the contract without the consent in writing of the Employer first obtained on shall have an execution device on his goods, or if the Engineer shall certify in writing to the Employer that in his opinion the Contractor.

(a) has abandoned the Contract, or

(b) without reasonable excuse has failed to commence the works or has suspended the progress of the Works for twenty-eight days after receiving from the Engineer written notice to proceed, or

I has failed to remove materials from the Site or to pull down and replace work for twenty eight days after receiving from the Engineer written notice that the said materials or work had been condemned and rejected by the Engineer under these conditions, or

(d) despite previous warning by the Engineer in writing is not executing the Works in accordance with the Contract or is persistently or flagrantly neglecting to carry out his obligations under the contract.

Or

(e) has to the detriment of good workmanship or in defiance of the Engineer’s instructions to the contrary sub-let any part of the Contract

Then the Employer may after giving fourteen days notice in writing to the Contractor enter upon the site and the Works and expel the Contractor there from without thereby voiding the Contract or releasing the Contractor from any of his obligations or liabilities under the Contract or affecting the rights and powers conferred on the Employer or the Engineer by the Contract and may himself complete the Works or may employ any other Contractor to complete the works. The Employer or such other contractor may use for such completion so much of the Construction plant, Temporary Works and materials, which have been deemed to be reserved exclusively for the execution of the Works under the provisions of the Contract as he or they may think proper and the Employer may at any time sell any of the said Constructional plant Temporary Works and unused materials and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to him from the Contractor under the Contract.
(2) **Valuation of Date of Forfeiture**

The Engineer shall as soon as may be practicable after any such entry and expulsion by the employer, fix and determine expert, or by or after reference to the parties or after such investigation or enquiries as he may think fit to make or institute, and shall certify what amount, if any, had at the time of such entry and expulsion been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract and the value of any of the said unused or partially used materials any Constructional Plant and any Temporary Works.

(3) **Payment after Forfeiture**

If the Employer shall enter and expel the Contractor under this Clause he shall not be liable to pay to the Contractor any money on account of the Contractor until the expiration of the Period of Maintenance and thereafter until the costs of execution and maintenance damages for delay in completion if any and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum or sums, if any, as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the Contractor on due completion by him then the Contractor shall upon demand pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

62.0 **Urgent Repairs**

If, by reason of any accident or failure or rather event occurring to in or in connection with the Works, or any part there of either during execution of the Works or during the Period of Maintenance any remedial or other work or repair shall in the opinion of the Engineer or the Engineer's Representative be urgently necessary for the safety of the Works and the Contractor is unable or unwilling at once to do such work or repair the Employer may employ and pay other persons to carry out such work or repair as the Engineer or the Engineer's Representative may consider necessary. If the work or repair so done by the Employer is work which in the opinion of the Engineer, the Contractor was liable to do at his own expense under the Contract all expenses Employer or may be deducted by the Employer from any Monies due or which may become due to the Contractor. Provided always that the Engineer or the Engineer’s Representative as the case may be shall as soon after the occurrence of any such emergency as may be reasonably practicable notify the Contractor thereof in writing.

63.0 **SPECIAL RISKS**

Notwithstanding anything in the Contract contained:

(1) The Contractor shall be under no liability whatsoever whether by way of indemnity or otherwise for or in respect of destruction of or damage to the Works save to work condemned under the provisions of Clause 39 hereof prior to the occurrence of any special risk hereinafter mentioned or to property whether of the Employer or third parties or for or in respect of injury or loss of life which is the consequence of any special risk as hereinafter defined. The Employer shall indemnify and save harmless the Contractor against and from the same and against and from all claims proceedings damages costs charges and expenses whatsoever arising there out or in connection therewith.

(2) If the works or any materials on or near or in transit to the Site, or any other property of the Contractor used or intended to be used for the purposes of the Works shall sustain destruction or damage by reason of any of the said special risks the Contractor shall be entitled to payment for:

   (a) any permanent work and for any materials so destroyed or damaged and so far as may be required by the Engineer or as may be necessary for the completion of the Works on the basis of cost plus such profit as the Engineer may certify to be reasonable.

   (b) replacing or making good any such destruction or damage to the Works.
I replacing or making good such materials or other property of the Contractor used or intended to be used for the purpose of the Works.

(3) Destruction damage, injury or loss of life caused by the explosion or impact whenever and wherever occurring of any mine bomb shell grenade or other projectile missile munitions or explosive of war shall be deemed to be consequence of the said special risks.

(4) The Employer shall repay to the Contractor any increased cost of reconstructing work condemned under the provisions of Clause 39 hereof prior to the occurrence of any special risk which is howsoever attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war but the Contractor shall as soon as any such increase of cost shall come to his knowledge forthwith notify the Engineer thereof in writing.

(5) The special risks as war hostilities (whether war be declared on not) invasion act of foreign enemies the nuclear any pressure waves risk described in Clause 20 (2) hereof on in so far as it relates to the country in which the works are being or are to be executed or maintained rebellion revolution in correction military or usurped power, civil war or unless solely restricted to the employees of the Contractor or of his Sub-Contractors and arising from the conduct of the Works of commotion or disorder.

(6) If during the currency of the Contract, there shall be an outbreak of war, whether war is declared or not, in any part of the Works which, whether financially or otherwise, material shall unless and until the Contract is terminated under the provisions of this Clause continue to use his best endeavors to complete the execution of the works. Provided always that the Employer shall be entitled at any time after such outbreak of war to terminate the Contract by giving written notice to the Contractor and upon such notice being given this contract shall except as to the rights of the parties under the Clause and to operation of Clause 67 hereof terminate but without prejudice to the rights of either party in respect of any antecedent breach.

(7) Removal of Plant on Termination

If the contract shall be terminated under the provisions of the last preceding sub clause, the contractor shall, with all reasonable dispatch remove from the Site all Constructional Plant and shall give similar facilities to his Sub-Contractors to do so.

(8) Payment if Contract Terminated

If the Contract shall be terminated as aforesaid the Contractor shall be paid by the Employer insofar as such amounts or items shall not have already been covered by payments on account made to the Contractor for all works executed prior to the date of termination at the rates and prices provides in the Contract and in addition:

(a) The amounts payable in respect of any preliminary items, so far as the work or service comprised therein has been carried out of performed and a proper proportion as certified by the Engineer of any such items, the work or service comprised in which has been partially carried out or performed.

(b) The cost of materials or goods reasonably ordered for the works which shall have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery, such materials or goods becoming the property of the Employer upon such payments being made by him.

I A sum to be certified by the Engineer being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the works insofar as such expenditure shall not have been covered by the payment in this sub Clause before mentioned

(d) Any additional sum payable under the provisions of sub clause (1) (2) and (4) of this clause.

(e) The reasonable cost of removal of Constructional Plant under sub clause (7) of this clause and if required by the Contractor return thereof the Contractor’s main plant yard in his country of registration or to other destination at no greater cost.
(f) Against any payments due from the Employer under this sub-clause the Employer shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of Constructional Plant and materials and any other sums which at the date of termination were recoverable by the Employer from the Contractor under the terms of the Contract.

64.0 **FRUSTRATION**

**Payment in Extend of Frustration**

If a war or other circumstances outside the control of both parties arises after the Contract is made so that either party is prevented from fulfilling contractual obligations or under the law governing the Contract the parties are released from further performance then the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as that which would have been payable under Clause 65 hereof if the Contract had been terminated under the provisions of Clause 65 hereof.

65.0 **SETTLEMENT OF DISPUTES**

**Settlement of Disputes Arbitration**

Except as otherwise provided in this contract all questions and disputes relating to the meaning of the specifications design, drawings and instructions herein before mention and as to think whatsoever, in any way, arising out of or relating to the contract, design, drawings, specifications, estimates, concerning the works, or the excavation or failure to exclude the same, whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the COMMISSIONER MUNICIPAL CORPORATION SINGRAULI shall give his written instructions and/or decisions within a period of 60 days of such request. This period can be extended by a mutual consent of the parties.

Upon receipt of written instructions or decisions, the parties shall promptly proceed without delay to comply such instructions or decisions. If the COMMISSIONER MUNICIPAL CORPORATION SINGRAULI fails to give his instructions or decisions in written within a period of 60 days or mutually agreed time after being requested or if the parties may within 60 days prefer and appeal to the Chief Engineer Directorate UADD Bhopal. Who shall afford an opportunities to the parties of being heard and to offer evidence in support of his appeal. The Chief Engineer Directorate UADD Bhopal will give his decision within 90 days. If any party is not satisfied with the decision of the Chief Engineer Directorate UADD Bhopal he can refer such dispute for arbitration to the M.P. Arbitrator Tribunal governed as per The MP MadhyasthaAbhikaranAdhiniyam, 1996

66.0 **NOTICES**

**Service of Notices on Contractor**

15 All certificates, notices or written orders to be given by the Employer or by the Engineer to the Contractor under the terms of the Contract shall be served by sending by registered post to or delivering the same to the Contractor’s principal place of business or such other address as the Contractor shall nominate for this purpose.

**Service of Notices on Employer or Engineer**

(2) All notices to be given to the Employer or to the Engineer under the terms of the Contract shall be served by sending by registered post or delivering the same to the respective address nominated for that purpose in Section-3 of these conditions.

**Special Conditions of Contract Change of Address**

(3) Either party may change a nominated address to another address in the country where the works are being executed by prior written notice to the other party and the Engineer may do so by prior written notice to both parties.

67.0 **DEFAULT OF EMPLOYER**

**Default of Employer**

(1) In the event of the Employer.
(a) failing to pay to the Contractor the amount due under any certificate of the engineer within thirty days after the same shall have become due under the terms of the Contract subject to any deduction that the Employer is entitled to make under the Contract.

(b) interfering with or obstructing or refusing any required approval to the issue of any such certificate or

I becoming bankrupt or being a company going into liquidation other than for the purpose of a scheme of reconstruction or amalgamation, or

(d) giving formal notice to the Contractor that for unforeseen reasons due to economic dislocation it is impossible for him to continue to meet his contractual obligations the Contractor shall be entitled to terminate his employment under the Contract after giving thirty days prior written notice to the Employer, with a copy to the Engineer.

(2) Upon the expiry of the thirty days notice referred to in sub-clause (1) of this Clause, the Contractor shall, notwithstanding, the provision of Clause 53 (1) hereof with all reasonable dispatch remove from the Site all Constructional Plant brought by him thereon.

(3) In the event of such termination the Employer shall be under the same obligations to the Contractor in regard to payment as if the contract had been terminated under the provisions of Clause 65 hereof.

68.0 LEGISLATION
Subsequent Legislation

15 If, after the publication of NIT and thirty days prior to the last date for submission of TENDERs for the works there occur changes to any national or State Statute, Ordinance, Decree or other Law or any regulation or bye-law of any local or other duly constituted authority or the introduction of any such State Statute, Ordinance, Degree, Law, regulation or bye-law which causes additional or reduced cost to the Contractor other than under sub clause (1) of this Clause in the execution of the works such additional or reduced cost shall be certified by the Engineer and shall be paid by or credited to the Employer and the Contract Price adjusted accordingly.
ANNEXURE - A
MODEL RULES RELATING TO LABOUR WATER SUPPLY AND SANITATION IN LABOUR CAMPS

NOTE: These model rules are intended primarily for labour camps which are not of a permanent nature. They lay down the minimum desirable standard which should be adhered to as standard for permanent or semi permanent labour camps and should not obviously be lower than those for temporary camps.

1. LOCATION:
The camp should be located in elevated and well drained ground in the locality.

2. Labour huts to be constructed for one family of 5 persons each. The lay out to be shown in the prescribed sketch.

3. HUTTING:
The huts to be built of local materials. Each hut should provide at least 20 sq. meters of living space.

4. SANITARY FACILITIES:
Latrines and Urinals shall be provided at least 16 meters away from the nearest quarters separately for men and women and specially so marked on it.

5. LATRINES:
Pit privies at the rate of 10 users or two families per seat, separate urinals as required & part can also be used for this purpose.

6. DRINKING WATER:
Adequate arrangements shall be made for the supply of drinking water. If practicable filtered and chlorinated supplies shall be arranged, when supplies are from intermittent sources covered storage tank shall be provided with a capacity of five liters a person per day. Where the supply is to be made from a well it shall conform to the sanitary standard laid down in the report of the Rural sanitation committee. The well should be at least 30 meters away from any latrines or other source of pollution. If possible hand pump should be installed for drawing the water from well. The well should be effectively disinfected once every month and the quality of the water should be got tested from the nearest Public Health Engg. Laboratory between each work of disinfections.

7. BATHING AND WASHING:
Separate bathing and washing places shall be provided for men and women for every 25 persons in the camp. There shall be one gap and space of 2 sq. meters for washing and bathing. Proper drainage for the water should be provided.

8. WASTE DISPOSAL:
Dustbin be provided at suitable places in camp and the residents shall be directed to throw all rubbish into those dustbins. The dustbins shall be provided with cover. The contents shall be removed every day and disposed off by trenching.

9. MEDICAL FACILITIES:
(a) Every camp where 1,000 or more persons reside shall be provided with whole time doctor and dispensary. If there are women in the camp a whole time nurse shall be employed.

(b) Every camp where less than 1,000 but more than 250 persons reside shall be provided with a dispensary and a part time nurse/mid wife.

a. If there are less than 250 persons in any camp a first aid kit shall be maintained in charge of whole time persons, trained in first aid.
b. All the medical facilities mentioned above shall be for all residents in the camp including dependent of the worker, if any free of cost.

10.0 **SANITARY STAFF:**

For such labour camp there should be qualified sanitary inspector and sweepers should be provided in the following scale:-

1. For camps with strength over 200 but not exceeding 500 persons one sweeper for every 75 persons above the first 200 for which 3 sweepers shall be provided.

2. For camps with a strength over 500 persons one sweeper for every 100 persons above first 500 for which 5 sweepers should be provided.

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**ANNEXURE: B**

**CONTRACT LABOUR REGULATION**

(a) The contractor shall pay not less than fair wages to labourers engaged by him in the work.

'Fair Wages' means wages whether for time or piece work as notified on the date of Inviting TENDERs and where such wages have not been so notified the wages prescribed by the Labour department for the division in which the works is done.

(b) The contractor shall, not with standing the provisions of any contract to the contrary, shall ensure the payment of fair-wage to laborers indirectly engaged on the work including any labour engaged by his sub contractors in connection with the said work as if laborers had been immediately employed by him.

(c) In respect of all labour directly or indirectly employed on the works or the performance of his contract, the contractor shall comply with or cause to be compiled with the labour Act in force.

(d) The Executive Engineer/Sub Divisional . shall have the right to deduct from the money due to the contractor any sum required or estimated to be required for making good the loss suffered by a workers by reason of non fulfillment of the conditions of the contract for the benefit of the workers non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of regulations.

(e) The contractor shall be primarily liable for all payments to be made under and for the observance of the regulations aforesaid without prejudice to his right to claim identify from his sub-contractors.

(f) The regulations aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

(g) The contractor shall obtain a valid license under the contract (regulations and Abolition) Act, in force and rules made there under by the competent authority from, time to time before commencement of work, and continue to have a valid license until the completion of the work.

Any failure to fulfill this requirement shall attract the penal provisions of this contract arising out of the resulted non-execution of the work assigned to the contractor.
ANNEXURE -G

SAFETY CODE

1. Scaffolding :

(i) Suitable scaffold should be provided for workman for all works that cannot safety be done from the grounds or from solid construction except such short period work as can be done safely from ladders. When a ladder is used extra Mazdoor shall be engaged for holding the ladder for carrying materials as well suitable foot holds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to (1/4 Horizontal and 1 Vertical).

(ii) Scaffolding or staging more than 3.5 M above ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly attached, bolted, braced or otherwise secured at least 1 meter high above the floor platform of such scaffolding or staging and extending along the entire length of the ends thereof with only such opening as may be necessary for the delivery of the materials. Such scaffolding or staging shall be fastened as to prevent it from swaying from the building of structure.

(iii) Working platform gangways and stairways should be so constructed that they should not sway unduly or unequally and if the platform of the Gangway or the stairway it more than 3.54 meter above ground level and or floor level they should be closely boarded, should have adequate width and should be suitably fenced as described (ii) above.

(iv) Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the falling of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 meter.

(v) Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable ladder shall be over 9 meter in length while the width between side rails in ring ladder shall be no case be less than 0.3 meter for ladder upto and including 3 meter length. For longer ladder this width should be increased at least 2 cm. for each additional meter of length. Uniform step spacing shall not exceeding 0.3 wt. Adequate precaution shall be taken to prevent danger from electrical equipment. No material on any of the work site shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall also provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit action or other precautions of law that may be brought by any person for injury sustained owing to neglect of the above and to pay any damages and costs which may be awarded in any such suit action or proceeding to any such person or which may with consent of the contractor be paid to compromise any claims by any such person.

2. Excavation and Trenching : All trenches 1.2 meter or more in depth, shall at all time be supplied with at least one ladder for each 30 meter in length of fraction thereof. Ladder shall be extended from bottom of the trench to at least 1 meter above the surface of the ground. The side of the trenches which are 1.5 meter or more in depth shall be stopped back to give suitable slopes or securely held by timber bracing so as to avoid the danger or sides to collapse. The excavated material shall not be placed within 1.5 meter of the edge of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.
3. **Demolition**: Before any demolition work is commenced and also during the process of the work -

(a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

(b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

(c) All precautionary steps shall be taken to prevent danger to persons employed from risk of fire or explosion of flooring. No floor roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

4. **Painting**: All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of person employed on the site and maintained in a condition suitable for adequate steps to ensure proper use of equipment by those concerned.

(a) Workers employed on mixing asphalting materials cement lime mortars shall be provided with protective footwear and protective goggles.

(b) Stone breakers shall be provided with protective goggles and protective clothing's, and seated at sufficiently safe intervals.

(c) Those engaged in welding works shall be provided with welder's protect.

(d) When workers are employed in sewers and manholes which are in use the contractors shall ensure that the manholes covers are open and are ventilated at least for an hour before the work shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.

(e) The contractor shall not employed man below the age of 18 and women on the work of painting with products containing lead in any form whenever men above the age of 18 are employed on the work of lead painting the following precaution should be taken:

(i) No paint containing lead or shall be used except in the form of paste or ready made paint.

(ii) Suitable face marks should be supplied for use by the workers when paint applied in the form of spray or a surface having lead paint dry rubble and scrapped.

(iii) Overhauls shall be applied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessations of work.

5. **Drawing**: When the work is done near any place where there is risk of drawing all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment for all injuries likely to be sustained during the course of the work.

6. **Machines**: Use of hoisting machines and tackle including their attachments anchorage and support shall conform to use the following standard or condition.
(a) These shall be good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.

(b) Every crane driver or hoisting appliances operator shall be properly qualified and no persons under an age of 21 years should in-charge of any hoisting machine including any scaffold which or give signals to the operator.

(c) In case of every hoisting machine and every chain ring lowering or as means of suspensions, the safe working load shall be ascertained by adequate means. Every hoisting machine and gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for load purpose of testing.

(d) In case of department machine the safe working and load shall be notified by the Electrical Engineer-in-Charge. As regards contractor machine the contractor shall notify the safe working load of the machine to the Engineer-in-Charge, whenever he brings any machinery to site of work and get verified by the Electrical Engineer concerned.

(e) Motors, gearing Transmission, Electric wiring and other dangerous parts of the hoisting appliance should be provided with efficient safe guards and with such means as well reduce the minimum of the risk of accidental descent of the load, adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load be coming accidentally displaced. When workers employed on Electrical installations which are already unregistered, insulating mats, wearing apparel such as gloves sleeves and boots as may be necessary should be provided, the workers should not wear rings, watches and carry keys, or other materials which are good conductors of electricity.

7. All scaffolds, ladders and their safety device mentioned or described herein shall be maintained in safe condition and no scaffold ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near places of work.

8. These safety provisions should be brought to the notice of all concerned by display on a Notice Board at prominent places at the work spot. The persons responsible for compliance of the safety code shall be named therein by the contractor.

9. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangement made by the contractor shall be open to inspection by the Labour., Engineer-in-Charge, or the Department or their representatives.

10. Notwithstanding the above clause (1) to (9) there is nothing in these to exempt the contractors to exclude the operations of any other act or rule in force in the Republic of India.
## List Of Key Equipments/ Machines For Quality Control Labs

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of Equipment/ Machinery</th>
<th>Quantity</th>
<th>Available with the Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digging tools like pick axe, shovel, etc.</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>IS Sieves Nos. with lid and pan (90 mm, 80 mm, 63 mm, 53 mm, 45 mm, 37.5 mm, 26.5 mm, 19 mm, 11.2 mm, 9.5 mm, 4.75 mm, 2.8 mm, 5.6 mm, 3.35 mm, 2.36 mm, 600 Micron, 425 Micron, 300 Micron, 150 Micron, 180 Micron, 90 Micron and 75 Micron)</td>
<td>ONE SET</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sand Pouring Cylinder with tray complete for field Density test</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Speedy moisture meter complete with chemicals</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Straight Edges 3.00 metre width</td>
<td>Two set</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Liquid Limit and plastic limit testing apparatus complete with water bottle and glass wares</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Electronic/digital balance 5 kg</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pan balance with weight box, 5 kg.</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Slump cone</td>
<td>Two no.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Concrete cube moulds (150 mm X 150mm)</td>
<td>Twelve no.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Free swelling index test</td>
<td>Six no.</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Apparatus</td>
<td>Quantity</td>
<td></td>
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<td>-----</td>
<td>---------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>Flakiness and elongation testing gauges</td>
<td>Two no.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Water absorption test apparatus</td>
<td>One no.</td>
<td></td>
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<tr>
<td>14</td>
<td>Specific gravity test apparatus</td>
<td>One no.</td>
<td></td>
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<tr>
<td>15</td>
<td>B.S. compaction apparatus</td>
<td>One no.</td>
<td></td>
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<tr>
<td>16</td>
<td>Proving rings</td>
<td>One each</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Glass ware</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Auto level and staff</td>
<td>Three nos.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Rapid moisture meter</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Post Hole Auger with extensions</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Measuring tape, spatula, glassware, porcelain dish, pestle mortar</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Standard Proctor Density Test Apparatus with rammer</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Electronic/digital balance 1 kg with the least count of 0.01 gm</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Camber Board</td>
<td>Two no.</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Core Cutter (10 cm dia) 10cm/15cm height complete with dolly and hummer.</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>CBR Testing machine</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Oven (ambient to 200°C)</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Digital Thermometers</td>
<td>Three no.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aggregate Soundness test apparatus</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Item</td>
<td>Quantity</td>
<td></td>
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<tr>
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<td></td>
</tr>
<tr>
<td>30</td>
<td>Concrete cube testing machine</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>First aid box</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Sampling Pipette</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Balance</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Dial Gauges</td>
<td>Six No.</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Thickness gauge</td>
<td>One set</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Water still (4 ft.)</td>
<td>One no.</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>A.I.V. testing equipment</td>
<td>One no.</td>
<td></td>
</tr>
</tbody>
</table>

The above list of essential equipment for quality control is for guidance and is not complete.

Other apparatus and equipment as desired/required by the Engineer-in-Charge shall be procured by the Contractor.
List Of Key Equipments/ Machines For Construction Work

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of Equipment/ Machinery</th>
<th>Quantity</th>
<th>Name of Equipment/ Machinery</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concrete weigh batch mixer</td>
<td>04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plate Vibrator</td>
<td>04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pin/Needle vibrator</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Concrete Lift</td>
<td>02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Welding machine</td>
<td>01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Excavator</td>
<td>04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Hydra Crane</td>
<td>04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Chain Pulley Block Set</td>
<td>06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Water Pump Sets</td>
<td>06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>DG Set(125 KVA)</td>
<td>01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Tractor with trolley</td>
<td>02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Digital Theodolite, Total Station</td>
<td>01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Auto level</td>
<td>02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above list of essential equipment for quality control is for guidance and is not complete. Other equipment as desired/required by the Engineer-in-Charge for timely completion shall be arranged by the Contractor.
1.0 GENERAL GUIDANCE AND RULES FOR CONTRACTORS

1.01 Contractors fulfilling the necessary eligibility criterion shall only be eligible to submit the TENDER.

1.02 TENDER must be submitted in online form for “Lump Sump Contract” duly filled and digitally signed in as per instruction contained in this TENDER notice and in the guideline which are attached with this NIT.

1.03 Lump sump TENDER shall be inclusive of all the items of works.

1.04 The lump sump rate should be expressed both in words and in figures. The Break-up Schedule for making RA bills payment is enclosed with this TENDER document.

1.05 The contractor shall have to make the desired and satisfactory arrangement from time to time for completion of work within time schedule. In case of labour strike or lock out or any such other matter at the work site or in his labour camp etc. the department shall not entertain any claim of the contractor whatsoever for closure, stoppage or delay or holding up etc. of the work and the contractor shall be liable for payment for item of work executed by him as per the approved billing breakup only as per contract agreement. It shall be clearly understood that no other claim, compensation or charges shall be liable to be considered for payment to the contractor due to any such reasons.

1.06 The rates quoted by the contractor should be firm without any escalation and shall not be altered by the contractor during the term of contract and no escalation charges etc. shall be payable at all what so ever conditions may be. The Rates shall be exclusive of excise duty, the certificate for the exemption of excise duty shall be provided to the Contractor by District Collector as per prevailing norms. EPI / OWNER shall extend all necessary help to get the certificate at the earliest.

1.07 No lead of water or any other material will be paid and the tendered amount should be inclusive of all lead and lift for all the material. Similarly no payment for dewatering shall be made. The contractor should himself verify the lead for different materials before submitting his TENDER.

1.08 TENDER of any contractor who proposes any addition or alteration to any of the condition laid down is liable to be rejected.

1.09 EPI reserves the right for accepting TENDER for the whole work or part of it or distributing the work between one or more BIDDERS.

1.10 Accepting authority does not bind itself to accept the lowest or any TENDER and may reject TENDERs without assigning any reasons thereof.

1.11 The general specification for the work shall be as per the following and shall be followed by the contractor in the order of priority as given below,


(ii) Relevant I.S. Specifications with upto date amendments.

(iii) Specifications as detailed under this contract and in the drawing etc.

(iv) Specifications as may be given in writing by the Engineer-in-charge from time to time.

(v) M.P. P.H.E.D. Specification with upto date amendments.


(Nothing As per to above shall however curtail the right of the Engineer-in-charge to alter the specification for any part or whole of the work, if he considered it...
necessary in the interest of the work, on all matters where there is difference of opinion between the contractors and the EPI. EPI’s decision will be final conclusive and binding to the contractor.

1.12 Specifications and schedule of works minutes and decision of Pre Tender meeting amendments short NIT/ detail NIT and after negotiation etc will also form part of the agreement.

1.13 Not more than one TENDER shall be submitted by a contractor or by a firm of contractor.

1.14 No two or more concerns in which an individual is inducted as proprietor and/or a partner shall TENDER for the same work. If they do so, all such TENDERs are liable to be rejected.

2.0 SPECIFICATION :

2.01 General
As provided in Technical Specifications (Vol-II Sl.no.3)

2.02 Materials of Construction :
All works pertaining to the TENDER shall be executed in accordance with standard specification of MP Government Works Deptt. and I.S. code of Practice. The I.S.S. will be given preference in case there is difference in MP Govt. standard specifications and I.S.S. code of practice.

2.03 Workmanship :
The work shall be carried out according to the specification referred to herein after and according to sound Engineering practice. The decision of the EPI in respect of workmanship shall be final. The contractor will be bound to carry out dewatering found necessary and his lumpsum rates should be inclusive of it. No payment will be made for dewatering or any other work connected with it.

2.04 Concrete :
All concrete work shall be carried out as per provision of IS: 456-2000 with up to date amendments. All concrete shall be mixed in concrete mixer and compacted by mechanical vibrators. Slump tests shall be carried out during concreting and samples test cubes prepared and tested in the due course. The testing will be carried out by the department. The results of the test shall confirm with the required standard and if the Engineer in-charge consider that the structural test is necessary the same shall be carried out as instructed by the EPI/Owner at contractor's expense and if the results of this be unsatisfactory the contractor will be bound to dismantle and reconstruct the particular portion which has given unsatisfactory test result.

2.05 Timber :
All timbers used for wood work must be properly seasoned.

2.06 Materials used on the Civil Work :
All materials should be of a quality approved by EPI/Owner. Rejected materials should be removed from the site immediately at the cost of the contractor.

2.07 Tests :
All structures will have to be tested for stability the testing shall be arranged by the contractor at his own cost, it will be the responsibility of the contractor that the structure does not leak during the period of first rainy season after its completion and he will make good the same and repair defective work at his own cost.

3.0 MISCELLANEOUS CONDITIONS :
3.01 **Subletting:**
The contractor shall not, assign to any other party/parties the whole or any portion of the work under the contract.

3.02 **Taxes:**
All dues regarding taxes including Income Tax, Sales Tax, Octroi duties, etc. levied on the contractor's work by Government and local bodies or private individuals will be payable by the contractors. The department will grant a certificate for the quantities actually used on the work, but will not entertain any claim on this account. 1% KarmkarKalyanUpkar shall also be levied on all the payments.

3.03 The royalty charges for extracting minor minerals for Government work will be paid on the contractor(s) to the Collector as per rules, and the amount so paid can be refunded by the Collector according to the procedure prescribed on production of certificate from the Executive Engineer of Owner, to the effect the minor minerals extracted by the contractor have been utilized for Government work, provided if the Rules so permit. For extra minerals if any extracted by the Contractor he shall be directly responsible to the Collector, reservation of quarry sites shall not be the responsibilities of the department.

3.04 **Rules of Labour Camp:**
The contractor will be bound to follow the Madhya Pradesh Model rules relating to layout for water supply and sanitation in labour camps (vide Annexure 'A' in SCC-I) and the provisions of the National Building Code of India, latest addition in regard to constructional practice and safety.

3.05 **Fair Wages:**
The contractor shall pay not less than fair wages to labourers engaged by him on the works (copy of rules enclosed vide Annexure 'B' in SCC-I).

3.06 **Work in the vicinity:**
The Executive Engineer reserves the right to take up departmentally or to award works on contract, in the vicinity without prejudice to the terms of contract.

3.07 **Best Quality of Quarries Materials:**
If in a quarry, materials of more than one quality if found the materials of the best quality will be used as approved by the Executive Engineer.

3.08 **Removal of Undesired Persons:**
The contractor shall on receipt of the requisition from the Executive Engineer, at once remove any person employed by him on the work who, in the opinion of the Executive Engineer is unsuitable or undesirable.

3.09 **Amount due from Contractor:**
Any amount due to EPI / OWNER from the contractor on any account of the concerning work, may be recovered from him as an arrears of land revenue.

3.10 **Tools and Plants:**
The contractor shall arrange/at his own cost all tools and plants required for the proper execution of the work.

3.11 **Right to Increase/Decrease:**
The competent authority reserves the right to increase or decrease any item or work during the currency of the contract and the contractor will be bound to comply with the order of the competent authority without any claim for compensation.

3.12 **Time Schedule:**
The work shall be done by the contractor according to the time schedule issued by the competent authority.

3.13 **Time of Contract:**
Time allowed for carrying out the work as entered in the NIT shall be strictly observed by the contractor and shall be reckoned from the date of issue of work order to commence the work.

3.14 **Payment by cheque:**

The payment will be made by crossed account payee cheques only. No bank commission charges for realizing such payments, will be done by the department. Contractor have to submit report of labour engaged to local employment office and copy of the same attached with the bill failing which no payment will be made to the contractor.

3.15 Every contractor who employed on any day of the proceeding 12 months 20 or more workers on contract work is required to obtain license from licensing . of the area concerned as per provision obtained under sub section 4'B' of Section -II of the contract labour regulation and abolition of 1970, as per provision contained in Section -12 of the Act. No contractor shall execute any contract work without obtaining license. The technical staff shall be as per follows,

1. An Engineer or Sub Engineer may look after more than one work in the same locality but the total value of such works under him should not exceed Rs. 20.00 lakhs in the case of Engineer and 5 lakhs in the case of Sub-Engineer.

2. It is not necessary for the contractor or partner in case of firm/company who is himself an Engineer/Sub Engineer for the Supervision of the work so long as the contractor/partner does work similar to what should have been done by an employed Engineer/Sub Engineer.

3. The required retired Engineer/Executive Engineer who is holding Diploma may be treated as per with the Graduate Engineer, for the operation of the above clause.

   In case the contractor fails to employ the Technical staff as aforesaid, he shall be liable to pay to the Government a sum of Rs. 1,000/- (Rs. one thousand) only for each month of default in the case of Graduate Engineer and Rs. 500/- (Rs. five hundred) only for each month of default on the case of Diploma Sub Engineer.

   contravention of above is punishable and contractor is liable to be prosecuted.

3.16 The successful BIDDER is liable to produce license as and when demanded by the Executive Engineer obtained from the labour department as laid down in chapter -IV of contractor labour (Regulation and Abolition), Act, 1970.

4.0 **TRANSPORTATION OF MATERIALS:**

The contractor shall make his own arrangements for transportation, handling and storage of all materials to be used for the execution of the job. The EPI / OWNERis not bound to arrange for storage/transportation of any materials though all possible assistance by way of recommendations will be given if it is found necessary in the opinion of the Engineer-In-charge. However, if it proves in-effective the contractor shall have no claim for any compensation on that account.

5.0 **INTERIM PROGRESS :**

The work shall be carried out by the contractor strictly as per the approved time schedule. Construction schedule in the form of the bar chart shall form part of the contract. In the event of unsatisfactory progress penalty up to 1/2 percent of the cost of balance work shall be imposed in addition to liquidated damages and penalty as per the relevant clause of the agreement. The interim progress shall be reviewed every fortnight. However, suitable extension of time shall be allowed to the contractor for delays on account of reasons beyond his control.

6.0 A third party inspection shall be conducted once in every three months during the concurrence of works for certifying the quality of works executed/to be executed in the contract. The authority of inspection shall be approved by Owner. The expenses for the said inspection shall be borne by Contractor.
7.0 SPECIAL CONDITIONS:
The special conditions are supplementary conditions to the TENDER and shall form the part of the contract.

1.1 It shall be the responsibility of BIDDER to co-ordinate with traffic authority, Railways, MPRDC, EPI / OWNER, M.P. Electricity Board, Telephone authority and concerned Public Health Engineering, Water resource Department for obtaining necessary permissions, shift of existing pipe line, sewer line, cable etc. as may be required for the due fulfillment of the obligations under this contract. Necessary assistance from the organization shall be rendered for seeking required permissions from different authorities but it shall be the primary responsibility of the contractor/firm to obtain the permissions. If as a result of excavation of trenches the underground services such as water main electric telephones cable, sewer lines become naked and unsupported it shall be the responsibility of the contractor to make suitable and necessary arrangement as per direction of the Engineer-in-Charge for their protection and no extra payment on this account will be made to the contractor. Any damages caused to the above mentioned underground services due to negligence of the contractor or otherwise the same shall be made good by the contractor at his own cost.

1.2 The BIDDER shall be responsible for safety of labour public property and is expected to take due precautions required under the law to safeguard accidents and to provide safety conditions such as red lanterns with caution board barricading providing pedestrian crossing etc. In case of any damages to property or labour the BIDDER shall be responsible to pay compensation as may be decided by appropriate authority/Court of law.

1.3 The contractor shall have to make his own arrangement for labour and its hutment. If any government land is available near by the work site, it may be allotted to the contractor for putting up the labour camp and stores etc. with the permission of government department but on completion of the work the labour camp should be removed immediately by the contractor failing to do so, the organization will dismantle the same at the risk and cost of the contractor and the dismantled material will become the property of this organization for which the contractor shall have no legal claim.

1.4 The contractor shall be responsible for any defect in the work for a period of 12 months after completion of the work and testing (after maintenance). In case of any defect coming to the notice within this period the same shall be made good by the contractor at his own cost and no extra claim shall be entertained. If necessary the contractor shall uncover the earth and expose the work at his cost where any damage may be suspected to have occurred. Contractor shall also be responsible for the continuous watch and ward of work executed during the execution of work and till the works handed over to the organization in case of any theft or damage he shall replace the same at his own cost. He shall be solely responsible for any kind of accident before handing over the TENDERed work to the organization.

1.5 The BIDDERs are required to take contingency of all the above conditions while quoting the rates of all items involved in the works.

2.0 Materials for permanent works
2.1 The Contractor shall be entitled to such sum as the Engineer may consider proper in respect of materials intended for but not yet incorporated in the Permanent works provided that:
   (a) the materials are in accordance with the Specification for the Permanent Works. The construction materials should be got tested in authorized testing laboratory as per special conditions attached for Mandatory tests.
   (b) Such materials have been delivered to Site, and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer.
The Contractor’s records of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer.

(d) The Contractor shall submit with his monthly statement the estimated value of the materials on Site together with such documents as may be required by the Engineer for the purpose of valuation of the materials and providing evidence of ownership and payment therefore:

(e) Ownership of such materials shall be deemed to vest in the Employer. And

(f) The sum payable for such materials on Site shall not exceed 75 percent of the
   (i) ex-factory/ex-warehouse price of locally manufactured materials or
   (ii) stockpile value of locally produced materials such as Bricks Sand Aggregates and Crushed Stone etc.

3.0 Accuracy of Lines, Levels and Grades

3.1 The various works shall be done true to line, level and grade. The periodical checking of these by the Engineer or Engineer's representative shall not absolve the Contractor of his responsibility regarding their accuracy. In case of any deviation or discrepancy in line, level or grade at the meeting faces, the contractor shall make good the discrepancy at his own cost and without any compensation for the additional work if any involved. Whenever such a discrepancy is found to arise at the junction of works being carried out by different Contractors the responsibility to set right their respective discrepancies shall be fixed by the Engineer whose decision shall be final and binding on the Contractors concerned. Engineer shall further have the unquestioned right if need be to rectify the discrepancies and recover the cost from the Contractor or Contractors according to proportions as he may consider reasonable.

3.2 The details of location and the nearest permanent bench marks. Reference Grid Marks shall be obtained by the Contractor in writing from the Engineer. Temporary bench mark for day to day use shall be fixed with reference to above permanent bench marks with double leveling. The Grid Co-ordinates and its references may be obtained from the Engineer.

4.0 Arrangements of Water and Electric Power

Arrangement for water and electric power required by the Contractor for the works shall be made by him at his own cost. Employer will however recommend to the State Electricity Board for giving the connection and power to the Contractor. However the Employer will bear no responsibility in this respect.

5.0 Measures for Prevention of Fire

5.1 The Contractor shall not set fire to any standing Jungle, trees, brush wood or grass without a written permission from the Engineer.

5.2 When such permission is given and also in all cases when destroying out of dug trees, brush wood, grass etc. by fire, the Contractor shall take necessary measures to prevent such fire spreading to or otherwise damaging surrounding property.

5.3 Any damage caused by the spreading of such fire, whether in or beyond limits of the Employer’s property, the amount of the damage shall be recovered by the Engineer from the Contractor’s Bills as damages or deducted by any other duly authorized . from any sums that may be due or become due from the Employer to the Contractor under the contract otherwise.

5.4 The Contractor shall bear the expenses of defending any action or law proceedings that may be brought by any person by injury sustained owing to neglect of precautions to prevent the spread of fire and shall pay any damage and cost that may be awarded in consequence.

6.0 Deployment of Departmental Machinery and Equipment by the Contractor

The Contractor shall himself procure and employ his own machinery and equipment for the work under contract with him. Only in exceptional circumstances if in the opinion of Engineer at any stage of the contract it becomes necessary to employ departmental machinery and equipments
on the work of the Contractor for any reason whatsoever the Engineer may order for the employment of departmental machinery and equipment under his orders and the rates to be charged for the use of machinery and equipment of the Department by the Contractor shall be according to the rates approved by the competent authority and Contractor will have to tender by his orders.

7.0 **Rectifying or Replacing Defective Work**

All work not conforming to the specifications shall be demolished and replaced or rectified by the Contractor at his own cost as may be ordered by the Engineer.

8.0 **Conversion of Units**

Whenever in the contract agreement dimensions and units have been expressed in FPS system, the same will be converted into Metric system units by applying the standard conversion table of Indian Standard Institution so as to arrive at the corresponding figures arithmetically and the Contractor will have to accepted the figures so derived without any claim or compensation whatsoever.

9.0 **Climatic Conditions**

The Engineer may order the Contractor to suspend any work that may be subject to damage by climatic conditions and no claim of the Contractor will be entertained by the Employer on this account.

10.0 **Damage to Works**

The work whether fully completed or incomplete all materials, machineries, plats, tools temporary buildings and other things connected therewith shall remain on the risk and in the sole charge of the Contractor until the complete work has been delivered to the Engineer and till completion certificate has been issued by the Engineer. Until such delivery of the completed work the Contractor shall at his own cost take all precautions reasonably necessary to keep all aforesaid works materials machineries plants, temporary buildings and other things connected therewith free from any losses or damages and in event of the same or any part thereof being lost or damaged, he shall forthwith reinstate and make good such loss or damage at his own cost.

11.0 **Works inter-related with Progress on other Jobs.**

The contractor shall not be entitled to any compensation for any delay in the execution of related items of work to be executed by the Department or under other contracts. The short fall in the progress of work that may occur due to such contingencies shall have to be made up by the Contractor by deploying additional resources so as to ensure that the work under the contract is completed within the prescribed time.

12.0 **Site Order Book**

A site order book shall be kept at the Employer’s office on the site of the work. As far as possible all orders regarding the works are to be entered in this book. All entries therein shall be signed by the Engineer on his representative and the contractor or his authorized representative. In important cases the Engineer will countersign the entries which have been made. The site order book shall not be removed from the work site except with written permission of the Engineer and the Contractor or his representative shall be bound to take note of all instructions and directions meant for the Contractor as entered in the site order book without having to be called on separately to note them. The Engineer shall submit periodically copies of the remarks in the site order book to the Employer for record and to the contractor for submitting compliance report.

13.0 **Foundations Depth/Levels.**

The drawings indicate the general foundation levels to be adopted for the different conditions of the structures. During execution these levels may be modified to suit the site conditions. The Contractor shall not be liable to any compensation for any minor
delays on this account. However this may be considered for granting suitable extension in the completion period if necessitated by such events.

14.0 *Approach Road*

Necessary haul road and roads to watch sources and quarries connected with the work shall be satisfactorily constructed and maintained by the Contractor at his own cost.

15.0...... *Construction Programme*

The Contractor shall submit within two weeks of receipt of notice to proceed with the work the programme for construction of the work allotted to him and the machinery to be engaged by him for the performance of the contract in conformity with clause 14 of General Conditions of Contract. The Construction Programme shall be in such form and details to properly show the sequence of operations and period of time required for completion of the work under each item of the Schedule within the frame work of his Construction Programme.

16.0 *Interference with Work of Other Agency.*

The Contractor must not interfere with the work of other Contractors, who may be employed simultaneously or otherwise by the Employer.

17.0 *Regulation and Bye-Lanes*

The contractor shall conform to the regulations, bye laws or any other statutory rules made by any local authorities or by the Government and shall protect and indemnify the Employer against any claims or liability arising from or based on the violations of any such laws, ordinance, regulations, orders and decrees etc.

18.0 *Contractor to use Excavated Hard Rock*

All useful materials like hard rock etc. excavated by the Contractor at site shall be the property of Employer and shall be issued to the Contractor at the issue rate of Rs. 45/- per cum. It shall be binding on the Contractor to use it as rubble, metal aggregate etc. after breaking into the required size for concrete work and as directed by the Engineer.

19.0 *Income Tax*

During the course of contract period, deductions of Income Tax shall be made at the prevailing rate of Department of Income Tax Government of India and as revised from time to time as per the advice of Income Tax authorities.

20.0 *Supply and Arrangement of Materials*

(1) The contractor shall make his own arrangement for supply of materials including cement and steel. The contractor shall be responsible for all transportation and storage of the materials at site and shall bear all the related costs. The Engineer shall be entitled at any time to inspect or examine all such materials. The contractor shall provide reasonable assistance for such inspection or examination as may be required.

(2) The contractor shall keep an accurate record of use of materials like cement and steel used in the works in a manner prescribed by the Engineers.

21.0 *Cement*

(a) The Contractor shall stock his requirement so as to ensure utilization of cement within 60 days but in no case later than 90 days Cement older than the period aforesaid shall not be used on any work except with the written permission of the Engineer, and after satisfactorily passing such lest as he may specify. The Contractor shall forthwith remove from the work such cement that Engineer has not allowed. The final disposal of such cement shall comply with the rules in force at the time and as the Engineer may approve

(b) Large stocks of cement shall not be kept at the works but only sufficient quantities shall be kept to assure continuity of the work. The Contractor shall provided and maintain efficient water proof storage sheds for cement on the site of work. It shall be stacked on
the platform 30 cms. Above the floor level and shall be covered with tarpaulin or any other impervious covering materials in order to protect the cement bags from moisture. The cement shall be neatly stacked in an orderly manner so as to allow an easy access and count. The arrangement of storage and utilization shall be such as to ensure the utilization of cement in the order of its arrival at the stores and the Contractor shall maintain satisfactory records which would at any time show the date of receipt and proposed utilization of cement laying in the stores at site.

The Engineer shall at all time have access to the stores at sites of the Contractor. He shall have authority to check and examine the method of storage, record accounting and security provided by the Contractor. The Contractor shall comply with instructions that may be issued by the Engineer in this connection. The Contractor shall further at all times satisfy the Engineer on demand and by the production of records and books or submission of returns and proforma or by other proofs that may be demanded that the cement brought from the approved manufacturer with date of receipt & consumption etc. The Contractor shall at all times keep his records up to date to enable the Engineer to apply such checks as he may desire to impose.

The contractor shall provide a double locking arrangement to the store the key of one of the locks being with the Engineer or his representative at site. The Engineer or his authorized agent will have the authority to verify the stocks and check the consumption in any manner he thinks proper.

22.0 Certificates and Payments Interim Payment Certificate

22.1 The Contractor shall submit and application for interim payment in three copies to the Engineer at the end of each month in a form approved by the Engineer. The application shall include the following items as applicable which shall be taken into account in the sequence listed:

(i) the estimated contract value in Rupees of the Permanent Works executed up to the end of the month in question, obtained by applying the base unit rates and prices in the Bill of Quantities to the quantities measured by the Engineer pursuant to Clause 56 of General Condition of Contract.

(ii) the estimated contract value of the Permanent Works obtained as in (i) above, executed up to the end of the previous month;

(iii) the estimated contract value at base unit rates and prices, expressed in Rupees of the Permanent Works for the month in question obtained by deducting (ii) from (i).

(iv) an amount reflecting any changes in cot and legislation pursuant to Clause 28 of Special Conditions of Contract.

(v) amounts approved in respect of Day work executed up to the end of the month in question less amounts for Day work certified in the previous Interim Payment Certificate and amounts, if any, reflecting the changes in cost and legislation pursuant to clause 28 of Special Conditions of Contract;

(vi) any amount to be withheld under the retention provisions of clause 26 of Special Conditions of Contract determined by applying the percentage set forth in sub-clause 26.1 hereafter to the sum of the amounts under sub paragraphs (iii) and (v)

(vii) any credit on debit for the month in question in respect of materials on Site intended for but not yet incorporated in the Permanent Works in the amount and under the conditions set forth in clause 1 here before.

(viii) any amount to be deducted on account of the Advance Loan repayment under the provisions set forth in clause 23 hereof.

(ix) any other sum to which the Contractor may be entitled under the Contract.

22.2 Within 30 days of receipt of the said application for interim payment, it shall be approved or amended such that, in the Engineer’s opinion the certificate reflects the amount due to
the Contractor in accordance with the Contract. In cases where there is a difference of
opinion as to the value of any item the EIC view shall prevail. When the EIC has
determined the amount due to the Contractor he shall issue to the Employer and the
Contractor a certificate hereinafter called “Interim Payment Certificate” certifying the
amount due to the Contractor.

22.3 No Interim Payment Certificate shall be issued for a sum less than ((equivalent) 2%
(two) of the contract amount.

23.0 Security Deposit

23.1. A retention money amounting to 5 percent of the amount included in any monthly Interim
Payment Certificate pursuant to clause 26 hereof due to the Contractor on account of Permanent
Works executed by him shall be made by the Engineer in the first and following Certificate until
such time as the cumulative total of such deductions (herein referred to as the Security Deposit)
shall amount to 5 percent of the Contract Price named in the letter of Acceptance.

24.0 Corrections

The Engineer may by any Interim Payment Certificate make any corrections or
modifications in any previous Certificate (other than one purporting to be a Final
Payment Certificate) which shall have been issued by him and shall have power to
modify or withhold any Interim Payment Certificate if the Works or any part hereof are
not being carried out to his satisfaction.

25.0. Final Account and Final Certificate

25.1 Not later than 3 months after the date of issue of the Maintenance Certificate the
Contractor shall submit a draft statement of Final Account and supporting documentation
to the Engineer showing in detail the value of the work done in accordance with the
Contract together with all further sums which the Contractor considers to be due to him
under the Contract up to the date of the Maintenance Certificate (hereinafter called the
“Contractor’s Draft Final Account”)

25.2 Within 3 months after receipt of the Contractor’s Draft Final Account and of all
information reasonably required for its verification the Engineer shall determine the value
of all matters to which the Contractor is entitled under the Contract. The Engineer shall
then issue to the Employer and the Contractor a statement (hereinafter called the
“Engineer’s Draft Final Account” showing the final amount to which the Contractor is
entitled under the Contract. The Employer and Contractor shall sign the Engineer’s Draft
Final Account as an acknowledgement of the full and final value of the Work performed
under the Contract and shall promptly submit a signed copy thereof called the “Final
Account” to the Engineer.

25.3 On receipt of the Final Account the Engineer shall promptly prepare and issue to the Employer
and the Contractor a Final Payment Certificate certifying any further monies due to the Contractor
in respect of the Contract. The Employer shall then make such payment as certified by the
Engineer to the Contractor within a reasonable period of time.

26.0 Special Condition Regarding Conditional TENDER

The BIDDER will have to give an undertaking with the instrument of Earnest Money to
the effect that there are no conditions in the TENDER and if any conditions are found the
same shall be ignored.

If such an undertaking is not found with the Earnest Money the TENDER will not be
opened and not taken into consideration. However in case the contractor gives such an
undertaking at the time of opening of TENDER the same may be considered.

27.0 The Contractor (s) is/are to provide everything of every sort and kind (with the exception
noted in the schedule attached) which may be necessary and requisite for the due and
proper execution of the several works including in the contract according to the true
intent and meaning of the drawings and specification taken together, which are to be
signed by the EPI / OWNER(hereinafter called the Authority and the contractor(s)
whether the same may be or may not be particularly described in the specification or shown on the drawings, provided that the same are reasonable and obviously to be inferred therefrom and in case of any discrepancy between the drawings and the specification the Authority is to be decide which shall be followed.

28.0 The contractor(s) is/are to set out the whole of the works in conjunction with an. to be deputed by the EPI/Owner and during the progress of the works the amount on the requisition of the EPI/Owner any errors which may arise therein and provide all the necessary labour and materials for so doing. The contractor(s) is/are to provide all plant, labour and materials with the exceptions noted in the scheduled attached, which may be necessary and required for the work. All materials and workmanship are to be the best of their respective kinds. The contractor(s) is/are to leave to works in all respects clean and perfect and the completion thereof.

29.0 Complete copies of the drawings and specifications signed by the Owner are to be furnished by him to the contractor(s) for his/their own use and the same or copies thereof are to be kept on site in-charge of the contractor(s) agent who is to be constantly kept on the site by the contractor(s) and to whom the instructions can be given by the EPI/Owner. The contractor(s) is/are not to sublet the works or any part thereof without the consent in writing of EPI/Owner.

30.0 EPI/Owner is to have at all times access to the works which are to be entirely under his control. He may require the contractor(s) to dismiss any person in the contractor(s) employ upon the works who may be incompetent or misconduct himself and the contractor(s) is/are forthwith to comply with such requirement.

31.0 The contractor(s) is/are not to vary or deviate from drawings or specifications or execute any extra work of any kind whatsoever unless upon the authority of EPI/Owner to be sufficiently shown by any order in writing by any plan or drawings expressly given and signed by him as an extra or variation or by any subsequent written approval signed by him. In cases of daily labour all vouchers for the same are to be delivered to the Executive Engineer or the. In-charge at least during the week following that in which the work may have been done and only such day work is to be allowed for as such as may have been authorized by EPI/Owner to be so done unless the work cannot from its character be properly measured and valued.

32.0 Any authority given by the EPI/Owner for any alterations or additions in or to work is not to violate the contract but all additions, omissions or variations made in carrying out the works are to be measured and valued and certified by the EPI / OWNER and added to or deducted from the amount of the contract, as the case may be, at rates in forces in the Works Department, in such cases in which rates do not exist, EPI / OWNER, will fix the rates to be paid.

33.0 All work and materials brought and left upon the ground by the contractor(s) or his/their orders for the purpose of forming part of the works are to be considered to be the property of EPI / OWNER of EPI / OWNER and the same are not to be removed or taken away by the Contractor(s) or any other person without the special license and consent in writing of EPI / OWNER but EPI / OWNER is not be in any way answerable for any loss or damage which may happen to or in respect of any such work or materials either by the same being lost or stolen or injured by weather or otherwise.

34.0 The Executive Engineer in charge of this work or EPI / OWNER shall have full power to require the removal from the premises of all materials which in his opinion are not in accordance with the specification and in case of default EPI / OWNER is to be at liberty to employ other persons to remove the same without being answerable or accountable for any loss or damage that may happen or arise to such materials. The Executive Engineer is also to have full power to require other proper materials to be substituted and in case of default EPI / OWNER may cause the same to be supplied and all costs which may attend such removal and substitution are to be borne by the contractor(s).

35.0 If in the opinion of EPI / OWNER any of the works are executed with improper materials or defective workmanship, the contractor(s) is/are when required by EPI / OWNER
forthwith to re-execute the same and to substitute proper materials and workmanship
and in case of default of the contractors in so doing within a week EPI / OWNER is to
have full power to employ other persons to re-execute the work and the cost thereof
shall be borne by the contractor(s).

36.0 Any defects, shrinkage or other faults which may appear within twelve months from the
completion of the works arising out of defective or improper materials or workmanship are upon
the direction of the Executive Engineer to be amended and made good by the Contractors at
his/their own cost unless EPI / OWNER shall decide that he/they ought to be paid for the same
and in case of default the EPI / OWNER may recover from the contractor(s) the cost of making
good the works.

37.0 From the commencement of the works to the completion of the same, they are to be
under the contractor(s) charge. The contractor(s) is/are to be held responsible for and to
make good all injuries, damages and repairs occasioned or rendered necessary to the
same by fire or other causes and they are to hold the EPI / OWNER harmless from any
claim for injuries to persons or for structural damage to property happening from any
neglect, default, want of proper care or misconduct on the part of the contractor(s) or of
any one in his/their employ during the execution of the works.

38.0 EPI / OWNER to be have full powers to send workmen upon the premises to execute
fitting and other works not included in the contract for whose operations the contractor(s)
is/are to afford every reasonable facility during ordinary working hours, provided that
such operations shall be carried on in such a manner as not to impede the progress of
the work included in the contract but the contractor(s) is/are not to be responsible for any
damage which may happen to or to be occasioned by any such fittings or other works.

39.0 The works comprised in this TENDER are to be commenced immediately upon receipt of
the order of commencement given in writing by EPI / OWNER when possession of the
site can be had. The whole work including all such additions and variations as aforesaid
(but excluding such, if any, as may have been postponed by an order from EPI / OWNER)
shall be completed in every respect within completion period and if from any
case what so ever other than willful obstruction or default on the part of EPI / OWNER Ml
or his staff and except as hereinafter provided in the whole of such work shall not be
finished to the satisfaction of EPI / OWNER within the said period, the contractor(s) shall
forfeit to the EPI / OWNER from his/their security deposit by way of ascertained and
liquidated damages for each default and not by way of penalty and the sum of Rs. 20000
per day for every complete day of such default. Provided that the entire amount of
damages to be forfeited under the provisions of this clause shall not exceed five percent
of the estimated value of the whole work as shown in the TENDER.

Provided never the less that if the contractor(s) shall be of the opinion that he is/they are entitled
to any extension of time on account of the works being altered, varied or added to or an account
of any delay by reason of any increment whether or cause not under the control of the
contractor(s) in consequence of orders to that effect from EPI / OWNER himself which orders EPI / OWNER is to hereby empowered to give them in cases any or either of such cases it shall be
competent for EPI / OWNER by an order in writing to extend the aforesaid period for final
completion by such period or periods, as he shall deem reasonable and the contractor(s) is/are to
complete the works within such extended period or periods as aforesaid. Provided that the
contractor(s) shall not be entitled to any extension of time unless he/they within three days after
the happening of the event in respect of which he/they shall consider himself/themselves entitled
to any extension given to EPI / OWNER written notice of such claim to any extension of time and
of the ground or grounds and of the amount thereof unless in any cases EPI / OWNER shall in his
discretion dispense with such notice and certify for an extension of time. Never-the-less and in
case of any extension of time, the aforesaid provisions with amount for damage in default of due
completion shall apply in case of non-completion of the works within the extended time. Provided
that the contractor(s) shall not be entitled to any extension of time in respect of the extra work
involved in the extra depth of foundation mentioned in clause 5.
40.0 If the contractor(s) shall become bankrupt or compound with or make any assignment for the benefit of his/their creditors or shall suspend or delay the performance of his/their part of the contract (except on account of causes mentioned in clause 13 or in consequence of not having proper instructions, for which the contractor(s) shall have duly applied), EPI / OWNER may give to the contractor(s) or his/their assignees or trustee, as the case may be, notice requiring the work to be proceeded with & in case of default on the part of the contractor(s) or his/their assignees or trustee for a total period of seven days, it shall be lawful for EPI / OWNER to enter upon and take possession of the work and employ any other person or persons to carry on and complete the same and to authorize him or them to use the plant, materials and property of the contractor(s) upon the works and the costs and the charges incurred in any way in carrying on and completing the said works are to be paid EPI / OWNER by the contractor(s). EPI / OWNER shall be final authority to determine the amount spend to complete the unfinished work. The certificate of EPI / OWNER as to the value of the balance work done shall be final and conclusive against the contractor.

41.0 The contractor(s) shall be paid the running payment according to the schedule of running payment agreed to at the time of award the contract on the completion of each calendar month commencing from the day of work order a sum of 90% of total value of work done.................since the last payment according to the certificate of EPI / OWNER when the works shall be completed, the contractor(s) is/are to be entitled to receive one moiety of the amount remaining due according to the best estimate of the same that can be made and the contractor(s) is/are to be entitled to receive the balance of all moneys due to or payable to him/them under or by virtue of the contract within twelve months from the completion of the works. Provided always that no final or other certificate is to cover or relieve the contractor(s) from his/their liability under the provision of clause 10 whether or not the same be notified by EPI / OWNER at the time or subsequently to be the granting of any such certificate.

42.0 A certificate of EPI / OWNER or an award of the referee hereinafter referred to, as the case may be showing the final balance due to or payable to the contractor(s) it to be conclusive evidence of the works having been duly completed and that the contractor(s) is/are entitled to receive payment of the final balance, but without prejudice to the liability of the contractor(s) under provision of clause 10.

43.0 If at any time before or after the commencement of the work, EPI / OWNER shall for any reason whatsoever.

a) Cause alteration, omissions or variations in the drawings and specifications involving any curtailment of the works as originally contemplated; or

b) Not required the whole of work as specified in the TENDER to be carried out:

The contractor(s) shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he/they might have derived from the execution of the work in full as specified in the TENDER but which he/they did not derive in consequence of the curtailment of the works by reason of alternations, omissions or variations or in consequence of the full amount of the work not having been carried out. The contractor(s) shall not be entitled to compensation for any loss sustained by him/them by reason of his/their having purchased or procured any materials or entered into any engagements or made any advance to labour or taken any other preliminary or incidental measures on account of or with a view to the execution of the works or the performance of the contract.

44.0 BILLING BREAK-UP

For sump well (17.16 % of the total sanctioned cost)

1 5% shall be payable to the Contractor after approval of Designs and drawings.
2 25% shall be payable to the Contractor on completion of excavation, PCC and foundation in all respect up to G.L. on pro-rata basis.

3 65% shall be payable to the Contractor on pro-rata basis as per the progress of Civil Works.

4 5% shall be payable to the Contractor after completion of the whole work and trial run for a period of 3 months including training the staff of MUNICIPAL CORPORATION (Owner), for running and maintenance.

For Pipeline (Raw/ Clear water pumping main and Feeder Main)  
(32.70 % of the total sanctioned cost)

1 5% shall be payable to the Contractor after approval of designs and drawings.

2 55% shall be payable to the Contractor on supply of pipes.

3 15% shall be payable to the Contractor after completion of laying of 50% length of pipeline in all respect on pro-rata basis

4 15% shall be payable to the Contractor after completion of laying of 100% length of pipeline in all respect on pro-rata basis.

5 5% shall be payable on Successful Testing of the pipeline.

6 5% shall be payable after completion of the whole work and trial run for a period of 1 month.

For OHT  
(15.72 % of the total sanctioned cost)

1 5% of the Sanctioned cost shall be payable to the Contractor after approval of designs and drawings.

2 10% of the Sanctioned cost shall be payable to the Contractor after completion of excavation.

3 10% of the Sanctioned cost shall be payable to the Contractor after completion of foundation.

4 20% of the Sanctioned cost shall be payable to the Contractor after construction of staging.

5 10% of the Sanctioned cost shall be payable to the Contractor after laying of lower dome.

6 10% of the Sanctioned cost shall be payable to the Contractor after erection of side walls.

7 10% of the Sanctioned cost shall be payable to the Contractor after laying of top dome.

8 10% of the Sanctioned cost shall be payable to the Contractor after fitting of all pipe and valves etc.

9 10% of the Sanctioned cost shall be payable to the Contractor after plastering, painting, water tightness testing etc. complete.

10 5% of the Sanctioned cost shall be payable to the Contractor after 3 months of successful completion of the work.

For Intake well and raw water pump house (1.32 % of the total sanctioned cost)

1 5% shall be payable to the Contractor after approval of Designs and drawings.

2 25% shall be payable to the Contractor on completion of excavation, PCC and foundation in all respect up to G.L. on pro-rata basis.

3 65% shall be payable to the Contractor on pro-rata basis as per the progress of Civil Works.

4 5% shall be payable to the Contractor after completion of the whole work and trial run for a period of 3 months including training the staff of MUNICIPAL CORPORATION (Owner), for running and maintenance.

For Supply and installation of Raw and Clear water pumps, motor HT Feeder (7.44 % of the total sanctioned cost)

1 5% shall be payable to the Contractor after approval of Designs and drawings.

2 65% shall be payable to the Contractor on supply of all the electro-mechanical items at site.

3 25% shall be payable to the Contractor on erection and complete fitting of motors and pumps at site.

4 5% shall be payable to the Contractor after completion of the whole work.
For Distribution Network (19.92 % of the total sanctioned cost)

1. 5% shall be payable to the Contractor after approval of designs and drawings.
2. 50% shall be payable to the Contractor on supply of pipes.
3. 15% shall be payable to the Contractor after completion of laying of 50% length of pipeline in all respect incl. road restoration on pro-rata basis.
4. 15% shall be payable to the Contractor after completion of laying of 100% length of pipeline in all respect incl. road restoration on pro-rata basis.
5. 10% shall be payable on Successful Testing of the pipeline.
6. 5% shall be payable after completion of the whole work and trial run for a period of 1 month.

For House Service connection, Bulk meters, SCADA (5.74 % of the total sanctioned cost)

1. 5% shall be payable to the Contractor after approval of Designs and drawings.
2. 50% shall be payable to the Contractor on supply of material (complete set for one connection as required incl. pipe, meter and all other accessories).
3. 35% shall be payable to the Contractor after completion of house connection in all respect incl. road restoration on pro-rata basis.
4. 10% shall be payable to the Contractor after completion & Successful Testing of the connection.

Operation and Maintenance:

The successful bidder shall carry put the operation and maintenance of the project facilities for 10 years after the successful commissioning of the project. The Lumpsum offer submitted by the Bidder shall include the operation and maintenance cost of the project for a period of 10 years from the date of successful completion of the work. During O&M the scope of Contractor shall be,

1. Repairs and replacements in all project components including Pipeline, Pumps, Electrical installations, valves, specials, OHTs, Intakewell etc. complete.
2. Electrical expenditure shall be borne by Owner as per actual.
3. It shall be the responsibility of Bidder that the system runs at desired capacity (24 x 7 water supply) and at efficiency not less than 90% during the O&M period.
4. Bidder shall ensure that all metering equipments (Consumer meter, Bulk meter, Sensors etc.) shall be working efficiently and effectively.
5. Bidder shall be responsible for reading the consumer meter and distributing the Bills in every 1st week of month.

ULB shall extend all the necessary support to the Bidder for fulfilling the Obligations for operating and maintaining the system successfully. Also it shall be the responsibility of ULB to enforce suitable water tariff and also ensure effective collection of water bills distributed by the bidder.

ULB shall release 25% of the total contract price during O&M period @ 2% pa with an increase of 5% in every succeeding year till the 10th year of O&M. The payment against the O&M shall be made every year on satisfactory upkeep and running of the system.

Note -

In case of any increase/decrease in length of distribution pipes for 100% coverage of the Municipal area the payment will be adjusted as per the latest SOR issued by Department of Urban Administration and Development, Madhya Pradesh without any escalation.
SPECIAL CONDITIONS
OF CONTRACT (SCC-II) Contd…

FOR
OPERATION & MAINTENANCE
This Obligation Understanding (OU) made on this ___ day of __________, 20…. at Singrauli, Madhya Pradesh.

BETWEEN

Singrauli Nagar Palika Nigam, constituted under the Madhya Pradesh Municipalities Act 1961, (hereinafter referred to as (“SNPN”) which expression shall, unless the context otherwise requires, include its administrators and assigns);

And

_______________________________ a Company incorporated under the Companies Act, 1956 and having its registered office at ________________________________ (hereinafter “Operator” which expression shall, unless the context otherwise requires, include its successors and permitted assigns)

Whereas:

A SNPN as Part of its initiative to implement a new project and maintain a Service Level Benchmark (SLB) in water supply as set by MoUD, Government of India, to its consumers has taken up a project for a command area under its jurisdiction. The project aims to achieve a high level of Technical & Commercial efficiency & upgrading/implementing-new water supply for continuous pressurized water supply & improving revenue & demand management to optimize water consumption as per the CPHEEO norms. The principal features of the project shall be as follows

i. Project: There is no existing treated water supply system based on the surface water source. It is envisaged that the water requirement in the project area shall be 20 MLD at the time of commissioning.

ii. The project objectives based on “Service Level Benchmarks” for water supply services include:
   a) 100% piped water supply coverage by year 2016.
   b) Per capita water supply to 135 lpcd through the implementation of effective demand management.
   c) Continuity of water supply to 24x7 by the year 2016 and subsequent years beyond 2016.
   d) Extent of metering of water connections to be 100% by the year 2016.
   e) Extent of non revenue water to be 20%.
   f) Quality of water as per the CPHEEO standards.
   g) Operating cost recovery to be 100% by 2016 by way of acceptable water tariff and efficient revenue collection system;
   h) Efficiency in redressal of consumer complaints to be 80% in any 24hrs period by 2016.
   i) Efficiency in collection of water related charges to reach 80% or more in the next five years after project commissioning.

iii. Communication: An effective communication system should be established with consumers, RWA’s Public representatives, employees etc., before and after the appointment of the operator.

iv. The expected outcomes of this Obligation Understanding are:
   a) Better customer service
   b) Optimal energy consumption and low cost thereon;
c) Optimal O&M cost.
d) Reliability of quality water supply on a continuous basis;
e) Better financial sustainability.
v. Tariff: It is expected that by levying the socially acceptable user charge/water tariff will generate sufficient revenue to meet all the O&M expenses.
vi. Revenue: The revenue from water charges shall be deposited in a specially created account of the SNPN which will be opened for the project.
vii. Operator’s Remunerations: Operator’s fee shall be paid on a lump-sum basis per annum [payable equally per quarter] and will ensure the technical efficiency of the project. Payment is directly related to the technical efficiency attained by the operator post commissioning.
viii. The Water account which will be opened for the project shall be escrowed to the operator in order to guarantee timely payment as per the contract.
ix. Monitoring of performance: Monitoring Committee having an advisory role shall consist of the Representative of Parshad or Resident Welfare Associations (RWA’s), Public representatives, Municipality officials to monitor the customer services etc.
x. Sovereign Power: such as disconnection, ownership of assets, development of new Infrastructures shall remain with SNPN.
xi. Dealing with defaulter consumers: defaulters: SNPNwill identify defaulting consumer and SNPN may instruct operator for disconnection.
xii. Project implementation Stages.

Phase – II – Implementation Period including mobilization, design & drawing : 18 months;

Phase – II – O&M period : 120 months.

B SNPN has full authority to enter into this Obligation Understanding with the Operator and to confer absolute Right to do Operation & Maintenance [post commissioning] of the Project in accordance with terms and conditions set forth hereunder.

C The Parties have agreed to enter into this OU on the terms and conditions set out herein.
1. **GRANT OF RIGHTS TO THE OPERATOR**

1.1 **Grant of Rights**

Subject to and in accordance with the terms and conditions set forth in this document (OU), **SNPN** hereby authorizes the Operator:

1.1.1 To investigate, study, design, engineer, procure, construct, augment, operate and maintain the Project Infrastructures and to exercise and / or enjoy the rights, powers, benefits, privileges, authorizations and entitlements as set forth in this OU to provide piped water supply in the project area under the jurisdiction of **SNPN**.

1.1.2 To enter upon and use the Service Area during the **OUPeriod** of [18 Months (Design and construction period) +120 Months (O&M Period)] including all rights of way and easements relating to the Project and access to the Project Infrastructures, including the Existing Assets, so that the Operator, its agents, sub-contractors and any third party it might designate may perform its rights and obligations under this OU, including the right to conduct any kind of work in the streets and other public places of the Service Area, in order to have access to the Project Infrastructures.

1.1.3 To produce drinking water as per the CPHEEO standard and supply to the Service Area as, immediately from the date of commissioning of project, without interruption in accordance with the provisions of this document (OU). The expected quantum of treated water supply contemplated by **SNPN** in the year 2015 through 2045 shall be as given below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Minimum Water Supply by Operator [MLD]</th>
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1.1.4 To prepare and issue water bills to consumers on behalf of **SNPN** till Expiry or Termination Date as the case may be. To fulfill its obligations, the Operator shall have the right to undertake activities either by itself or through subcontracting arrangements.

1.1.5 To exercise such other rights as **SNPN** may determine as being necessary or desirable and which it consents to in writing, for the purposes incidental and necessary for the provision of the services having regard to the needs of the consumers.

1.2 **OU Period**

The time period of this OU shall be for 120 Months excluding 18 months of project implementation period. Provided that in the event of Termination, the OU Period shall mean and be limited to the period commencing from the date of commissioning of project and ending with the Termination Date.

1.3 **Acceptance of rights by the Operator**

In consideration of the rights, privileges and benefits conferred upon the Operator, and other good and valuable consideration expressed herein, the Operator hereby accepts the rights granted under this OU and agrees and undertakes to perform / discharge all of its obligations in accordance with the provisions hereof.
2. CONDITIONS PRECEDENT

The rights and obligations of the Operator shall be subject to the satisfaction in full of the following conditions precedent to be fulfilled unless any such condition has been waived. Each Party shall bear its respective cost and expense of satisfying such Condition Precedent.

2.1 Operator’s Conditions Precedent

The Performance Security in full has been provided by the Operator to SNPN in accordance with tender conditions:

2.2 SNPN’s Conditions Precedent

a. SNPN shall have granted to the Operator or caused to be granted to the Operator all the necessary rights including pipeline routes, and other Easementary Rights in order to permit design, construction, rehabilitation, testing, commissioning and operation and maintenance of the Project Infrastructures;

b. SNPN shall have received authorizations required for the execution and implementation of the Project and its rights.

c. Opening of special purpose account & approval for escrow arrangement on such account

2.3 Non-Fulfillment of Conditions Precedent

a. If the Conditions Precedent set forth above have not been satisfied on or before the expiry of 01 (one) months from the Appointed Date and the Other Party has not extended the said period or waived, fully or partially, such conditions, than the Operator or SNPN may, give twenty-one (21) days notice in writing to the Party which has failed to fulfill the Condition Precedent and upon expiry of such notice this OU shall stand terminated.

b. Upon Termination on account of non-fulfillment of Conditions Precedent by SNPN, the SNPN shall release the Performance Security to the Operator.

c. Upon Termination on account of non-fulfillment of Conditions Precedent by Operator, the SNPN shall appropriate the Performance Security.

3. MONITORING COMMITTEE

SNPN shall constitute the Monitoring Committee having advisory role to SNPN within 90 days of project commissioning which shall consist of the following:

a. consist of following representatives

i. Class-I Officer / Nominated representative of SNPN

ii. Nominated Officer from Directorate of Urban Administration and Development Department, GoMP.

iii. Member of council nominated by Perishad.

iv. Two members from SNPN (One officer each from Revenue/Finance side and one officers from technical side-Engineer).

v. One member from Residents Welfare Associations (RWA)

b. be responsible for monitoring of the Project implementation and Performance by the Operator.
c. all the recommendations of the Monitoring Committee shall be within the contract structure.
d. the Monitoring Committee may decide the frequency of meeting to be held but the MC meeting should be held at least once in three months. During the project implementation period the MC meeting shall be held monthly.
e. the Corum of meeting shall be of a minimum of 5 members. In the absence of a corum the meeting shall be rescheduled.
f. SNPN Council may replace any member in case a member is not in position to attend the meeting for whatsoever reason or abstain for more than 2 meeting in continuation.
g. the expenditure of the MC meeting shall be borne by SNPN
h. the operator’s representative will be a permanent invitee for MC meeting to represent operator in the meeting, as & when the MC requires such representation

4. **OBLIGATIONS OF OPERATOR**

Operator shall have the following obligations:

4.1 **Performance Security**

The Operator shall, for due and punctual performance of its obligations hereunder relating to the Project, submitted to SNPN, simultaneously with the execution of this OU, provide a revolving bank guarantee from a scheduled bank acceptable to SNPN, in favour of ______________, SNPN, in the form as set out in Tender Document, ("Performance Security") for a sum of Rs. 5% of the O&M Cost [this shall be 5% of the bid O&M cost which shall be 25%](Rupees ……………………………………). The bank guarantee for Performance Security shall be kept valid throughout the OU Period. Provided that if the OU is terminated due to any event other than an Operator Event of Default, the Performance Security if subsisting as of the Termination Date shall, subject to SNPN’s right to receive amounts, if any, due from the Operator, be duly discharged and released to the Operator.

4.2 **Working Capital Arrangement**

The Operator shall at its own cost; expenses and risk shall arrange working capital during the O&M period excluding any capital investment to meet its service level obligation.

4.3 **O&M Obligation**

4.3.1 The Operator shall during the O&M Period (Post commissioning period), undertake all services relating to operation and maintenance of the Project Infrastructures in conformity with O&M requirements.

4.3.2 The Operator shall along with the Approved Implementation Plan, submit to the SNPN a plan for operation and maintenance of the Project Infrastructures (“O&M Plan”) in conformity with the O&M Requirements and Performance Standards as per the CPHEEO standard.

4.3.3 The O&M Plan shall set out in detail the standards, schedules, procedures, type, periodicity and other details of the operation and maintenance activities to be carried out for the Project during the OU Period so as to meet the O&M Requirements as well as details of the management information system to be incorporated, reports to be submitted and procedure for reviews, including developing a mechanism for grievance redressal.

4.3.4 Within 30 days of receipt of the O&M Plan, the SNPN shall review the same and convey its comments/observations to the Operator on the O&M Plan, including the need, if any, to modify the same.
If the comments/observations of the SNPN require the O&M Plan to be modified, the Operator shall suitably modify the O&M Plan. The O&M Plan shall be finalized with mutual consent.

4.3.5 Notwithstanding any review or failure to review by the Operator or the comments/observations of the SNPN, the Operator shall be solely responsible for the adequacy of the O&M Plan and the conformity thereof with the Performance Standards, Construction Requirements and O&M Requirements and shall not be relieved or absolved in any manner whatsoever of any of its obligations hereunder.

4.3.6 The Operator shall within a reasonable period inform SNPN of the details of its key personnel responsible for O&M and subsequent changes, if any, from time to time.

4.3.7 The Operator shall undertake operations and maintenance of the Project Infrastructures by itself or through contractor possessing requisite Technical/financial/managerial expertise/capability, but in either case, the Operator shall remain solely responsible to meet the O&M requirements.

4.3.8 The Operator shall incorporate good management practices and appropriate technologies required for meeting the Performance Standards.

4.3.9 The Operator shall, during the OU Period;
   a. have requisite organization and designate and appoint suitable staff/representatives as it may deem appropriate to supervise the Project, to deal with the SNPN and SNPN and to be responsible for all necessary exchange of information required pursuant to this OU;
   b. for the purposes of determining that the Project Infrastructures are being maintained in accordance with the O&M Requirements, the Operator shall with due diligence carry out all necessary and periodical Tests in accordance with the instructions and under the supervision of the SNPN. The Operator shall maintain proper record of such Tests and the remedial measures taken to cure the defects or deficiencies, if any, indicated by the Test results.
   c. conduct all Tests to ascertain compliance with O&M Requirements.
   d. suspend forthwith the whole or any part of the O&M activities upon receiving a written notice from the SNPN, who may require the Operator to suspend the activities in whole or part if in the reasonable opinion of the SNPN, the operations are being carried on in a manner that is not in conformity with the O&M Requirements.

4.3.10 The Operator shall as per pre agreed format record the system performance and periodically provide the same to SNPN / SNPN.

In the event the Operator has failed to operate and maintain the Project in accordance with the O&M Requirements, and such failure has not been remedied despite a notice to that effect issued by the SNPN ("Notice to Remedy"), SNPN may, without prejudice to any of its other rights/remedies, be entitled to operate and maintain the Project or cause to repair and maintain the Project Infrastructures at the risk and cost of the Operator. The Operator shall reimburse all 200% (two hundred percent) of the costs incurred by SNPN on account of such operation and maintenance or repair and maintenance within 7 days of receipt of SNPN claim thereof.

4.3.11 The Operator shall be deemed to be in material breach of O&M Requirements if the SNPN acting reasonably and in accordance with the provisions hereof, has determined that the there has been a breach of the Operator’s obligations as follows:
   a. there has been failure/undue delay in carrying out scheduled/planned maintenance or the scheduled/planned maintenance has not been carried out in accordance with the O&M Requirements;
   b. the maintenance of the Project Infrastructures or any part thereof has deteriorated to a level which is below the acceptance level prescribed by the O&M Requirements;
c. there has been a serious or persistent let up in adhering to the O&M Requirements and thereby the Project Infrastructures or any part thereof is not safe for operations;
d. there has been persistent breach of O&M Requirements. For avoidance of doubt, persistent breach shall mean:
i. any breach of O&M Requirements by the Operator which has not been remedied by the Operator despite a Notice to Remedy in respect thereof issued by the SNPN;
ii. recurrence of a breach by the Operator, during the pendency of Notice to Remedy by the SNPN requiring the Operator to remedy a breach, and repeated occurrence of a breach notwithstanding that earlier breach has been remedied pursuant to Notice to Remedy or otherwise. Upon occurrence of a material breach of O&M Requirements, SNPN shall, without prejudice to and notwithstanding any other consequences provided therefore under this OU, be entitled to terminate this OU.

4.4 Service Obligation

a. supply Treated water to consumers within the Service Area and shall meet its Performance Standards as per the CPHEEO requirement.
b. at its cost and expense, undertake emergency chlorination measures at times of outbreak of epidemics and any such emergency situations.
c. identify Critical Measurement Points in the distribution network, in consultation with SNPN for installation of pressure measurement data loggers.
i. ensure that the Treated Water shall be supplied at a positive pressure being never less than 07 (seven) meters measured at all the Critical Measurement Points in the Service Area at all times.
ii. continuously log pressure readings at all pressure-metering points installed at Critical Measurement Points, which shall also include a point where pressure is routinely experienced at the minimum level in the Service Area, and monitor continuous pressured water supply on a daily basis in accordance with the prudent utilities practice.
d. Carryout repairs to any leakages in the distribution network.
e. from the project commissioning date, carry out the following activities in the Service Area:
i. upon intimation by SNPN, provide connection to a property within a period of seven (7) days from such intimation;
ii. carry on basic plumbing and shall replace, with the approval of the SNPN, illegal property water connections with legal connections where the property owner accepts to legitimize the connection, and if the property owner does not so opt to legitimize the connection the operator shall act per the written instruction of SNPN and shall carry out disconnection in presence of SNPN official;
iii. be expected to co-operate with SNPN in the implementation of the communications program to foster ownership of the Project by the local stakeholders and encourage their support for the work. The Operator shall disseminate to the Consumers the communication materials prepared by the SNPN through their inclusion with water bills and their availability at
iv. set up and operate the Consumer Service Centers established in the Service Area. The communication material shall include information on significance of safe quality water supplied including water conservation and benefits of continuous water supply to the Consumers. The Operator shall do nothing that would hinder the work of those involved in implementing the communications program.

v. Report, if possible and deemed necessary to SNPN in respect of unauthorized water connections and connections for which the Consumers have defaulted on the payment in the Service Area. Within 30 days of such intimation SNPN shall with the assistance of Operator, undertake remedial actions by way of either regularizing the unauthorized connections or disconnecting such properties from the network within the Service Area and initiate proceedings as necessary for collecting the dues from such connections.

vi. Set up water quality surveillance program to undertake daily, weekly and monthly testing of water quality at Consumer taps for checking the residual chlorine content and also chemical and bacteriological quality of the supplied water, only in case the consumer is not storing water or consuming water directly.

4.5 General Obligations

The Operator shall at its own cost and expense observe, undertake, comply with and perform, in addition to and not in derogation of its obligations setout as following:

a. investigate, study, design, procure, construct, augment, construct, operate and maintain the project infrastructure in accordance with the provisions hereof;

b. review the existing consumer database, appropriately modify to reflect the details of consumers and periodically update the same; [in case this data base does not exists then this work shall be done by the Operator]

c. develop and maintain in a good order and up to date the inventories, maps and any other technical documents that are needed to operate all the project infrastructure;

d. allow representatives of SNPN or persons duly authorized by the relevant Government Agency concerned with safety, security or environmental protection, access to the Project Infrastructures, at all reasonable times and on reasonable notice, but so as not to interfere unreasonably with the construction, operation or maintenance of the Project Infrastructures;

i. procure, as required, the appropriate proprietary rights, licenses, agreements and permissions for materials, methods, processes and systems used or incorporated into the Project;

j. make efforts to maintain harmony and good industrial relations among the personnel employed in connection with the performance of its obligations under this OU and shall be solely responsible for compliance with all labour laws and solely liable for all possible claims and employment related liabilities of its staff employed in relation with the Project and hereby indemnifies SNPN against any claims, damages, expenses or losses in this regard and that in no case and shall for no purpose shall SNPN be treated as employer in this regard;

k. not to place or create nor permit other person claiming through or under the Operator to create or place any Encumbrance or security interest over all or any part of Service Area or the Project Infrastructures, or on any rights of the Operator therein or under this OU, save and except as expressly set forth in this OU; be responsible for all the health, security, environment and safety aspects of the Project at all times during the OU Period
I. ensure that the Project Infrastructures remain free from all encroachments and take all steps necessary to remove encroachments, if any;

m. upon receipt of a request thereof, afford access to the Project Infrastructures to the authorized representatives of SNPN for the purpose of ascertaining compliance with the obligations.

n. indemnify SNPN against all actions, suits, claims, demands and claims and any loss or damage or cost or expense that may be suffered by them on account of anything done or omitted to be done by the Operator in connection with the performance of its obligations under this OU; and

o. assist and co-operate with the Monitoring Committee in discharging their obligations under this OU and implement the directions and consider the recommendation given by the Monitoring Committee from time to time.

4.6 Customer Service

a. set up a Consumer Service Centre in the Service Area, at an appropriate location designated by SNPN, which would have a minimum of three (3) operational dedicated phone lines and a minimum of two consumer service representatives during 8am – 8pm on any working day and one consumer service representative during the remaining hours of the day for receiving Consumer calls/complaints in various forms such as telephone calls, e-mail, short message service etc. and undertake prudent consumer grievance redressal mechanisms, which shall be duly documented.

b. continuously log the consumer complaints received through personal visits, letters, telephone calls, emails, smsetc of consumers and respond to consumer within 24 hours from the time of receipt of such complaint and resolve the complaint within 5 (five) working days from the time of receipt of the said complaint. Any complaints related to lack of water or water or poor quality of water shall be attended to within 6 (six) hours from the time of receipt of complaint and resolved within 24 hours.

4.7 Billing

4.7.1 Billing Mechanism

a. The Operator shall develop and set up a computerized billing system compatible with SNPN billing system with all built in monitoring systems. The Operator shall provide SNPN the access to the computerized billing [GSM Based Billing] system.

b. For the purpose of billing the Consumers against the supply of Treated Water, the Operator shall carry out the following activities:

(i) from the commissioning date, the Operator shall continue to issue water bills prepared by SNPN or on the behalf of SNPN.

(ii) record the water meter readings of the Consumers at the end of every 2 months/Billing Cycle from the date of installation of the meters and assess the water charges at the prevailing water bills and advise the Consumer and SNPN on the amounts so as to provide maximum two billing cycle to the Consumer to undertake any repairs in internal plumbing of the Consumer Property to minimize wastage of water supplied.

(iii) distribute Water Bills monthly/ or as decided by SNPN to consumers based on the volume of Treated Water consumed at the Water Charge set by SNPN.

(iv) the bills printed by the Operator on the GSM based system should indicate that the Consumer Payment has been collected by SNPN and if payment is not made
by the due date SNPNP shall intimate to the operator who shall do the necessary correction in the prospective/future water bill/charge.

4.8 Providing Connection

4.8.1 Obligation to make connections to a water main
On receipt of connection advice from KMPP the operator shall prepare the estimate as per approved rates of SNPN for providing water connection in which the cost of plumbing upto water meter shall be included. Apart from the inclusion of applicable costs and charges in accordance with SNPN’s water supply bye laws, the cost shall also include the cost of road cutting if any and restoration to original or better condition thereof. The estimate for the above cost/s shall be issued by the SNPN to the intending consumer. On payment to SNPN by the intending consumer, the cost of new connections as per the demand note/estimate SNPN shall issue connection advice to the operator, and Operator shall provide such connection within seven (7) days upon completion of all connection work and affixation of a calibrated metering device. The SNPN shall reimburse to the operator the cost of providing water connection. The operator shall be fully responsible for the restoration of road cutting to the original or better condition thereof.

4.9 Disconnections
The operator shall carryout the disconnection of services only after the written instruction of SNPN within the stipulated time of seven (7) days.

4.10 Insurance

4.10.1 The Operator shall throughout the OU Period at its cost and expense, purchase and maintain by due re-instatement or otherwise all insurances limited to its obligations in respect of the project infrastructure in accordance with the prudent industry practice. The Operator shall maintain a register of entry in order of premiums paid and proof of payments made shall be submitted to SNPN whenever requested for. during the subsistence of OU Period the insurance shall follow the following guiding principles:

i. loss, damage or destruction of the Project Infrastructures excluding for the Existing Assets at replacement value;

ii. comprehensive third party liability insurance including injury or death to personnel / representatives of Persons who may enter the Service Area;

iii. workmen’s compensation insurance;

iv. standard fire and special perils

v. the Operator’s general liability arising out of the rights granted by the SNPN under this OU;

vi. liability to third parties;

vii. Third Party Motor Vehicle Liability Insurance Covering use of all vehicles used by the Operator or its Sub-Contractors, whether or not owned by them, in connection with its obligation under this OU; and

viii. any other insurance that may be necessary to protect the Operator, its employees and its assets against loss, damage, destruction, including insurance against all Force Majeure Events that are insurable.

4.10.2 If at any time the Operator fails to obtain or maintain in full force and effect any and all of the insurances required under this OU, SNPN may at its option (but not being obliged to do so) obtain and maintain such insurance and all sums incurred by SNPN thereof shall be reimbursed by the Operator to SNPN together
4.11 Environmental Compliance

The Operator shall, at all times, ensure that all aspects of the Project Infrastructures and processes employed in the construction, operation and maintenance thereof shall conform with the laws pertaining to environment, health and safety aspects, policies and guidelines related thereto. The Operator shall obtain and maintain from time to time all necessary clearances as per the environment management plans in respect of the Project Infrastructures. While, SNPN shall provide necessary assistance to the Operator in securing the said clearances, the Operator shall be responsible for obtaining and maintaining the said clearances.

4.12 No Breach of Obligations

The Operator shall not be considered to be in breach of its obligations under this OU nor shall it incur or suffer any liability if and to the extent performance of any of its obligations under this OUs is affected by or on account of any of the following:

a. SNPN Event of Default;
b. Compliance with the instructions of SNPN or the directions of any Government Agency/Court Order/Statutory Body which may create deviation of obligation by Operator detailed in this OU;

4.13 Maintenance of Records

a) The Operator shall maintain records in accordance and provide monthly, quarterly and annual reports of the same to the SNPN. This report should also include details on stocks and assets held by the Operator during the OUpersiod.

b) Maintain daily records of the following and submit the same to SNPN and the SNPN by the 10th day of every Month or in case the 10th day of a Month is a holiday then on the following working day of such Month:

i. Quantum of Treated Water as measured at the outlet..

ii. Results of the residual chlorine measurement in the network and the periodical measurement for chemical and bacteriological analysis of the water supplied to the Consumers
iii. Quantum of Treated Water supplied to the Consumers based on the Water Supply and Consumption Statement
iv. Estimation of the Leakage Losses and
v. Pressure at the Critical Measurement Points
vi. Redressal of Consumer complaints and public disclosure.
vii. provide to the SNPN, a report on the project operational data, including technical and cost data. Data shall include description of service levels, state of Project Infrastructures, physical improvements carried and consequent investments made, operational issues including Consumer service, monthly billing, and management of maintenance records, connections and disconnections.
viii. continuously log pressure readings at pressure-metering points installed at Critical Measurement Points on the distribution network as approved by the SNPN including a point where pressure is routinely experienced at the minimum level in Service Area and to measure and monitor continuous pressured water supply on a daily basis in accordance with the good industry practice.
ix. rechlorinate the Treated Water so as to ensure that the residual chlorine content at the Consumer tap complies with the O&M Requirement
x. take necessary action as may be appropriate and in accordance with good industry practice in the event of an emergency or risk of danger or damage to persons or property (including the Project Infrastructures).

4.14 APPLICABLE PERMITS

The Operator shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this OU shall;
a. make, or cause to be made, necessary applications to the relevant Government instrumentalities with such particulars and details, as may be required for obtaining all Applicable Permits and obtain and keep in force and effect such Applicable Permits in conformity with the Applicable Laws;
b. ensure and procure that its Sub-Contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the Operator’s obligations under this OU;

5. Obligation of SNPN

During the Operation and Management Period, SNPN shall have the following obligations, as applicable:

(a) provide the Operator with assistance as is necessary in procuring access to:
   (i) the water supply infrastructure within the service area; and
   (ii) Provide space for storage Facility;
   (iii) Grant right to create/construct facility for the OU period at the location(s) for specific use to meet the operational requirements;
(b) provide the OC with the permission to repair or replace the Infrastructures, which the OC is responsible for as the case may be;
(c) order decommissioning of existing asset as the case may be and receive the salvaged material;
(d) depute the Corporations Employees and constitute the Monitoring Committee
(e) Make regular payment to Operator;
(f) Manage all aspects of customer interface outside the service scope of Operator;
(g) Receive requests for approvals for new connections and issue written order to Operator
(h) Appoint appropriate agency for the purpose of service delivery monitoring by Operator;
(i) Assist Operator in case of Law and Order problem and provide police protection while
disconnection;
(j) Assist Operator for meeting service level obligations as the case may;
(k) Ensuring Raw water availability (Quality & Quantity) and announcing the water scarcity/deficit
period as the case may be;
(l) take legal action on those people/entity who damage the water infrastructure and against whom
Operator intend to take legal action after due consideration;

6. Water Shortage Period
a) A Water Shortage Period shall commence when SNPN has failed to ensure raw water availability
of designated quantity of Raw Water to the Operator because of any of the following reasons not
attributable to the negligence of Operator :

b) SNPN notifying the commencement of a Water Shortage Period or
c) The determination by Operator of shortage of water and certification thereof by the SNPN, SNPN
shall notify the commencement of a Water Shortage Period to the Consumers through suitable
means, which shall be deemed to have commenced from the first hour of such notification.
d) The Water Shortage Period shall cease when the SNPN notifies and supplies the designated
quantity of raw water or treated water from other source at the input point.
Provided that during a Water Shortage Period or otherwise, SNPN shall have rights to direct the
Operator to modify the water supply and regulate the allocation of potable water among the
Consumers.
e) During the subsistence of a Water Shortage Period, Operator shall undertake such measures so
as to minimize the supply interruptions to the Consumers. Subject to the Operator making
reasonable endeavors to maintain the Services, the Operator shall not be considered to be in any
Material Breach under this OU and shall not be subjected to penalty arising out of water
shortage.

7. O&M Cost Obligation
The gross operator rate includes the following O&M Cost obligations with other
contractual obligation within the project area:
(i) establishment cost
(ii) chemical cost & other consumables
(iii) Minor maintenance & repairs of Project Infrastructures
(iv) O&M obligations under this contract unless excluded by this contract.

8. Operator Payment & Mechanism
Subject to the provisions of this OU and in consideration of the Operator accepting the rights under this
OU and undertaking to perform and discharge its obligations in accordance with the terms & conditions
set-forth in this OU, SNPN shall pay to the Operator a lump sum fee bill/invoice raised by operator after
making necessary adjustments.
8.1 Escrow Mechanism
SNPN shall establish and maintain an Escrow Account with the Escrow Agent, which shall be settled in trust with the Escrow Agent and shall be operated in accordance with the provisions of escrow agreement.

8.2 Payment Guarantee Mechanism
The payment guarantee mechanism is set out below.

a. SNPN shall within 15 (fifteen) days of project commissioning date enter into Escrow Agreement with Operator and a bank to be agreed between the Parties for opening and establishing a Escrow Account, to meet the Operator Payment ("Escrow Agreement").

b. The nature and scope of the Escrow Account, deposits of amount, withdrawals and retention related conditions shall be fully described in the Escrow Agreement.

c. The amounts deposited in the Escrow Account shall be utilized towards meeting the Operator Payment payable by SNPN to the Operator and in such manner as provided in the Escrow Account. The amounts in the Escrow Account at the start of a quarter shall be equal to three months of the Operator Payments and shall be replenished on a regular basis in accordance with the Escrow Agreement.

d. The Parties undertake that the amounts deposited in the Escrow Account shall be utilized only for purposes and the manner as specified in Escrow Agreement.

8.3 Mechanism of Operator Payment
The operator shall be paid through the Escrow Account on quarterly basis. The O&M cost submitted by the operator at the time shall be divided for the period of contract on quarterly basis. The payment shall be computed by SNPN in consultation with the agency appointed by SNPN. The net operator payment shall be computed under the following formula which shall be paid by SNPN:

Net Operator Payment = (Agreed payment to the operator at the time of tendering + Incentive(s)) – (Penalty + Direct Payment + Liquidated damage (Material Breach))

8.4 Incentive
In case of achieving the desired service level, resulting in SNPN collection of more than 85% of water tax; the operator may seek an incentive of 10% of the revenue collected in excess of 85% of water tax. The Monitoring Committee envisaged under clause 3 will vet any such demand of operator and make necessary recommendations to SNPN which, in accordance to the recommendation of Monitoring Committee, will release incentives to the operator.

8.5 Penalty
In case of non-achievement of following service indicators as detailed hereunder Operator shall be liable for penalty which shall be calculated as follows:
<table>
<thead>
<tr>
<th>S.N.</th>
<th>Parameter</th>
<th>Acceptable Infraction</th>
<th>Penalty (Rupees)</th>
<th>Modality</th>
<th>Calculation Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Residual Chlorine not as per the CPHEEO norm</td>
<td>10 Location/Complains</td>
<td>Five Thousands rupees per infraction beyond (B).</td>
<td>SNPN or its agency conducted tests in the recognized laboratory – laboratory test certificate.</td>
<td>If the infraction is more than ten then the penalty shall be calculated Rupees twenty five thousands + (number of infraction beyond 10) multiplied by Rupees five thousands.</td>
</tr>
<tr>
<td>2.</td>
<td>Water Quality not as CPHEEO standard</td>
<td>10 locations</td>
<td>Five Thousands rupees per infraction beyond (B).</td>
<td>SNPN or its agency conducted tests in the recognized laboratory – laboratory test certificate.</td>
<td>If the infraction is more than ten then the penalty shall be= Rupees twenty five thousands + (number of infraction beyond 10) multiplied by Rupees five thousands.</td>
</tr>
<tr>
<td>3.</td>
<td>Pressure lower than 07 (seven) meter at ferrule point</td>
<td>3 critical points</td>
<td>Ten Thousands Rupees per infraction beyond (B)</td>
<td>1. SNPN or its agency analyzed the data-logger data. and/or 2. Frequent customer complain by same customer and decided in MC.</td>
<td>If the infraction is more than three then the penalty shall be = Rupees fifteen thousand + (number of infraction beyond 3) multiplied Rupees ten thousands.</td>
</tr>
<tr>
<td>4.</td>
<td>Non Receipt of Water Charge Bill or error in water bill</td>
<td>50 non Receipt</td>
<td>One thousands per infraction</td>
<td>1. Two arrear and customer complain; 2. Enquiry by SNPN officials or its agency;</td>
<td>If the infraction is more than fifty then the penalty shall be = Rupees two thousand five hundred + (number of infraction beyond fifty) multiplied Rupees ten thousands.</td>
</tr>
<tr>
<td>5.</td>
<td>Delay in Connection</td>
<td>No Tolerance</td>
<td>One thousands per day</td>
<td>1. Customer signature on the completion certificate. And/or 2. Updated customer database</td>
<td>Number of days delayed multiplied by one thousands rupees per infraction.</td>
</tr>
<tr>
<td>6.</td>
<td>Delay in disconnection</td>
<td>No Tolerance</td>
<td>Two Thousands per day</td>
<td>1. Notice issued by NKPP and data of completion certificate submitted by operator with photograph. And/or 2. Physically verified by NKPP or its agency on the due date of disconnection with photograph having</td>
<td>Number of days delayed multiplied by two thousands rupees per infraction.</td>
</tr>
<tr>
<td>S.N.</td>
<td>Parameter</td>
<td>Acceptable Infraction</td>
<td>Penalty (Rupees)</td>
<td>Modality</td>
<td>Calculation Methodology</td>
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<td>(A)</td>
<td>(B)</td>
<td>(D)</td>
<td>(E)</td>
</tr>
<tr>
<td>7</td>
<td>Delay in repair work as per the Notice Served</td>
<td>To be attended within the stipulated time period.</td>
<td>Five thousands</td>
<td>Physical verification by NKPP or ots agency.</td>
<td>Number of days delayed multiplied by Five thousands rupees per infraction.</td>
</tr>
<tr>
<td>8</td>
<td>Non resolution of customer complain/issues falling within the ambit of Operator by the same customer in the same calendar month.</td>
<td>10 customers</td>
<td>Two Thousands</td>
<td>1. Customer complain database. 2. MC resolution; 3. SNPN or its agency’s physical verification</td>
<td>If the infraction is more than ten then the penalty shall be = Rupees ten thousand + (number of infraction beyond ten) multiplied Rupees two thousands.</td>
</tr>
</tbody>
</table>

The penalty shall be limited to 10% of amount reserved for O&M under the main contract no. ........................................ dt. ..........................................  

8.6 Service Tax Indemnity

The services to be rendered by Operator shall not attract any service vide Notification No.12/20 Service Tax, dated 17th March 2012.; section 12 (e).

8.7 Technical Efficiency

\[ ATE_n = \frac{V_{fn}}{V_{Sn}} \]

Where:

\( V_{Sn} \) = Volume of Water Supplied, which shall be equal to water put into distribution system at the input of [Detail the input point] which is measured at the Flow meter installed at ________ location.

\( V_{fn} \) = Total volume of water billed to the Consumers and Communities for services rendered during the Accounting Year “n”.

The technical efficiency shall be determined, after 30 days from the end of each Billing Cycle.

8.8 Direct Payment

The Direct Payment shall include all the payments made by the SNPN on behalf of the Operator, which are within the scope of Operator. It shall also include all the Penalties and any other deductions. The Direct Payment (DP) shall be deducted from the Operator’s Payment to compute Net Operator Remuneration.

8.9 Outstanding Amounts
The determination of the actual quantum of amounts due and payable to the Operator and SNPN in accordance with relevant section of this OU shall be certified by agency appointed by SNPN.

8.10 Audit

SNPN shall have a right to audit the calculation of any amount set forth in any statement delivered by the Operator to the Escrow Agent. The Operator shall render all reasonable assistance to the SNPN to conduct such audit. In the event pursuant to such audit, SNPN and the Operator agree for an adjustment to any amount received by the Operator, the quantum of such agreed adjustment shall be debited from the operator payment which is to be received by the Operator every month, till such time that the balance of such quantum of agreed adjustment is not reduced to zero.

8.11 Tax Deducted at Source

The operator’s remuneration shall be liable for Tax Deducted at Source (TDS) as per rate applicable, by statutory law, as applicable, in force as on date.

9. HAND BACK OF PROJECT INFRASTRUCTURES

9.1 Ownership

Without prejudice and subject to the rights granted under this OU, the ownership of the Project Infrastructures, including all improvements made therein by the Operator, shall at all times remain that of SNPN.

9.2 Operator’s Obligations

a. Project Infrastructures

i. The Operator shall on the date of expiry of OUPeriod, hand back on as-is where-is basis, the Project Infrastructures to SNPN free of cost and in good operable condition. For the purpose of clarity, the Operator shall leave behind all assets in good and operable condition including tools, spares, inventory, machinery and all other movables required for continuous water supply.

ii. Atleast 12 (twelve) months before the expiry of the OUPeriod a joint inspection of the Project Infrastructures shall be undertaken by SNPN and the Operator. SNPN shall, within 45 days of such inspection prepare and furnish to the Operator a list of works/ jobs ("Handback Requirements"), if any, to be carried out so as to conform to the Construction Requirements and O&M Requirements. The Operator shall promptly undertake and complete such works / jobs at least 3 (three) months prior to the expiry of OUPeriod and ensure that the Project Infrastructures continue to meet such requirements until the same are handed back to SNPN. On Expiry Date, the parties shall undertake a joint inspection of the Project Infrastructures so as to ensure that Handback Requirements are met. The release of the final installment of the Operator Payment and other outstanding payments, if any, shall be subject to the Handback Requirements being fully met to the satisfaction of SNPN.

iii. SNPN shall, within 45 days of the joint inspection undertaken under preceding clause (ii) prepare and furnish to the Operator a list of items, if any, with corresponding distinctive descriptions, which are to be compulsorily handed
back to SNPN.

iv. The Operator, upon written request by the SNPN no later than 180 days prior to the Transfer Date, shall provide assistance to the SNPN during a transitional period of up to 60 days prior to the Transfer Date. ("Transition Assistance") The purpose is to ensure a smooth transition between Operator and a subsequent manager of the Project Infrastructures. The scope of the assistance shall be determined by SNPN provided that the assistance shall be related to only transition services.

v. If the SNPN makes a request for assistance, the Transition Assistance shall be provided by those staff identified by SNPN and the identified staff shall be resident in India until the completion of the Transition Assistance.

b. The Operator hereby acknowledges SNPN’s rights against it upon Termination and its corresponding obligations arising there from. The Operator undertakes to comply with and discharge promptly all such obligations.

9.3 SNPN’s Obligations

SNPN shall duly discharge and release to the Operator the final payment of the Operator Payment and other outstanding payments, if any, within 3 months from the Expiry Date, subject to SNPN’s right to deduct amounts towards:

a. carrying out works/jobs listed under Handback Requirements which have not been carried out by the Operator,
b. purchase of items, which have not been handed back to SNPN in terms of Clause 9.2(a)(iii), and
c. any outstanding dues, which may have accrued in respect of the Project during the OU Period.

10. Termination

This OU can be terminated:

10.1 In case of Operator default where:

(a) The liquidated damage is more than 10% of the bid security [on prorata basis applicable to that quarter] and has happened three consecutive quarter;
(b) There is persistent default [five continuous] by operator even after notice has been served by SNPN;
(c) The Net Operator payment payable by SNPN is negative and has happened in three consecutive quarter;

In all the above cases, the security deposit of the Operator shall be forfeited by SNPN and no payment shall be made, and it is obligatory on the Operator to vacate the properties / infrastructure facilities for which operator was rendering service within 21 (twenty one) days on the publication of termination of this OU.

10.2 In case of SNPN default where:

(a) SNPN has failed to pay to Operator in two consecutive quarters to operator’s payment;
(b) The Nagar Nigam has passed resolution on recommendation of MC to terminate this contract;

Upon publication of such termination order triggered by the abovementioned event the Operator is liable to get the performance security in full and payment dues from SNPN and shall vacate/ handover the asset to SNPN within 21 (twenty one) days.
Technical Specifications
SPECIFICATIONS FOR PIPE LINES

1. Excavation for Pipe Line Trenches

1.1. Excavation for Pipe Line Trenches
The excavation in hard rock will have to be carried out either by controlled blasting or chiseling, wedging or by mechanical means and the TENDERed rate is supposed to cover cost of all such means.

1.2. Site Clearance
The pipe line alignment shall be cleared of all bushes, shrubs, roots, grass, weeds and if required trees, coming in the alignment of pipe line in the trench width portion. The rates for excavation shall cover all such site clearance work and no extra payment will be allowed on this account.

1.3. Alignment marking
After the work site is cleared as above, pipe line alignment with required trench width shall be marked on the ground with apex points, curves etc, as shown on the drawings or as directed by the Engineer-in-Charge in charge for the stretch where the work is to be started. The contractor shall provide all labour, survey instruments, and materials such as strings, pegs, nails, bamboos, stones, mortar, concrete etc. required for setting out and establishment of bench marks. The contractor shall be responsible for the maintenance of bench marks and other marks and stakes as long as they are required for the work in the opinion of the Engineer-in-Charge.

1.4. Working survey
Working survey of the pipeline alignment shall be carried out by the contractor before start of the excavation work. The contractor shall provide all the instruments such as leveling instruments, steel tape, ranging rods, strings, pegs etc for carrying out the survey. Based on the working survey, the alignments, L-section (depth of laying), grade, and location of specials, valves and chambers shall be finalized and got approved from the engineer in charge. The gradient and alignment shall be such that minimum horizontal and vertical bends shall be required.

1.5. Use of Machinery:
All excavations shall be carried out by mechanical equipments / machinery unless, in the opinion of the Engineer-in-Charge, the work involved and time schedule permit manual excavation.

1.6. Trench Width and Depth:
All buried pipelines shall be minimum 1 meter +/- 0.2 mtr below ground level to maintain proper grade unless other depths are approved by the engineer in charge. The trench width for respective pipe diameters permissible as required under respective IS code for Pipeline laying and installation.

The trench width shall be constant through out the trench depth, which will provide a clearance of about 0.30 m on either side of the pipe line.

The contractor may, for the facility of work or similar other reasons, excavate and also backfill later, if so approved by the Engineer-in-Charges, at his own cost, outside the allowable trench width specified above. Should any excavation be taken below the specified trench bottom, contractor shall fill it up to required level, at his own cost, with the same material available at the trench bottom including watering and compaction.

The excavation shall be taken down to such depths as shown in drawings. Excavation for extra depth equal to the thickness of proposed pipe bedding shall be done below pipe soffit level for providing bedding below pipe line wherever bedding is required. The trench bottom shall be excavated to proper grade as shown on drawings. The contractor shall provide site rails and leveling instruments required for checking the grade during excavation, bottom bedding and pipe laying. Projections in rock excavation shall be removed by chipping.
The contractor shall carry out extra excavation at the pipeline joints to be welded in the trench, as required (minimum 0.6 m deep and 0.9 m lengthwise, all around the pipe), for facilitating proper welding of the bottom joint from out side. The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 500 m ahead of work of laying and jointing of pipeline unless otherwise permitted by the Engineer-in-Charge.

The minimum cover on pipe is to be maintained 1 meter+/− 0.2 mtr. However the cover on pipe may be modified to suite gradients and site conditions as per direction of Engineer-in-Charge.

1.7 Barricading and Guarding:
To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, red lanterns and guards as required shall be placed and maintained. During the progress of work, till filling of the trenches after pipes are laid and jointed. The lighting, barricading, guarding of the trenches and the maintenance of watchman shall be done by the contractor at his cost.

All precautions shall be taken during excavation and laying operation to guard against possible damage to any existing structures, under ground cables, pipe lines of water, gas, sewage etc. Any damage done to such properties will have to be repaired / rectified by the contractor at his cost. The Contractor has to ensure the following:

• safety protections as mentioned above have to be incorporated in the work process
• hindrances to the public have to be minimized
• the trench must not be eroded before the pipes are laid
• the trench must not be filled with water when the pipes are laid
• the trench must not be refilled before laying of the pipes

The bed for the laying of the pipes has to be prepared according to the L-Section immediately before laying of the pipes.

1.8 Reuse of surface material
All surface materials, which in the opinion of the Engineer-in-Charge, suitable for reuse in restoring the surface shall be kept separate from the general excavation material, as directed by the Engineer-in-Charge.

1.9 Stacking of excavated material
All excavated materials shall be stacked in such a manner that it does not endanger the work and avoids obstructing foot paths and roads. Hydrants under pressure, surface boxes, fire and other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean or other necessary provisions made for street drainage and natural water courses shall not be obstructed. All the excavated material shall be the property of the Employer and shall be stacked or disposed off as directed by the Engineer-in-Charge.

1.10 Maintenance of traffic
The work of excavation and pipe laying shall be carried in such a manner that it causes the least interruption to traffic and the road / street may be closed in such a manner that it causes the least interruption to the traffic. Where it is necessary for traffic to cross open trenches, suitable bridging arrangement shall be provided. When the street is closed for traffic, suitable signs indicating that street is closed shall be placed and necessary detour signs for proper maintenance of traffic shall be provided.

1.11 Structure protection
Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of work shall be furnished under the direction of the Engineer-in-Charge. The structures which have been disturbed shall be restored upon completion of work.

1.12 Protection of property
Trees, shrubbery fences, poles and all other property shall be protected unless their removal is allowed by the Engineer-in-Charge. When it is necessary to cut roots and tree branches, such cutting shall be done under the supervision and direction of the Engineer-in-Charge.

1.13 Avoidance of existing services
As far as possible, the pipeline shall be laid below existing services, such as water and gas pipes, cables, cable ducts and drains but not below sewers. Excavation of the trenches shall be carried out to the required depth accordingly. If it is unavoidable, the pipeline shall be suitably protected and lesser trench depth in such cases can be allowed. A minimum clearance of 150 mm shall be provided between the pipeline and such other services. When thrust or auger boring is proposed for laying pipeline across roads, railway or other utilities, larger clearance as required shall be provided. Adequate arrangements shall be made to protect and support the other services during excavation and pipe laying operations. The work shall be so carried out as not to obstruct access to the other services for inspection, repair and replacement. When such utilities are met with during excavation, the authority concerned shall be intimated and arrangements made to support the utilities in consultation with them.

1.14. Bailing out of Water

a) During the excavation if subsoil water is met with, contractor shall provide necessary equipment and labour for dewatering the trenches. If pumping out subsoil water is found necessary, contractor shall provide sufficient number of pumps for the same. The TENDERed rate shall cover all costs for bailing out of water including hire charges of pumps, cost of diesel and labour etc and hence, no extra payment shall be allowed.

b) Disposal of drainage of Water Treatment Plant and Sump is to be made up to the nearby Nallah. Which is included in scope.

1.15. Disposal of loose boulders etc

All loose boulders, semi detached rocks, (along with earthy stuff which might move therewith), not directly in the excavation but close to the area to be excavated, as to be liable, in the opinion of the Engineer-in-Charge, to fall or otherwise endanger the workman equipments, or the work etc, shall be stripped off and removed away from the area of the excavation. The method used shall be such as not to shatter or render unstable or unsafe the portion which was originally sound and safe. The TENDERed rate is supposed to cover this job and no extra payment will be allowed on this account.

1.16. Disposal of Excavated Material

All the excavated surplus material shall be disposed off on low lying Government land or as directed by the engineer in charge.

1.17. Moorum / Sand Bedding below Pipeline

In case of hard rock and black cotton soil, before lowering of the pipes in trenches, a layer of selected moorum, available from excavated material under the same contract shall be provided below the pipe line to act as bedding. The bedding shall be compacted properly including required watering and the thickness of well compacted layer shall not be less than 150 mm. The bedding shall be provided for full trench width with proper grade as shown on drawings.

2. Refilling the trenches

2.1. Use of selected excavated material

Filling of excavated material in trenches shall be commenced as soon as the joints of pipes and specials have been tested and passed. The backfilling material shall be properly consolidated by watering and ramming, taking due care that no damage is caused to the pipes and the outer coating.

Selected surplus spoils from excavated material shall be used as backfill. Fill material shall be free from clods, salts, sulphate, organic or other foreign material. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill up the voids and the mixture used for filling.

2.2. Filling zones

For the purpose of back-filling, the depth of the trench shall be considered as divided in to the following three zones from the bottom of the trench to its top:
### Zone A:
| From the bottom of the pipe (top of bedding) to the level of the centre line of the pipe | Back-filling by hand with selected approved material available from excavation, placed in layers of 150 mm and compacted by tamping. The back-filling material shall be deposited in the trench for its full width on each side of the pipe, specials and appurtenances simultaneously. Special care shall be taken to avoid damage of the pipe and the coating or moving of the pipe. |

### Zone B:
| From the level of the centre line of the pipe to a level 300 mm above the top of the pipe | Back-filling and compaction shall be done by hand or approved mechanical methods in layers of 150 mm; special care shall be taken to avoid damage of the pipe and the coating or moving of the pipe. |

### Zone C:
| Back-filling shall be done by mechanical methods in 15 cm. |

2.3. All excavations shall be backfilled to the level of the original ground surfaces unless otherwise shown on the drawings or ordered by the Engineer-in-Charge in Charge, and in accordance with the requirements of the specification. The material used for backfill, the amount thereof, and the manner of depositing and compacting shall be subject to the approval of the Engineer-in-Charge in Charge, but the Contractor will be held responsible for any displacement of pipe or other structures, any damage to their surfaces, or any instability of pipes and structures caused by improper depositing of backfill materials.

The back filled layers shall be wetted and compacted to a density of not less than 90 percent of the maximum dry density at optimum moisture content of the surrounding material. Any deficiency in the quantity of material for backfilling the trenches shall be supplied by the Contractor at his expense.

The Contractor shall at his own expense make good any settlement of the trench backfill occurring after backfilling and until the expiry of the defects liability period.

On completion of pressure and leakage tests exposed joints shall be covered with approved selected backfill placed above the top of the pipe and joints in accordance with the requirements of the above specifications. The Contractor shall not use backfilling for disposal as refuse or unsuitable soil.

2.4. **Fillings of the trench excavated in rock**

In case of excavation of trenches in rock, the filling up to a level of 30 cm above the top of the pipe shall be done with fine materials, such as soft soil, murrum etc. The filling up of the level of the centre line of the pipe shall be done by hand compaction in layers not exceeding 15 cm, whereas the filling above the centre line of the pipe shall be done by hand compaction or mechanical means in layers not exceeding 15 cm. The filling from a level of 30 cm above the top of the pipe to the top of the trench shall be done by mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.

2.5. **Consolidation**

The consolidation of the filled material shall be done to attain 95 % proctor density. The density of the filled and compacted material shall be tested regularly and record maintained accordingly.

2.6 **Road Restoration**

The contractor shall be restoring the road after laying & jointing of pipe & refilling of trench. The restoration work shall include WBM & Bituminous/cc surface of thickness & design mix as directed by EIC.

3.0 **PIPES** (Pipes shall be procured only from the Manufactures.)

3.1 **Supply, laying and jointing of DI Pipes and fittings.**

The pipe to be supplied and laid under this contract shall be DI K-7/K-9 as per IS 8329-2000 Rubber Gaskets used with push-on joints or mechanical. All fittings
for the pipe shall conform to the provisions of IS 5382-1985, along with DI fittings confirming to IS 9523:1980 complete.

3.2 The laying of pipe shall be as per IS 12288:1987 with up to date amendments.

3.3 The manufacturer and their associates(if any) should have the facility to carry out the internal coating / lining and external coating / painting at factory for pipes and specials confirming to IS 11906:1986.

3.4 The DI pipe manufacturer should have valid BIS license from last 5 years (or valid BIS license from last 2 years with an experience of manufacturing and supplying atleast 500 kms of various diameters of DI pipe to any State/Central govt/ board/organization of repute in last 3 years) and the pipes should be manufactured conforming to IS 8329-2000 specification and further amendment to the code as on date and duty ISI marked.

3.5 The DI pipe manufacturer should have house facility for carry out the following test for size DN 80-DN1000:-
   a) C -value determination arrangement
   b) Type test for leak tightness as per ISO 2531:2009/BS EN 545/IS 8329:200.

3.6 DI pipe manufacturer should have the ISO 9001:2008 & ISO 2531:2009 certification for manufacture of DI pipe.

3.7 A certificate for having supplied DI pipe of size proposed in the project for quantity 1/3 of the TENDER requirement during last 3 years to any state/central govt. department /board to be submitted by pipe manufacturer.

The manufacturer should be able to demonstrate the conformity of the product to the requirement by controlling the manufacturing process and by carrying out the various tests as specified in IS wherever possible, statistical sampling techniques should be used to control the process so that the product is produced within the specified limit. Quality assurance program of the manufacturer shall be enclosed with the Tender.


4.1. Scope
This specification covers the requirements for successfully designing, manufacturing, supplying, laying, jointing and testing at works and site of High Density Polyethylene Pipes used for water supply. Use of HDPE Pipes of various diameters shall be as per relevant BIS /other standards marked with Pressure class of PN 6.

4.1.2 Applicable Codes
The manufacturing, testing, supplying, laying, jointing and testing at work sites of HDPE 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 standards / Codes, this Specification shall govern.

Others Codes not specifically mentioned here but pertaining to the use of HDPE pipes form part of these Specifications.

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Title/Specification</th>
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<tbody>
<tr>
<td>IS 4984</td>
<td>High Density Polyethylene Pipes for Water Supply</td>
</tr>
<tr>
<td>IS 2530</td>
<td>Methods of test for polyethylene moulding materials and polyethylene compounds DI K7 Pipes, Joints and Fittings for use for Potable Water Supply</td>
</tr>
<tr>
<td>IS 5382</td>
<td>Rubber sealing rings for gas mains, water mains and sewers.</td>
</tr>
<tr>
<td>IS 4905</td>
<td>Methods for random sampling</td>
</tr>
<tr>
<td>IS 7328</td>
<td>High density polyethylene materials for moulding and extrusion</td>
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<tr>
<td>IS 7634</td>
<td>Laying &amp; Jointing of Polyethylene (PE) Pipes</td>
</tr>
<tr>
<td>IS 9845</td>
<td>Method of analysis for the determination of specific and/or overall migration of constituents of plastics material and articles intended to come into contact with foodstuffs</td>
</tr>
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</table>
4.1.3 Designation
4.1.3.1 Pipes shall be designated as per IS 4984, according to the grade of material, followed by pressure rating and nominal diameter, for example, PE 100 PN 10 DN 200 indicates a pipe pertaining to material grade 100 having a pressure rating 1.0 MPa and outside nominal diameter 200 mm.

4.1.4 Colour
The color of the pipe shall be black.

4.1.5 Materials
The material used for the manufacturer of pipes should not constitute toxicity hazard, should not support microbial growth, should not give rise to unpleasant taste or odour, cloudiness or discoloration of water. Pipe manufacturers shall obtain a certificate to this effect from the manufacturers of raw material by any internationally reputed organization as per the satisfaction of the Engineer-in-Charge in charge.

4.1.6 Raw Material
(a) Raw material used to manufacture the HDPE pipes shall be PE 100, pre-compounded PE resin confirming to IS: 4984, IS: 7328 and ISO: 4427-2007. For this a certification has to be given by the resin manufacturer as per clause 3.2.3 of IS: 4984. The resin proposed to be used for manufacturing of the pipes should also comply with the following norms as per ISO 9080-2003.
(b) 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 10 MPa for PE 100 resin. Internal certificate of any resin manufacturer will not be acceptable.
(c) Certificate from reputed organization OR Raw material supplier 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-50-T-003 of IS 7328. HDPE conforming to designation PEEWA-50-T-003 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.
(d) The specified base density shall be between 940 kg/ m³ and 958 kg/ m³ (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 3 kg/ m³ as per 5.2.1.1 of IS 7328. The MFR of the material shall be between 0.20 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 percent of the value declared by the manufacturer.
(d) 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.

4.1.7 Anti-oxidant
The percentage of anti-oxidant used shall not be more than 0.3 percent by mass of finished resin. The anti-oxidant used shall be physiologically harmless and shall be selected from the list given in IS 10141

4.1.8 Reworked Material
No addition of Reworked/ Recycled Material from the manufacturer’s own rework material resulting from the manufacture of pipes is permissible and the vendor is required to use only 100% virgin resin compound.

4.1.9 Maximum Quality of Pipe
The outside diameter of pipes, tolerance on the same and quality of pipe shall be as given in table 2 of IS 4984. 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. For pipes to be coiled the quality
shall be measured prior to coiling. For coiled pipes, however, re-rounding of pipes shall be carried out prior to the measurement of quality.

4.1.9.1. Detect ability
HDPE Pipes should be detectable when buried underground, by providing a copper wire of 1.50 sq.mm +/- 0.2 sq.m, co-extruded or fixed on to the pipe with the help of superior quality adhesive tape on the outer surface as provided in IS 7634 part II in such a way that in no way it affects the pipes’ conformity to relevant BIS codes.

4.1.10 Length of Straight Pipe
The length of straight pipe used shall be minimum 6 mtr or as agreed by Engineer-in-Charge. Short lengths of 3 meter (minimum) up to a maximum of 10% of the total supply may be permitted.

4.1.11 Coiling
The pipes supplied in coils shall be coiled on drums of minimum diameter of 25 times the nominal diameter of the pipe ensuring that kinking of pipe is prevented. Pipe beyond 110mm dia shall be supplied in straight length not less than 6m.

4.1.12 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. IS 4984:1995 will be followed for visual appearance.

4.1.13 Handling, Transportation Storage and Lowering of pipes
During handling, transportation, storage and lowering, 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. The following procedures should be followed so as to eliminate potential damage to pipes and fittings and to maintain maximum safety during unloading, lifting and lowering.

- 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.
- During coiling care should be taken to maintain the coil diameter at or above the specified minimum to prevent kinks. Coiling shall be done when the pipe attains the ambient temperature from the extruder. In uncoiling or recoiling care should be taken that sharp objects do not scour the pipe.
- When releasing coils, it must be remembered that the coil is under tension and must be released in a controlled manner. The end of the coil should be retained at all times, then the straps released steadily, one at a time. If the coil has bands at different layers of the coil, then they should be released sequentially starting from the outer layers. The amount of the energy locked up in the coil will depend on the size of the pipe, the SDR of the pipe, and the size of the coil.
- Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set.
- Bare coils shall be wrapped with hessian cloth for long distance (> 300Kms) transportation. The truck used for transportation of the PE pipes shall be exclusively used of PE pipes only with no other material loaded – especially no metallic, glass and wooden items. The truck shall not have sharp edges that can damage the Pipe.
- 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 Engineer-in-Charge.
- 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 Engineer-in-Charge.

4.1.14 Lowering, Laying of Pipes
- Each pipe shall be thoroughly checked for any damages before laying and only the pipes which are approved by the Engineer-in-Charge shall be laid.
- While installing the pipes in trenches, the bed of the trench should be level and free from sharp edged stones. In most cases, the bedding is not required, as long as the sharp and protruding stones are removed, by sieving the dug earth, before using the same as backfill material. While laying in rocky areas suitable bed of sand or gravel should be provided. The fill to about 10 to 15 cm above the pipe should be fine sand or screened excavated material. Where hard rock is met with, bed concrete M15, 15 cm or 20cm thick sand bed as approved by the Engineer-in-Charge may be provided.
- As PE pipes are flexible, long lengths of Electro/Butt-fusion jointed pipes having joints made above ground can be rolled or snaked into narrow trenches. Such trenches can be excavated by narrow buckets.
- During the pipe laying of continuous Electro/Butt-fusion jointed systems, due care and allowance should be made for the movements likely to occur due to the thermal expansion/contraction of the material. This effect is most pronounced at end connections to fixed positions (such as valves etc) and at branch connections. Care should be taken in fixing by finishing the connections at a time the length of the pipe is minimal (lower temperature times of the day.)
- For summer time installations with two fixed connection points, a slightly longer length of PE pipe may be required to compensate for contraction of the pipe in the cooler trench bottom.
- The final tie-in connections should be deferred until the thermal stability of the pipeline is achieved.
- The flexibility of polyethylene pipes allows the pipe to be cold bend. The fusion jointed PE pipe is also flexible as the plain Pipe. Thus the total system enables directional changes within the trench without recourse to the provision of special bends or anchor blocks. However, the pipe should not be cold bend to a radius less than 25 times the OD of the pipe.
- The installation of flanged fittings such as connections to sluice/air/gate valves and hydrant tees etc., requires the use of stub ends (collars/flange adaptors complete with backing rings and gaskets. Care should be taken when tightening these flanges to provide even and balance torque.
- Provision should be made at all heavy fittings installation points for supports (such as anchoring of the flange in the soil) for the flange joint to avoid the transfer of valve wheel turning torque on to the PE flange joint.
- PE pipe is lighter than water. Hence care should be taken for normal installations where there could be a possibility of flooding of the trench thus the trench shall be kept free of water till the jointing has been properly done.
- When flooded, some soils may lose cohesiveness, which may allow the PE pipe to float out of the ground. Several design checks are necessary to see if groundwater flotation may be a concern. Obviously, if the pipeline typically runs full or nearly full of liquid, or if groundwater is always below the pipe, flotation may not be a significant concern.
• However, weights by way of concrete blocks (anchors) are to be provided so that the PE pipe does not float when suddenly the trench is flooded and the soil surrounding the pipe is washed away. Thus site conditions study is necessary to ensure the avoidance of flotation.
• Pipe embedment backfill shall be stone-free excavated material placed and compacted to the 95% maximum dry density.

4.1.15 The pipe ends shall be suitable for Electro-fusion/ Butt- Fusion jointing system that shall provide for fluid tightness for the intended service conditions.

4.1.16 Bedding, Backfilling and Compaction

4.1.17 Bedding
In case of sandy strata no separate bedding is required. However the bottom face / trench bed where pipe shall be placed shall be compacted to provide a minimum compaction corresponding to 95% of maximum dry density. The pipe bedding should be placed so as to give complete contact between the bottom of the trench and the pipe. The minimum cover over buried pipe should be 1 m.

4.1.18 Back Filling
Backfilling should be placed in layers not exceeding 15cm thickness per layer, and should be compacted to a minimum of 95% maximum dry density. The refilling should be done on both sides of pipe together & height difference in earthfill on each side should not be more to cause lateral movement of pipe.
Most coarse grained soil are acceptable. This may comprise of gravel or sand. However silty sand, clayey sand, silty and clayey gravel shall not be used unless proposed to be used in conjunction with gravel or clean sand.
It is very important that the pipe zone backfill material does not wash away or migrate in to the native soil. Like wise, potential migration of the native soil in to the pipe zone backfill must also be prevented.
Heavy earth moving equipment used for backfilling should not be brought until the minimum cover over the pipe is 90 cm in the case of wide tracked bulldozers or 120 cm in the case of wheeled roaders or roller compactors.

4.1.19 Compaction
Vibratory methods should be used for compaction. Compaction within distances of 15 cm to 45 cm from the pipe should be usually done with hand tampers. The backfill material should be compacted not less than 95% of maximum dry density.

4.1.20 Thrust Block
RCC thrust blocks, if required, should be suitably designed & provided at bends and at places of reduction in cross section to take care of thrust as required as per the provisions of relevant standards/codes.

4.1.21 Fittings & Specials
All HDPE fittings/ specials shall be of minimum PN 6 or above Pressure class, fabricated in accordance with IS: 8360 (Part I & III). PE Injection moulded fittings shall be as per IS: 8008 (Part I to IX). All fittings/specials shall be fabricated or moulded at factory only. No fabrication or moulding will be allowed at site, unless specifically permitted by the Engineer-in-Charge. Fittings will be Butt welded on to the pipes or other fittings by use of Electro/Butt fusion process. Recommended makes for PE / PP fittings / specials are Georg-Fischer / Glyned / Frialen / Durafuse if purchased or should be manufactured by the manufacturer himself to have consistency with pipe material/grade.

4.1.22 Bends
HDPE bends shall be plain square ended conforming to IS: 8360 Part I & III Specifications. Bends shall be moulded.

4.1.23 Tees
HDPE Tees shall be plain square ended conforming to IS: 8360 Part I & II Specifications. Tees may be equal tees or reduced take off tees. Tees shall be moulded or fabricated from pipe elements.
4.1.24 **Reducers**
HDPE Reducers shall be plain square ended conforming to IS: 8008 Part I & VII Specifications. Reducer must be moulded.

4.1.25 **Flanges/ HDPE Pipe Ends**
HDPE Stub ends shall be square ended conforming to IS: 8008 Part I & VI Specifications. Stub ends will be welded on the pipe. Flange will be of slip on flange type as described below.

4.1.26 **Slip-On Flanges**
Slip-on flanges shall be metallic flanges covered by epoxy coating or plastic powder coating. Slip-on-flanges shall be conforming to standard mating relevant flange of valves, pipes etc. Nominal pressure rating of flanges will be PN10.

4.1.27 **Welding Procedure**
Jointing between HDPE pipes and specials shall be done as per the latest IS: 7634 part II. Method of jointing between the pipes to pipes and pipes to specials shall be with Electro or Butt-fusion welding using automatic or semi automatic, hydraulically operated, superior quality Electro/Butt-fusion machines which will ensure good quality welding of HDPE pipes.

Normally Electro/Butt fusion welding shall include following activities:
- Aligning of pipe on welding M/C
- Surface preparation for welding.
- Heating of pipes/ ends
- Holding pipes for welding
- Cooling etc.

4.1.28 **Hydraulic Testing**
Pipes shall be given different hydraulic tests for ensuring quality of manufacture as per clause 16.9.5.6.2 of Standard Specification.

4.1.29 **Site Fabrication of PE Fittings**
Two or more PE specials coming at one place (like PE Tee, Reducer, Flanged end etc.,) shall be jointed at contractor’s workshop and transported to the site of works for final installation with proposed PE pipelines. In no case, jointing of three or more welds in one place, at site will be allowed.

4.1.30 **Training**
The Contractor shall provide on-site training on PE pipe laying, jointing, testing and maintenance etc., to the personnel authorized by EMPLOYER.

4.1.31 **Manuals**
Technical Manual on PE pipes including precautions to be taken during operation of the pipeline shall be prepared and submitted by the contractor immediately on completion of work.

4.1.32 **Flanges**
All flanges employed in the project must be compatible whatever material used.

4.1.33 **Marking**
All pipes shall be marked at maximum interval of 1 m. The marking shall indicate at least the following information.
1) Manufacturer’s name & / or trade mark.
2) The dimensions (nominal outside diameter X nominal wall thickness)
3) The outside diameter tolerance (A or B)
4) The designation of pipes material (PE 100, PE 80 etc)
5) The nominal pressure (PN)
6) The production period (date or code)
7) The number of the International standard.
8) The word “Water” shall also be included.
9) Lot number/Batch Number
### 4.1.34 Packing & Transport

The pipes should be preferably transported by road from the factory and stored as per the manufacturer specifications to protect damage.

### 4.1.35 Summary of quality Tests:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality Mark: Pipe: IS 4984</td>
</tr>
<tr>
<td>2</td>
<td>Material: As per IS 4984. However only virgin resin is allowed, reworked material is not allowed.</td>
</tr>
<tr>
<td>3</td>
<td>Grade of Material: PE 100 as per IS 4984 (Certificate from raw material manufacturer is required).</td>
</tr>
<tr>
<td>4</td>
<td>Pressure Rating: Minimum PN 6 or above as per requirement.</td>
</tr>
<tr>
<td>5</td>
<td>Colour: as per IS 4984</td>
</tr>
<tr>
<td>6</td>
<td>Dimensions:</td>
</tr>
<tr>
<td></td>
<td>Diameter: The nominal diameter (outside)</td>
</tr>
<tr>
<td></td>
<td>Wall thickness: As per IS 4984</td>
</tr>
<tr>
<td></td>
<td>Length:</td>
</tr>
<tr>
<td>i</td>
<td>For diameter up to 110 mm: min 6 mtr max. 100 meter</td>
</tr>
<tr>
<td>ii</td>
<td>For diameter more than 110 mm: minimum 6 mtr</td>
</tr>
<tr>
<td></td>
<td>(Tolerance as per IS 4984)</td>
</tr>
<tr>
<td>7</td>
<td>Visual Appearance: as per IS 4984</td>
</tr>
<tr>
<td>8</td>
<td>Test and sampling: as per IS 4984</td>
</tr>
<tr>
<td>9</td>
<td>Special Test:</td>
</tr>
<tr>
<td></td>
<td>Notch hydraulic Test for the HDPE pipe made from PE-100 grade raw material as per ASTM 1474 OR ISO 13479 at manufacturers laboratory or independent laboratory and should pass the Hydraulic test as per IS:4984:1995 for a minimum 165 Hours. The test reports shall not be more than three months old. Pipe shall convey water under variable temperature conditions ranging from 4 degree centigrade to 45 degree centigrade.</td>
</tr>
<tr>
<td>10</td>
<td>Jointing of pipes (pipe end):</td>
</tr>
<tr>
<td></td>
<td>For diameters up and more than 110 mm diameter: Butt or Electro-fusion Process</td>
</tr>
<tr>
<td>11</td>
<td>Quality Assurance: Quality Assurance Plan shall be got approved from the employer before production start.</td>
</tr>
</tbody>
</table>

**BIS License**

The pipe manufacturer who is going to supply the pipes for the project has to have a valid BIS license. The Bidders shall include this valid license along with the Tender from the proposed pipe/ fittings manufacturer.

**Performance requirements**

The pipe supplied should have passed the acceptance tests as per clause given in specified standards. The manufacturer should provide the test certificates for the tests conducted, as required in specified standards along with the supply of pipes. These acceptance tests can be performed in the in-house laboratory of the pipe manufacturer. The Employer will depute one person to be positioned at the pipe manufacturing facility of the successful Contractor. This deputed person will check and approve each lot of the pipes manufactured before they leave the factory after ensuring that they are meeting the required specifications.

**Note:** All remaining parameters / specifications shall be as per respective IS.

**5. Field Hydraulic testing of the pipelines**

**a. Sectional tests**

After laying and jointing the pipeline shall be tested for tightness of barrels and joints, and stability of thrust blocks in sections approved by the Engineer-in-Charge in Charge.
The length of the sections depends on the topographical conditions. Preferably the pipeline stretches to be tested shall be between two chambers (air valve, scour valve, bifurcation, other chamber). At the beginning, the Contractor shall test stretches not exceeding 1 km. After successful organization and execution of tests the length may be extended to more than 1 km after approval of the Engineer-in-Charge in Charge. The hydraulic testing shall have to be commenced immediately after laying and jointing of 1 km reach is completed.

The water required for testing shall be arranged by the contractor himself. The Contractor shall fill the pipe and compensate the leakage during testing. The Contractor shall provide and maintain all requisite facilities, instruments, etc. for the field testing of the pipelines. The testing of the pipelines generally consists in three phases: preparation, pre-test/saturation and test, immediately following the pre-test.

6. **Flushing and disinfecting of pipelines**

After testing and commissioning the contractor shall flush the pipes with a velocity not less than 1 m/s or as approved by the Engineer-in-Charge in Charge. Disinfection of drinking water pipelines should be done by Contractor.

7. **Above ground pipeline**

DI K9 pipe of appropriate size, conforming to IS : 8329 or MS pipes of appropriate size and thickness, conforming to IS :3589 will be used wherever the pipeline is laid above ground. MS pipes will be in-lined and out-coated with 15 mm thick Cement concrete mortar or Epoxy coating of 400 Micron DFT.

8. **Flow measuring devices:**

Electromagnetic Flow Meter of appropriate size shall be provided along with 8 hour Battery back-up, at inlet and outlet of the Raw water and Clear water pipeline and Feeder pipeline outlet at RCC Over head tanks; to check losses and measure the quantity of water. Reading display of all the Flow meters, alongwith data logging instruments should be made available at single point, wherever decided by the Engineer-in-charge.

All the Electromagnetic Flow meters shall have the same make and salient features as under.

Coil housing of the Electromagnetic flow meters of fully welded SS-316 and Flow-tube lining of PTFE / EPDM / Neoprene.

Recommended make : Krohne-Marshall / Yokogawa / Emerson- Rosemount.

9. **Technical Qualifications for procurement of pipes during construction:**

9.2. **H.D.P.E. Pipe:**

9.2.1. The Pipe manufacturer should have an annual installed production capacity of quantity equal to this TENDER.

9.2.2 The manufacturer should hold valid IS license under IS:4984 consecutively for last five years to manufacture ISI marked pipes.

9.2.3 The Pipe manufacturer should have manufactured and supplied in India at least HDPE Pipe of minimum 110 mm or above dia. More than required in this TENDER during past 3 years ending 2012. Self certified document from HDPE Pipe Manufacturer to be attached alongwith technical Tender.

10. **Technical Qualifications for Bidder:**

10.1 The Bidder should have successfully executed one job of Supply, laying and commissioning of ISI marked HDPE Pipeline, complete in all respects on Turn-key basis having cost 50% of the proposed works.

11.0 **Installation and Commissioning of HDPE pipes**

11.1 Installation

a. Supplying, laying, jointing, testing and commissioning of pipes shall conform to relevant IS codes, as applicable.

b. The alignment of pipelines shown in drawings of the TENDER documents is only indicative and the exact alignment will be as per drawings and/or as directed by the Engineer or his representative.

12.0 **Field Hydraulic Test**

a. The Sectional Hydraulic Test shall be carried out after the pipeline section to be tested has been laid jointed and backfilled to a depth sufficient to prevent floatation
b. Each length of the pipeline to be tested shall be capped or blanked off at each end and securely strutted or restrained to withstand the forces which will be exerted when the test pressure is applied.

c. Proposals for testing where thrusts on structures are involved, even where thrust flanges on the piping are installed, shall be with the prior approval of the Engineer.

d. The proper method of filling the pipeline with water shall be used. The length under test shall be filled making certain that all air is displaced through an air valve or any other appropriate mechanism. The test length shall then remain under constant moderate pressure as per testing method given in the IS 7634.

e. As per IS code water required to built up allowable drop in pressure during test will be treated as a make up water.

f. The maximum allowable test pressure shall be 1.5 times the system design pressure or pipe rating which ever is higher

g. Notwithstanding the satisfactory completion of the hydraulic test, if there is any discernible leakage of water from any pipe or joint, the Contractor shall, at his own cost, replace the pipe, repair the pipe or re-make the joint and repeat the hydraulic test with cost including the cost of water.

h. Test pressures are to be measured in kg/cm² at the centre of the blank flange situated at the lowest end of the pipeline under test. Unless otherwise specified the test pressure shall be as stated below.

13.0 INSTALLATION OF VALVES

General
The installation of valves shall be made according to the instructions of the manufacturer and the Engineer.

Installation of valves
Butterfly/Sluice valves shall be installed between flanges according to the instructions of the manufacturer.

Valves shall be placed on a support of concrete so that no shear stress is in the flanges. In case of axial thrust due to closure of a valve against pressure the valve shall be anchored in the support in a suitable manner to transfer the thrust into the floor slab of the chamber.

Air valves shall be installed on top of air valve tees.

SLUICE VALVES

DESIGN REQUIREMENT

A. Sluice valves shall generally conform to IS 14846/BS EN 1171/DIN 3352. Additionally, they should also meet specific requirement as stated.

B. Spindle, thrust collar and operating arrangement including hand wheel should be designed in such a way that one adult male is able to operate the valve against full differential pressure by exerting no more than 8 kgf effort (pull and push) on the hand wheel.

FEATURES OF CONSTRUCTION

a. Valves shall have inside screw, non rising spindle.

b. Valves shall be with appropriate bushing arrangement for replacement of packing without leakage (350 mm ø and above), up to 350 mm ø valves shall be glanduss.

c. Valves 450 mm ø & above shall be provided with an antifriction device / ball thrust bearing arrangement to minimize friction between spindle collar and casting. These should be housed away from wet chamber and should have facility for periodic greasing.

d. Valves of size 450 mm ø and above shall be provided with enclosed, grease packed spur gear box.

e. Valves 450 mm ø and above shall be provided with a drain and air plug.

f. All valve doors when fully closed would ensure door faces are riding on body seat ring by at least 50% of the width of seat ring and there is sufficient room for wear travel. Applicable for valves 350 mm and above., up to 300 mm valves shall be resilient seated.
g. All face and seat rings will be force/press fitted and additionally riveted (300 ø & above) to the recess in the CI casting. No screws are allowed.

h. Spindle, thrust collar and operating arrangement including hand wheel should be designed in such a way that one adult male is able to operate the valve against full differential pressure by exerting no more than 80 N effort (pull and push) on the hand wheel. Only single start, square threads with a pitch not exceeding 12 mm in the spindle be used.

i. Manufacturer to give details of gear box proposed – no. of spur pair, ratio, efficiency etc.

j. Manufacturer to justify with calculation that the valve proposed is operable within the effort parameters specified and no. of turns to ensure the time required to operate the valve from full open to full close is within reasonable limits. This is a vital requirement.

k. Nominal size of the valve shall be cast on the body of the valve.

DATA:

1. Size : 300 mm to 1000 mm

2. Rating (Kg/sq.cm) : PN 1.0

3. Drilling : IS 1538 Table 4 & 6 / relevant ISO with latest amendments/ BS EN 1092-2

4. Material of construction :
   - Body : DI IS 1865 Gr. 500/7 ; 400/15 or CI IS 210 Gr. FG 200 for PN 1.0 (all sizes)
   - Wedge : DI IS 1865 Gr. 500/7 ; 400/15 (fully rubber lived EPDM, upto 300 mm) or CI IS 210 Gr. FG 200 for PN 1.0
   - Spindle : St. St. AISI 410 / 316 / relevant ISO with latest amendments
   - Seat & face rings : Bronze IS 318 LTB II 6 / relevant ISO with latest amendments (for 350 mm above)
   - Drain & air plug : Bronze IS 318 LTB II 6 / relevant ISO with latest amendments
   - Ball thrust bearing : SKF or equivalent
   - Bushing arrangement : Halprene on bronze
   - Rivets : Soft annealed brass
   - Gland packing : Teflon coated / graphited asbestos / hemp
   - Fasteners : Carbon Steel

SHOP TESTING:

HYDROTEST

- Seat leakage : 10 Kg/cm² (5 min) – for PN 1.0
- Back seat leakage : 5 Kg/cm² (2 min) – for PN 1.0
- Body : 15 Kg/cm² (5 min) – for PN 1.0

APPROVED MAKE : IVC / KIRLOSKAR / VAG / FOURESS/IVI
BUTTERFLY VALVES

a. Butterfly valves shall be of double eccentric and resilient sealed type generally as per BS EN 593, BS 5155 and IS 13095. Valves shall be installed in valve chambers. Valves shall be provided with stainless steel extension spindle so that valves can be operated from ground level and without entering the chamber.

b. Material of construction of butterfly valves shall comply with following requirements:

<table>
<thead>
<tr>
<th>Item</th>
<th>PN 1.0 Valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>Ductile IRON DIN 1693 – GGG40/spheriodal graphite icon IS 1865 Gr 400/12</td>
</tr>
<tr>
<td>Disk</td>
<td>Ductile IRON DIN 1693 – GGG40/spheriodal graphite icon IS 1865 Gr 400/12</td>
</tr>
<tr>
<td>Shaft</td>
<td>Stainless steel BS 970 Grade 431 S 29</td>
</tr>
<tr>
<td>Body Seat</td>
<td>Nickel weld overlay micro finished</td>
</tr>
<tr>
<td>Disc Seal</td>
<td>EPDM</td>
</tr>
<tr>
<td>Seal retaining ring</td>
<td>Ductile IRON DIN 1693 – GGG40</td>
</tr>
<tr>
<td>Shaft bearing</td>
<td>Bronze with EPDM ‘O’ ring seal</td>
</tr>
<tr>
<td>Internal Fasteners</td>
<td>Stainless steel SS 316</td>
</tr>
<tr>
<td>Nuts, Bolts &amp; washers for pipe flanges</td>
<td>High Tensile steel hot dip galvanized for valve in chamber. Stainless steel SS 316 for buried valves</td>
</tr>
<tr>
<td>Coating</td>
<td>Internal and external with power of liquid epoxy coating with minimum dry film thickness of 250 microns</td>
</tr>
</tbody>
</table>

c. Butterfly valves shall be suitable for mounting in any position. The valve shall be free from induced vibration.

d. Butterfly valve shall be suitable foe bi directional pressure testing with dead tight shut off even after long period of operation of 5 years. The valves shall be of double flanged long type.

e. The valve seal shall be of replaceable design. When the valve is fully closed, the seal shall seat firmly. The seat surfaces shall be machined smooth to provide a long life for the seal. All fasteners shall be set flush so as to offer the least resistance possible to the flow through the valve.

f. The shaft shall be stainless steel with bronze or equivalent seal with self lubricating bearings. Disc pin shall be stainless steel. Ring shall be Tenderirectional seal adjusting suitable for pressure and vacuum service. Removal and replacement of steel shall be possible without removing the operating mechanism, valve shaft and without removing the valve from the pipeline. Valve shaft shall be of one piece unit extending completely through the valve disc hubs.

g. All valve spindle and head wheels shall be positioned to give access for operational personnel. Valves shall be provided with enclosed gear arrangement for ease of operation. The gear box shall be worm and worm wheel design type totally enclosed grease filled and weather proof. The operation with gearing shall be such that they can be opened and closed by one man against an unbalanced head of 1.15 times the specified ratings. Valves and gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 200 N. The valve disc shall be 90 deg turn.

h. The disc shall be designed to withstand the maximum pressure differential across the valve in either direction of flow. The disc shall be contoured to ensure the lowest possible resistance to flow and shall be suitable for throttling operation.

i. It should be possible to open the valve with upstream pipe fully filled and down stream pipe fully empty. The shaft shall be designed to withstand the maximum torque that will be
imposed by the operator. It shall be secured to the disc by tapered stainless steel cotter pins.

j. Valve shall be provided with mechanism position indicator to show the position of the disc mounted on the driven shaft end.

k. Rigid adjustable stop mechanism shall be provided within the gear box or elsewhere on the valve to prevent movement of the disc beyond the fully opened or closed position (i.e. set points).

l. Valve shall be capable of closing against the maximum flow that can occur in practice. The break way torque against maximum differential head conditions shall be within the manufacturer's limits.

m. All hand wheels shall be arranged to turn in a clockwise direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels.

n. All hand wheels shall be provided with an internal locking device to prevent operation device by unauthorized person.

AIR VALVES

A SCOPE AND GENERAL DESIGN FEATURE

This section covers the requirements of double orifice type air valves with tamper proof cover to be used for evacuation of accumulation of air in water mains under pressure, for the exhaust of air when such mains are being charged with water and for inlet of air when they are emptied of water.

The working pressure of the air valves shall be 10 kg/cm² (PN 1).

B FUNCTION

Automatic air valves generally conforming to IS 14845 / relevant ISO with latest amendments are to be used for evacuation of accumulated air in water mains under pressure, for the exhaust of air when such mains are being charged with water and for ventilating the mains when they are being emptied of water.

C DESIGN FEATURES

a) Air valves shall be double orifice type and tamper proof unless otherwise directed by Engineer. A buoyant rigid float shall seal the large orifice and the chamber housing shall be designed to avoid premature closing of the valve by the air whilst being discharged. Small orifice shall discharge small air volume during operation under full internal pressures. All air valves shall be provided with isolating sluice valves and flanged end connection.

b) The valve shall be capable of exhausting air from pipe work automatically when being filled, the air being released at a sufficiently high rate to prevent the restriction of the inflow rate. Similarly the valve shall be capable of ventilating pipe work automatically when being emptied or under water hammer condition, the air inflow rate being sufficiently high to prevent the development of a vacuum in the pipelines. The valve shall also automatically release air accumulating in pipe work during normal working conditions.

c) The valves shall be designed to prevent premature closure prior to all air having been discharges from the line. The orifice shall be positively sealed in the closed position with the float only raised by the liquid and not by a mixture of air and liquid spray. The seating shall be so designed to prevent the float sticking after a long period in the closed position.

d) Air valves shall thus be designed to automatically operate so that they will:

- Positively open under internal pressure less than atmospheric pressure to admit air in bulk during pipeline draining operation;
- Exhaust air in bulk and positively close as water, under low head, fills the body of the valve during filling operation;
- Not blow shut under high velocity air discharge; and
- Exhaust accumulated air under pressure while the pipe is flowing full of water.

D CONSTRUCTION FEATURES

Material of construction of air valves shall comply with following requirements:
a) All air valves shall be constructed so that internal working parts which may become necessary for repairs shall be readily accessible, removable, and replaceable without used special tools and removing the valve from the line.

b) Valves with air intake or exhaust facilities shall have an integral protecting cover top shall be supplied to prevent dirt and debris from entering the outlet of the valve.

c) The contractor shall verify with the supplier of the valves that the valves have the capacity to sustain the pipeline test pressure prior to testing. In the event that the valves do not sustain the pressure they shall be removed and the stub pipes from the main pipeline blanked off before pressure testing the pipeline.

E DATA

<table>
<thead>
<tr>
<th>a)</th>
<th>Valve size</th>
<th>300 to 1000 mm dia</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>Suitable for max. differential pressure (kg/cm²)</td>
<td>10</td>
</tr>
<tr>
<td>c)</td>
<td>Material of construction Body and cover</td>
<td>CI IS 210 Gr FG 200 or SG iron 1865 Gr 400/12 or grade GGG40</td>
</tr>
<tr>
<td></td>
<td>Float</td>
<td>Rubber coated timber or Polycarbonate up to 50 NB/ SS 304 above 50 NB</td>
</tr>
<tr>
<td></td>
<td>Internal Linkages</td>
<td>SS 304</td>
</tr>
<tr>
<td></td>
<td>Seat Ring</td>
<td>Dexine (Nitrile Rubber) or bronze seat</td>
</tr>
<tr>
<td></td>
<td>Isolating Sluice Valve</td>
<td>Generally conforming to IS 14846/relevant ISO with latest amendments</td>
</tr>
<tr>
<td></td>
<td>Spindle for Sluice Valve</td>
<td>St. St. AISI 410</td>
</tr>
<tr>
<td></td>
<td>Bolts &amp; Nuts</td>
<td>M.S.</td>
</tr>
</tbody>
</table>

TESTING AND PERFORMANCE

a) When tested as per clauses 11.6.d.1, the air passage and the function of ball floats in a valve shall be satisfactory, and the valve shall work smoothly.

b) Hydrostatic test of valve body, when tested in accordance with 11.6.d.4 there shall be no leakage through pressure sustaining components and joints. There shall be no permanent deformation of any part.

c) Valve seat and cock, when tested in accordance with 11.6.d.2 and 11.6.d.3 shall not show any leakage.

d) Function and Performance Test

d.1 The valve shall be fitted on a test bench. The pressure of the water in pipe shall be developed to working pressure, and the main valve shall be gradually opened to check the air release and float function. Compressed air shall then be slowly put into the valve through underside of the valve, and check the function of floats.

d.2 High Pressure Orifice Seat Test

Subsequent to high pressure orifice performance test, hydraulic pressure shall be reduced up to half of the working pressure to check leakage of orifice seat for a duration of three minutes.

d.3 Low Pressure Orifice Seat Test

Subsequent to high pressure orifice performance test, hydraulic pressure shall be reduced up to half of the working pressure to check leakage of orifice seat for a duration of three minutes.

d.4 Body Test

The valve body (without cover and ball floats) shall be covered by a blank flange, keeping isolating valve open. Hydrostatic pressure of 1.5 times the pressure class of the valve shall be applied for duration of 5 minutes to check the water tightness of the body.

14 VALVE CHAMBERS

Valve chambers shall be constructed according to the typical drawings suitable for the respective valve and special arrangement if any shall be approved by Engineer. They
shall be constructed in brick masonry as shown in the drawing. The chambers shall be constructed after the laying of the pipes and the assembly of specials and valves. The size of the chambers shall be according to the following criteria as per direction of Engineer.

- Minimum distance of flanges from walls: 45 cm
- Minimum distance of sockets from walls: 45 cm
- Minimum distance between highest point of equipment and roof slab: 30 cm
- Maximum distance between highest point of equipment and roof slab: 50 cm

Pipes passing through walls should be coated by two layer of soft material (Hessian felt) to allow for differential settling and longitudinal expansion if directed by Engineer. Only metallic pipes may be cast into the walls for anchoring purposes.

The work shall include excavation, consolidation, leveling, lean concrete as per drawing in foundations, finishing, refilling. It shall include all labour and material required for the complete chamber.

15 DISMANTLING JOINTS

Double flanged Dismantling joints shall be of Cast Iron in such a manner that valves (300 mm and above dia) can be dismantled without stress to the joints. These shall be for working pressures of 10 kg/cm2 (1 Mpa) and shall be completely leak proof with proper gasket arrangement. Flange dimensions shall conform to IS 1538 (part I to XXII). Flanged specials shall be supplied with required nuts, bolts and rubber gaskets. The nuts and bolts shall be of best quality carbon steel, machined on the shank and electro-galvanized. Rubber gasket shall be as per IS 5382. Dimensions and drilling of flat gasket will be as per IS 1538 : 1993, suitable for making flanged joint. The dismantling pieces shall provide minimum clearance of + 25 mm (total distance 50 mm. The dismantling joint shall be internally and externally coated with hot applied (dip) bituminous paint.

16 THRUST BLOCKS

The thrust blocks shall be of plain/reinforced cement concrete on site as per design and drawings to be given by the Contractor and approved by the Engineer In Charge. The thrust blocks shall be cast directly against the undisturbed soil.

17 OTHER SERVICES

Contractor shall take the necessary precautions to avoid the damage to other services such as water supply lines, telephone cables, electrical cables, storm water drains etc. In case of any damages to any of the services, contractor shall be responsible for restoring the facilities in bare minimum time at his own cost.

18 REINSTATING THE ROAD SURFACE

Road restoration should be done just after proper backfilling of trenches. About 100 mm thick layer of stone dust/zeera gitti should be filled in trenches and making with adjacent road. Any settlement in trench should be immediately filled with stone dust/zeera gitti. WBM/Bituminous surface shall be made as directed by Engineer In Charge.
SPECIFICATION FOR CONSTRUCTION OF R.C.C. OVER HEAD WATER TANK

1. **PREAMBLE:**
   The work of the aforesaid Overhead tank is to be assigned on Lump Sum contract at Turn-key job basis.

2. **Scope of work:**
   Nine RCC Overhead tank as mentioned in Description of work is to be designed and tested on Lump sum contract.

   The work includes the following sub work:
   i. Investigation and testing for foundation.
   ii. Design and drawing of the structure.
   iii. Construction as per approved designed and drawing.
   iv. Providing and fixing of pipes, valves and other appurtenances.
   v. Testing of the structure for the water tightness and stability.

   All materials required for satisfactory completion of the work such as cement, steel, pipes, specials and valves shall be procured by the contractor himself. The water required for construction shall be arranged by the contractor but that required for testing and handed over to the department within the time period specified in the Notice inviting TENDER.

3. **LOCATION OF WORK:**
   Overhead tank site: Nine nos. 18 m staging OHT’s, 9 nos.1000 KL, having cumulative storage capacity 9000 KL at Nine location of Municipal area.

4. **GENERAL REQUIREMENT:**
   4.1 The foundation of the structure should be taken down sufficiently below the average ground level for safe transfer of load to undisturbed formation. The strata chart of test pit, taken at this site is enclosed as Drawing. No.3 for general information only. Suitable Soil test should be carried out by the contractor through Govt. Engineering college or any other recognized laboratory to ascertain safe bearing capacity of the soil for design purpose.

   4.2 The tank shall have RCC round column staging only circular columns shall be preferred. The specification laid down in the letter TC No. 236 dated 21.05.97 issued by Engineer-in-Chief PHED M.P. Bhopal be strictly followed.

   4.3 The type of foundation should be suiting to the determined safe bearing capacity of the soil and shall be designed accordingly. The excavation shall be done in all sort of strata and if blasting is required, the contractor shall obtain permission from the competent authority and all rules regarding safety shall be followed.

   4.4 The tanks can either be rectangular or circular is shaped supported over column staging but the location plan of the columns should permit utilization of spacing underneath fully for construction of office/staff building.

   4.5 The capacity of the tanks specified in para 2.0 above shall be between the outlet level and the full tank level. The maximum depth of water in the tanks should not be more than 6.0 m. The outlet level should be kept minimum 0.15m above the tank floor level. A free board of 0.5m should be provided below the lowest surface of the
roof slab or beam. The inlet level should be 0.10m above the full tank level. The scour level should be kept flush with the floor slab.

4.6 The height of the staging specified in para 2.0 shall be above the general ground level at the tank site of the nearest road level whichever is higher and shall be measured up to tank floor level.

4.7 A RCC doglegged staircase 1.2m wide shall be provided from ground level to gallery on outlet of the tank. The staircase should have straight flights with intermediate landing at bracing levels. The rise of the stairs shall not be more than 25cm. The staircase should have railing on both sides comprising of 1.2m high GI medium class pipe of 80 mm dia posts, 1.5 to 1.6m apart and medium class 20mm dia I pipes in three rows. The GI pipes posts and the railing pipes (class medium) should be secured adequately.

4.8 A RCC gallery 1.2m wide all around the tank at vertical wall ring beam level should be provided to facilitate inspection, cleaning and painting of the tank. A railing comprising of medium class 80mm dia GI pipes posts 1.2m high rigidly fixed in the gallery slab at 1.5m maximum spacing with 3 rows of 20mm GI pipes (Class medium) should be provided. The gallery should have access from the staircase, A steel door shall be provided at the entrance to the gallery or at the far end of the RCC staircase to prevent unauthorized entry.

4.9 RCC ladder properly supported from tank wall with hand rails 0.45m in width should be provided outside of the tank from gallery of top of roof slab. The RCC ladder shall have at least one landing in between gallery and roof top and. Mild steel ladder, from the manhole in the roof slab to floor slab, inside of the tank to facilitate inspection and cleaning. These ladders should be of MS plates 65mmx10mm size with 20mm dia round bars fixed at 0.25 centers by holding and welding to MS plates. The insides ladder should be properly supported in the mid span for rigidity.

4.10 An apron of cement concrete 1:2:4 i.e. M-15 mix should be provided for an area which is 1.5 meter more the dimension of the tank of all sides having 100x100 mm drain in cement concrete 1:2:4 all around shall be constructed and water will be led to the proper disposal point through the drain to be constructed for the purpose. The top of the drain around the apron shall be 100mm above the ground level. Outer edge will be covered with sloping earth the apron will have a slope of 1.60 from centre towards the drawl. The edge of the drain will be flush with the top surface of the apron. The apron will be 100mm thick in cement concrete 1:2:4 laid on sub base of 100mm thick 1:4:8 cement concrete in case of black cotton/cohesive soil the soil will be removed up to 500mm below the ground level and refilled with rammed moorum up to 400mm incase of hard strata like moorum, kopra etc. moorum filling will not be required.

5. **PIPES AND FITTINGS:**

The inlet, outlet, over flow and scour pipes for the tanks shall be cast iron double flanged class A as per IS : 7181-186 all these pipes shall be independent of each other and shall be fixed in vertical position rigidly by bolting and clamping properly.

The size of these pipes in OHT shall be as given below

<table>
<thead>
<tr>
<th>Pipe Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet dia of pipe</td>
<td>250 mm</td>
</tr>
<tr>
<td>Outlet dia of pipe</td>
<td>300 mm</td>
</tr>
<tr>
<td>Overflow dia of pipe</td>
<td>350 mm</td>
</tr>
<tr>
<td>Scour dia of pipe</td>
<td>200 mm</td>
</tr>
</tbody>
</table>

The size of these pipes in Sump well shall be as given below
inlet dia of pipe  250 mm  
Outlet dia of pipe  250 mm  
Overflow dia of pipe  300mm  

Cast iron bell mouths as per Appendix 10.2 of CPHEEO manual conforming to IS 1538-1976 shall be provide on the top end of all pipes. These pipes shall have CI puddle collars properly embedded in the floor slab at the time of concreting to provide monolithic joint. Cast iron strainer shall be provided on the top of outlet and scour pipes. Cast iron duck foot bends shall be fixed over cement concrete bed block, to support vertical pipes. The bed blocks shall be designed to take the load of pipes and the water column indecently. The double flanged Duck foot shall be provided. 1.2m below average ground level at site.

Cast iron Double flanged sluice valves with spur gear and hand wheel class PN 1.0 confirming to IS : 14846 with all revision up to date issued of NIT shall be provided and fixed minimum 3.0 m away from the ground level bracing, along with necessary C.I.D.F. pipes. The size of the valves shall be as given below:

Inlet valve Dia  (150 mm)  
Outlet valve Dia  (150 mm)  
Scour valve Dia  (80 mm)  

The overflow pipe shall be left open at minimum 3.00 m distance from bracing CIDF pipes shall be provided between Duck foot bends and D.F. sluice. The contract will limit up to fixing of DF values.

6 APPURTENANCES:
6.1 Water level indicator:
A float operated level indicator comprising of stainless steel float pulleys, steel wire rope and enameled indicator plate calibrated to read depth of water in metre, shall be provided.

The pulleys should provide free movement of rope and they should be easily accessible for repair and maintenance. The indicate plate should be fixed at about 5m. Above ground level on the front side of tank.

Additionally the following arrangement may be provided as optional
(a) Water level indicator, working on physical characteristics.
(b) Pressure gauge, calibrated, to read water depth directly.

6.2 Ventilators:
Mosquito proof ventilators, of suitable design shall be provide on the roof slab of tank to facilitate discharge of dissolved gases of water and to keep the inside of tank odour free.

6.3 Man hole:
An opening of 0.75x0.75m or 0.9m dia size shall be provided in the roof slab fo tank for access inside the tank for inspection and cleaning. The opening shall have CI/MS cover with locking arrangement.

Lightening Arrestor:
Aluminum lightening arrester as per relevant B.I.S. shall be above highest point and 30 mmx4mm size strip connected to earth electrode shall be provided. The earth strip shall be secured rigidly to concrete surface.

7 Finishing and painting
7.1 Form finish:
All external surfaces on the structure shall have form finish. However all uneven surface and small defects shall be made even immediately after removal of forms with 1:1 cement mortar. The inside surface of the tank shall be rendered even and water proof by cement plaster in 1:2 portion.

7.2 **Painting of Concrete:**
The outside surface of the Over Head Tank shall be painting with 2 coats of IS marked cement colour of approved make. The colour shade shall be decided by the Engineer-in-Charge.

7.3 **Painting of pipes etc.**
Cast iron pipes, valves and fittings, shall be painted with 2 coats of black bituminous paint.

7.4 **Painting of MS Ladders and MH Cover:**
As the MS ladder inside of the tank and manhole cover shall be subjected to corrosive action of chlorinates water they shall be coated with epoxy paint.

8. **TESTING OF OVER HEAD TANK / SUMPWELL:-**
In addition to the structural test as given in IS 456-1978 revised and amended up to date the Over head tanks shall also be tested for water tightness at maximum water level in accordance with clause 10.1.1 of IS 3370 (part-l0 1965. The tanks shall be filled more than 0.25m per day and the settlement of foundation of foundation shall be measured accurately before each filling. Any defect of any sort affecting the strength, durability, appearance of usefulness of the structure noticed during testing shall be completely removed to the satisfaction of executive Engineer with in the specified time for completion of work.

9. **COMMISSIONING & HANDING OVER:-**
On completion of all works and the successful of the over head tank, it shall be handed over to the department for commissioning as required on completion of work and testing. The contractor shall submit completion drawing in six sets along with foundation investigation, concrete strength water tightness test reports at the time of handing over of work.

**Additional Specifications**

01 The work of construction of RCC reservoir involves workmanship; hence requirement of higher standard than general concrete work is essential.

02 The responsibility for design, construction, structural stability and water tightness for all water tight structures will however, rest solely with the contractor and the will have to make good at their own cost any damage or loss to EPI/owner due to defect, if any in the above mentioned work.

03 The TENDER submitting their offer in form "F" (lump-sum TENDER) shall indicate the approximate quantities of various items involved in the work e.g. cement, concrete and steel etc. This information shall be attached with the TENDER itself. The lump sum offer shall include provision for balcony railing, lightening arrestor, water level indicator and staircase also.

04 The contractor shall have to arrange his own steel whatever the quantity of steel is required to complete the whole structure in all respect. The department shall not supply any quantity of steel under any circumstances. No extension of time will be granted for late supplies of steel of escalation, if any in future. The steel for reinforcement shall conform IS2266-1962 OR IS 1977-92 (st. 44) only and a certificate shall be required to be produced to the department in support in addition to random sample at site duty got checked at contractor cost to see whether it confirm to above specification.
05 The tank container shall be designed to take care of corrosive effect of water due to mixing of chlorine in the water for disinfections.

06 The department shall not be responsible for providing water required for construction and other purpose. The contractor shall make his own arrangement for the same at his own cost.

07 Not extra charges for the plastering if required for the finishing of the surface of structure shall be paid under any circumstances.

08 Whenever bailing out of water or dewatering of foundation is required to be done, nothing extra will be paid for it the contractor/firm should quote his rate after taking this factor into consideration.

09 The contractor/firm shall be required to submit the complete drawing in six copies on completion of the work in A3 size only.

10 The contractor shall have to make his own arrangement of electric or telephone connection, if required at his own cost.

11 For blasting if required, in foundation the contractor /firm will make his own arrangement for license/permit and materials from the competent authority.

12 The work shall be treated as complete when the same is completely tested and handed over to the department including site clearance.

DESIGN REQUIREMENT

01 A separate drawing showing only dimension must be given.

02 Details of reinforcement in different components like footing, columns bottom dome, vertical wall rings beams, roof dome and stair case etc.

03 Orientation and shape of each type of bar must be shown against sketch for the component length and total number of bar of each type must be mentioned to avoid confusion.

04 Location of pipes and other fittings and extra reinforcement at opening should be shown separately.

05 Bar bending schedule and location of construction joints also be made clear in the drawings.

06 Contractor shall consider the earthquake zone for design purpose.

REINFORCED CONCRETE WORK

It shall be strictly as per IS 456 & IS 3370 (part (i) to (iv), IS 11682 and other relevant specification revised up to date for RCC structures.

01 Minimum strength of concrete:
Minimum strength of concrete for components of elevated tank shall be as below:
- Columns, staging - M25 (250kg/sqm.cm)
- Tank including roof - M-30 (300kg/sqmc.m)

02 Minimum cement content:
From durability considerations minimum content shall be as below:
- Concrete MK-25 - 350mg/cum
- Concrete M-30 - 400kg/cum

03 The cover of concrete:
The minimum cover shall be 40mm all the reinforcement & for foundation this cover shall be 60mm.
04. **Cement Grade:**
Grade 43 of cement should be used for columns and grade 53 for the tank portion, including the top dome cover only fresh cement should be used in the tank. It is advisable to use cement, manufactured by major plant and reputed firms OPC or blast furnace slag cement should be used.

05 **Water cement ratio**
Water cement ratio shall not be more than 0.45. This means 22.5 litres of water per 50kg of cement.

06 **Use of Chemicals**
When the water cement ratio is less the strength and durability of concrete of concrete is good. It is advisable to use plasticizers in concrete and reduce water cement ratio up to 0.4 plasticizers manufactured by reputed combines are recommended.

(i) Sika Qualcrete 24-B park street, calcutta, 7000 16 CM bauchemie PVT Vardhman chambers sector 17 Vashi new Mumbai 400703
(ii) Rioffe, 12 c Vikas center, S.V. Road Betul, Creuze, West Mumbai 400054.
(iii) Fos Rock India Ltd. Hafeea Chambers 2nd floor 111/74 K.H. Road Bangalore 560027.
(iv) Shallmar tar products, construction Additive division 16 NGN Vaidya Marg, bank street Mumbai. 400023.

Proportion of plasticiser to be used shall be as per the instruction manual supplied by the manufactures.

07 **MEASUREING:**
The quantity of cement shall be determined by weight. The quantities of fine and coarse aggregates shall be determined either by volume or by weight.

08 **Aggregates**
It is advisable to use metal derived form igneous rock preferable of basaltic or granitic origin. The coarse sand should be free soil. All aggregates shall conform to all provision and test methods of I.S. specification 388-1963.

01 Fine aggregates when tested by the colorimetric method the color shall of be darker than light amber, fine aggregates shall be capable of developing 30% of the compressive strength.

02 Maximum aggregate size shall not be more than 20mm when the spacing of reinforcement bar is 20mm.

03 Fineness modulus shall be more ten plus or minus 0.20 from that of the approved sample.

04 Water shall be clean & free from oil acids of injurious substances.

09 **Storage of material**
Cement shall be stored off the ground in a dry ventilated building. Aggregate shall be stored in 0.6 meters layers on planning. reinforced steel shall be stored under cover & protected from rusting oil grease or distortion only steel needed for immediate use shall be removed from storage.

10 **Minimum Dimension And shapes:**
Minimum Dimension shall be as below:

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular</td>
<td>400mm</td>
</tr>
<tr>
<td>Tank wall</td>
<td>200mm</td>
</tr>
<tr>
<td>Bottom slab</td>
<td>150mm</td>
</tr>
</tbody>
</table>
Top slab 125mm

Note: If a dome is provided at the top, the thickness can be limited to 100mm rectangular square columns are not allowed circular shafts are also not allowed. In respect of horizontal braces corners shall be chamfered by 40x40mm

Form

01. The contractor shall provide form that will produce correctly aligned concrete.

02. The centering shall be true and rigid and thoroughly based both horizontally and diagonally. The forms shall be sufficiently strong to carry the dead weight of the concrete without deflection and tight enough to prevent leakage of mortar.

03. For exposed interior or exterior concrete surface of columns and walls, steel or other approved corrosion resistance devices shall be used.

04. Rigid care shall be exercised that all columns are in plum and true & thoroughly cross braced to keep them so.

05. All floor and beam concreting shall be crowned not less than 6mm in all direction for every 4.8 meter span.

06. Beveled strains shall be provided in form, angles and in corners of column and beam boxes for chamfering of corners where shown in drawings or as directed.

07. The inside of forms shall be coated with approved oil thoroughly wetten oil shall be applied before reinforcement is placed.

08. Temporary openings for cleaning and inspections shall be provided at the base of vertical forms and at other places when they are necessary.

11. FORM WORK:

Wherever intz type of tanks are adopted or where then is an inclined slab having inclination steeper than one vertical to three horizontals, inside form work must be provided, the procedure for such a form work be

a) Place outer form work.

b) Place inner form work 300 to 450mm wide Then concrete that portion then fix next strip and concrete.

c) In respect of top of bottom domes, place upper form work for lowest circular strip of width equal to 1/4th dia of dome and concrete as stated above, then concrete central half for which top form may not be provided.

12. REINFORCEMENT STEEL

01. Bars and rods shall be free from scale oil structural defects and shall be maintained so on the job.

02. Fabrication shall be accurately done to the dimensions shown on the drawings, stirrups and ties shall be bent around a pin having diameter at least twice the bar thickness, other bars shall be bent around a pin having a diameter at least 6 times the bar thickness. All bars shall be bent cold.

03. All steel will be rigidly held in place with approved galvanized wire devices in such a manner that all steel will support the weight of the workman without displacement.

04. On exterior exposed concrete no metal ties charts or spacer shall remain within 40mm of the finished surface.

05. The steel bars used for reinforcement shall be strictly as per IS specifications.

13. Minimum Steel:
Design requirements as set out in relevant codes in respect of steel shall be full satisfied. However, following minimum steel should be provided

a) Vertical steel in column 0.8% of cross sectional area actually required & 0.3% when larger section than actually required is provided.

b) Horizontal links in columns not less than 8mm dia at 200mm c/c or 10mm dia not more than 300mm c/c.

c) Exposed RCC Surface On both faces when thickness is 150mm or more.
2 kg/sqm in one direction.
2 kg/sqm in perpendicular direction.
The above requirement is satisfied if.
8mm bars @ 200mm c/c OR
10mm bars @ 300mm c/c are provided.
Even if design steel is less than above, the above minimum shall be provided.

d) Steel in tanks As per provision of IS 3370 subject to minimum as set out in (c) above.

13. Minimum Spacing of Reinforcement:
Maximum spacing of main reinforcement in slab or walls shall not be more than 150mm center to center. The spacing of secondary bars, such as distribution steel of vertical bars in columns shall not be more than 300mm center to center.

14. Type of Steel:
It is advisable to use corrosion resistant CR steel such steel is now available.

15. Detailing of Steel:
Before commencing the work the drawing should be studied. It must be insisted that the designer provides details of the shape of each bar, its diameter, length and numbers of each category in a schedule of reinforcement. This must be incorporated in every working drawing.

16. Mixing Concretes:
01 It is extremely essential that the contractors undertaking the work should have concrete mixer with them. No hand mixing shall be allowed.
02. Concrete shall be mixed in the standard batch mixer with a drum speed of 200 to 250 peripheral feet per minute mixing time shall be two minutes for batches of 1 cu. yd or 0.39 cum or under and shall be increased 15 seconds for each additional 1/2 cu. yd or 0.39 cum of fraction there of.
03. Tempered concrete shall not be allowed Air standard or lean concrete shall not be used, the contents of the mixer shall be completely discharged before each new batch is loaded.
04. The concrete shall be, uniform in ingredients, colour and consistency.

17. Transportation
Concrete shall be handled from the places of mixing to the place of original deposit as rapidly as practicable by methods which will prevent segregation or loss o any ingredients. If segregation does occur during transport the concrete shall be remixed before begin placed.

18. PLACING OF CONCRETE
01. Concrete shall be deposited in its final position without segregation, remand or flowing.
02. When possible concreting shall be continued until the section is completed.
03. Form shall be clean before concrete is placed.
04. In no case the concrete shall be laid without vibration, it is desirable to keep two concrete vibrators at the construction site so that in case of break down the other vibrator can be used.
05. Concrete shall be shaped & vibrated with approved mechanical vibrator to maximum subsidence without segregation and adjacent to form and joints over vibrating or vibrations of very wet mixes will not be permitted and should be avoided. Reinforcement bars shall be shaken to ensure bond with concrete.
06. Slabs and beams stems shall be placed in one operation.
07. Concrete columns & walls settle at least 2 hours before the floor system supported on is poured.
08. Construction joints be treated in accordance with is 456. The surface of already laid concrete be cleaned by water jet and cement slurry be applied, Cement mortar 10mm thick of the same proportion as in concrete by applied and then fresh concrete of the lift be laid. The form work must overlay 100m on the already laid concrete.
09. Conveying & chattering of concrete shall be done only by approval of the Engineer-in-charge & with equipment to insure a continuous flow with no segregation.
10. Water accumulation during placing shall be removed concrete shall not be deposited in such accumulation.
11. The concrete shall be placed and compacted before setting commences and should not be subsequently disturbed.
12. Converting shall be placed and compacted before setting commences and should not be subsequently disturbed.
19  EXPOSED SURFACE
01. Imperfect surfaces where strength is not impaired may be patched and rubbed smooth with carborundum brick.
02. Fins and projection shall be removed and the concrete surface affected thereby shall be rubbed smooth.
03. Small voids shall be filled with 1:3 mortar pressed into holes and floated smooth.
04. Plastering and steel troweling of surface shall not be allowed.
05. Honey comb concrete shall be repaired by removal and replacement of member.
06. Forms shall be filled tightly so as to minimize fins joints shall be finished with bevels strips as directed by the Engineer-in-charge.
20. CURING CONCRETE
01. It is extremely important to make arrangement for supply of sufficient water at the construction site for curing of the concrete. Continuous and efficient curing is extremely important for development of good compressive strength in any concrete structure.
02. After finishing concreting, curing shall be done by damping concrete at least for one week after placing. Floor & vertical surfaces shall be covered with a layer of old gunny bags or similar absorbent material and kept constantly wet. Curing operations shall begin as soon as the concrete has attained initial set. All materials and facilities for curing concrete shall be on hand and ready for use before concrete is placed.
03. Concrete shall be kept wet and moist for at least two weeks.
21. FLOOR FINISH
Tank wall and floor finish shall be monolithic bonded.

22. REMOVAL OF FORM
01 In no circumstances forms shall be struck until the concrete reaches strength of at least twice the stress to which the concrete may be subjected at the time of striking.

02 In normal circumstances i.e. at temperature 21 C forms may be removed at the following minimum times which will be subject to the Engineer’s requirement.

Wall 02 days
Columns 03 days
Beams soffits (sides) 05 days
Bottom of beams up to 6m span 14 days
Bottom of beams above 6m span 21 days
Slabs 125mm thick or less, up to 4.6m span 07 days
Slabs 125mm thick or less, above 4.6m span 14 days
Slabs over 125mm thick or, up to 4.6m span 18 days
Slabs over 125mm thick or above 4.6m span 14 days

04 All concrete shall be inspected for quality before forms are removed.

05 When struck by a carpenter's hammer it shall ring like stone.

06 Upon removal of forms the contractor shall place adequate precautions to prevent injury to the concrete by construction loads.

07 The contractor shall be responsible for safe removal of forms and for placing adequate precaution.

23. APPROVAL OF MATERIAL
Before use, samples of all materials shall be got tested from recognized laboratory by the contractor at his own cost and the test certificate shall be furnished to the Engineer-in-charge & no material shall be used until it has been approved.

25. LABORATORY TEST
Following laboratory test shall be made by the contractor at his own cost and reports furnished to the Engineer-in-charge.

<table>
<thead>
<tr>
<th>Sn</th>
<th>Material</th>
<th>Lab test</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Cement</td>
<td>Physical &amp; Chemical test</td>
<td>IS 269-445</td>
</tr>
<tr>
<td>02</td>
<td>Coarse &amp; Fine Aggregate</td>
<td>i) Gradation</td>
<td>IS 2386 (part-I)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Deleterious constituents</td>
<td>IS 2386 (part-I)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Moisture Content</td>
<td>IS 2386 (part-III)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv) Bulking of fine aggregate (for volume batching)</td>
<td>IS 2386 (part-III)</td>
</tr>
<tr>
<td>03</td>
<td>Coarse aggregate</td>
<td>i) Los Angles abrasive values (aggregate impact valve)</td>
<td>IS 2386 (part-IV)</td>
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<tr>
<td></td>
<td></td>
<td>ii) Soundness</td>
<td>IS 2386 (part-V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Alkali aggregate reactivity</td>
<td>IS 2386 (part-VII)</td>
</tr>
<tr>
<td>04</td>
<td>Water</td>
<td>Chemical test</td>
<td>IS 456</td>
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<tr>
<td>05</td>
<td>Concrete</td>
<td>i) Workability (Slump or compacting factor test)</td>
<td>IS 1199</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Concrete strength</td>
<td>IS 516</td>
</tr>
</tbody>
</table>
26 FIELD TEST

01 The contractor shall provide all equipment and make all arrangements for field tests to exercise proper quality control over work specially for test mentions as S.No.2(ii) and S.No. 5 mentioned under para 28.0.

02 Test for compressive strength of concrete.

03 Test specimens cubical in shape shall be 15x15x15cm. If the largest nominal size of the aggregates does not exceed 20mm; 10cm cubes may be used as an alternative. Cylindrical test specimen shall be 15cm in diameter and 30cm long. Smaller test specimen shall have ratio of diameter of specimen to maximum size of aggregate of not less than 3 to 1 except that the diameter of the specimen shall be not less than 7.5 cm for mixtures containing aggregate more than 5% of which retained on is sieve 480.

04 The mould shall be of metal preferable steel or cast iron and should be strong enough to prevent distortion. It shall be constructed in such a manner as to facilitate the removal of the moulded specimen without damage and shall be so machined that when it is assembled ready for use. The dimensions and internal faces shall be accurate within the permissible limits the mould and base plate shall be coated with a thin film of oil before use in order to prevent adhesion of the concrete.

05 The tamping bar shall be of steel bar 16mm in diameter 0.6 meter long and bullet pointer at the lower end.

06 The test specimen shall be made as soon as practicable after mixing and in such a way as to produce full compaction of the concrete with neither segregation nor excessive laitance. The concrete shall be filled into the mould in layers approximately 5cm deep in placing each scoop full of concrete. The scoop shall be moved around the top edge of the mould as the concrete slides from it in order to ensure a symmetrical distribution of the concrete within the mould each layer shall be compacted by vibration. After the top layer has been compacted the surface of the concrete shall be finished level with the top of the mould using a travel & covered with a glass or metal plate to prevent evaporation.

07 When compacting by vibration, each layer shall be vibrated by means of an electric or pneumatic hammer or vibrator or by means of a suitable vibrating table until the specific condition is attained.

08 The mode and quantum of vibration of the laboratory specimen shall be as nearly same as those adopted in actual concreting operations.

09 The test specimen shall stored in a place free from vibration it should be kept in moist air of at least 90% relative humidity & at a temperature of 2702 C for 24 hours + - 1/2 hours from the time of addition of water to the dry ingredients in the fields, it should be kept under matting racks or other similar material for 24 hours + 1/2 hour from the time of adding water to the other ingredients at a temperature at a temperature range of 22 to 32 C, after this period, the specimen shall be marked and remove from the mould and unless required for test within 24 hours immediately submerged in clean, fresh water or saturated lime solution and kept there until taken out just prior to test. The temperature of water or solution shall be maintained at 27 + - C, the specimen shall not be allowed to become dry at any time until they have been tested.

10 At least 06 test samples on each day concreting should be collected and date mentioned on it subject to minimum samples as described in para 25 (05) above.
11. The contractor shall also provide all equipments and make all arrangements for field test and conduct all test as under and submit the test result to the Engineer-in-charge.
DESIGN AND CONSTRUCTION OF RCC ELEVATED RESERVOIRS

GENERAL INSTRUCTIONS

1.0 Elevated Service Reservoirs supported on concrete shaft shall not be constructed henceforth. The .s responsible for approval of the design shall see that tanks are supported on column structure.

1.1 The R.C.C. columns supporting the tank should necessarily be round shape and not square or rectangular. The top shall i.e. water container, could be square or rectangular.

1.2 On the bottom floor of the water container cast iron or stainless steel grate should be provided over the supply outlet and scour outlet. This is essential to prevent any accident for the labour attending to periodical cleaning of the tanks. One such accident occurred at BETUL when two persons in succession were sucked into the scour pipe, the top of which could not be seen because of calcium deposits due to regular use of bleaching powder, Cast iron grates 20x20mm or stainless steel square 20x20mm can be used with square frames on top of the outlet.

1.3 The over flow outlets should not be connected to the distribution system. Connection of over flow pipe to the distribution system can result in over filling of the elevated service reservoirs in case supply valves of the distribution system are not open. The over flow outlet should always be kept open for draining any excess storage in the tank.

1.4 It is extremely important to make arrangements for supply of sufficient water at the construction site for curing of the concrete. Continuous and efficient curing is extremely important for development of good compressing strength in any concrete structure.

1.5 It is advisable to use metal derived from igneous rock preferably of basaltic of granite origin. The coarse sand should be free from soil. This can be checked easily by half filling a transparent glass with the sand sample and the other half by clean water. Stir the sand vigorously. Silt in the sand can then be easily seen in the top water portion.

1.6 It is extremely essential that the contractors undertaking the work should have a concrete mixer with them. No hand mixing should be allowed.

1.7 In no case the concrete should be laid without vibration. It is describable to keep two concrete vibrators at the construction site so that in case of a break down the other vibrator can be used. It is desirable that the divisions have with them at least two concrete vibrators, which is an essential T & P for laying concrete.

FOLLOWING SPECIFICATIONS SHOULD BE STRICTLY FOLLOWED:

2.0 CEMENT AND CONCRETE:

2.1 Minimum Strength of Concrete:
Minimum strength of concrete for components of elevated tank will be as below:
Column staging M 25 (250 kg/sqcm)
Tank including roof M-30 (300 kg/sqcm)

2.2 Minimum Cement Content;
From durability considerations minimum cement content shall be as below:
Concrete M-25 (350 kg/cum)
Concrete M-30 (400 kg/cum)

2.3 Cover of Concrete
The minimum cover shall be 40mm for all the reinforcement. For foundations this cover shall be 60mm.

2.4 Cement Grade:
Grade 43 of cement should be used for columns and grade 53 for the tan portion, including the top dome cover. Only fresh cement should be used in the Tank. It is advisable to use cement manufactured by major plants and reputed firms. OPC or blast furnace slag cement should be used.

2.5 Water Cement Ratio:
Water cement ratio shall not be more than 0.45. This means 22.5 litres of water per 50 kg bag of cement.

2.6 Testing Machines for Concrete:
Compression testing machines should be installed in each rural and project divisions.

2.7 Use of Construction Chemicals:
When the water cement ratio is less, the strength and durability of concrete is good. It is advisable to use plasticizers in concrete and reduce water cement ratio up to 0.4. Plasticizers manufacture red by reputed companies is recommended.

Proportion of plasticizer to be used shall be as per the instruction manual supplied by the manufacturers.

2.8 Construction Joints:
Construction joints are treated in accordance with IS 456. The surface of already laid concrete is cleaned by water jet and cement slurry be applied. Cement mortar 10mm thick of the same proportion as in concrete by applies and then fresh concrete of the lift be laid. The form work must overlay 100mm on the already laid concrete.

Minimum Dimensions and shapes:
Circular Column 400mm  
Tank Wall 200mm  
Bottom Slab 150mm  
Top Slab 125mm  
Rectangular / square columns are not allowed. Circular shafts are also not allowed. In respect of horizontal braces, corners shall be chamfered by 40x40mm.  
Footing: The depth of footing on the face of column shall not be less than 1/3rd of the spread of footing from the face.

3.0 STEEL:

3.1 Minimum Steel: Design requirements as set out in relevant codes in respect of steel shall be fully satisfied. However, following minimum steel should be provided.

a) Vertical steel in columns : 0.8% of cross sectional area actually required and 0.3% when larger section than actually required is provided.
b) Horizontal links in columns : Not less than 8mm dia at 200mm c/c or 10mm dia not more than 300mm c/c.
c) Exposed RCC surface: on both faces when thickness is 150mm or more.
   2 kg/sqm in one direction
   2 kg/sqm in perpendicular direction. The above requirement is satisfied if 8mm bars @ 200mm c/c OR 10mm bars @ 300mm c/c are provided.

3.2 Type of Steel
It is advisable to use corrosion resistant steel such steel is not available.

3.3 Detailing of Steel
Before commencing the work. Executive Engineer In Charge should study the drawing. It must be misted that the designer provides details of the shape of each bar, its diameter, length and numbers of each category in a schedule of reinforcement. This must be incorporated in every working drawing.

3.4 Form Work:
Wherever inzite type of tanks are adopted or where there is an inclined slab having inclination steeper than one vertical to three horizontals, inside form must be provided. The procedure for such a form work shall be:

a) Place outer form work.
b) Place inner form work 300 to 450mm wide. Then concrete that portion. Then fix next strip and concrete.
c) In respect of top or bottom domes, place upper form work for lowest circular strip of width equal to 1/4th dia of dome and concrete as stated above. Then concrete central half for which top form may not be provided.

4.0 Protection Work Drainage:
At the ground level, stone pavement should be provided for an area which is 1.5 meter more than the dimension of tank on all sides. This should be laid in a slope of 1.60 from the centre and a drain be constructed around for outlet of water. It is advisable to provide fencing around the tank so that the space around the tank is not misused for any purpose. It is advisable that the tanks be white-washed every year.
TECHNICAL SPECIFICATION
A. PUMPS, MOTORS AND ALLIED EQUIPMENTS
PART1: SPECIFICATION FOR VERTICAL TURBINE PUMPS FOR RAW WATER PUMPING
Design, manufacturer, supply, erection, testing commissioning of turbine pumping sets for pumping clear water including all electrical, mechanical equipment's, accessories and civil works viz., foundation of pump, motor, cable, pipes, fittings for suction, delivery butterfly valves, reflex valve, specials etc., complete as per details given in this NIT.

1.0 DETAILED SPECIFICATIONS OF PUMPS SETS :
The pumps shall be vertical turbine wet pit type and non pull out design with multistage bowl assembly directly coupled with vertical hollow shaft motors.

a. 3 (Three) units of self water lubricated vertical turbine pumps sets each of capacity 275 LPS against approximate total head of 50 meters for pumping raw water at intake well.
The pumps should be KIRLOSKAR/JYOTI/WORTHINGTON/BEACON WEIR/MATHER & PLATT make only.

1.1 GENERAL SPECIFICATIONS
The pumps shall be water lubricated complete with bowl assembly, column pipe such floor discharge head, line shaft, oil tubes, foundation plate/sole plate, basket strainer, motor foot stool and all necessary accessories. The pump shall be designed so as to have a maximum flow capacity not less than 110% of the rated flow capacity. The pumps shall also be designed for continuously operation at any point of head capacity curve between 90% and 110% of pump rated flow, without undue vibration or over heating and thrust bearing should be antifriction type point head.

(A) BOWLS:
The bowl shall be made of close grained cast iron smoothly finished and free any casting defects. The bowls shall be capable of with standing hydrostatic pressure equal to twice the pressure at rates capacity or 1.5 times of the shut off head whichever is greater. The water passage in the bowls shall be smooth and shall have the Nitril rubber linked bearing with bronze shall to save bearing for the impeller shaft. Neoprene rubber lined bearing with bronze shall should be provided in the bottom of the bowl assembly also.

(B) IMPELLERS :
Impellers shall be closed type made of zinc free bronze statically and dynamically balanced. Impellers shall be free from any casting defect and shall be properly machined. All the water passage shall be smooth finished. The impellers shall be secured to shaft with tapered lock collect or key & split rings.

(C) IMPELLER SHAFT :
The impeller shaft shall be of stainless steel with renewable stainless steel sleeves at bearing portion. The impeller shaft shall be guided by bearing provided in each bowl. The butting faces of the shaft shall be machined surer to the axis and the shaft shall be chamfered an the edged. The shaft shall have a surface finish of 0.75 micron as per IS : 3078/1967.

(D) LINE SHAFT :
The line shaft shall be made of High grade carbon steel. The shafts shall be furnished with interchangeable suctions having a length of 1.25 M / 2.5 M / 3M. The butting faces of shaft shall be machined square to shaft axis and the shaft ends shall be chamfered on the edges. To ensure to correct alignment of shafts they shall be perfectly straight.
The shaft shall not have the surface roughness more than 0.75 microns as per IS : 3073/1967. The shaft shall have the adequate strength to withstand all the forces at + 10% of the critical speed of shaft.

(E) COLUMN PIPE :
Column pipe shall be manufactured from the heavy class M.S. pipe confirming to relevant India Standard Specification. The column pipe shall not exceed 3.0 meters in length & made of 6mm thick sheet the dia of bolts to be used in flange joints should not be less than 20mm.

(F) LINE SHAFT BEARING:
Line shaft bearings shall be designed to be lubricated by forced water. line shaft bearing shall be cutless Nitrile rubber lined bearing with bronze shell.

(G) LUBRICATION:
The pumps are water lubricated.

(H) DISCHARGE HEAD:
The discharge head shall be of standard construction cast iron as per IS:210 Gr. FG 200 and sufficiently strong to support the weight of the pump. It shall be fitted with a tube tension plate for tightening. The shaft tubes for the purpose of aligning the shafts.

(I) STUFFING BOX:
A packing gland shall be provided at the top of stuffing box. Shaft sleeves shall be provided on the top shaft. The stuffing box shall be of sufficient depth to permit adequate packing. The space between the pump motor main coupling and the stuffing box shall be sufficient to permit removal of packing gland and insertion of new packing without dismantling the pump.

(J) MOTOR STOOL:
The motor stool shall be of fabricated mild steel shall be designed to take care of all static and dynamic loads on it.

(K) PRESSURE INDICATION DEVICES:
Each pump shall be provided with pressure gauge of best quality makes to give indications of delivery pressure. The pressure gauges shall be of Borden type, dial size 150mm.

(L) LABORATORY TEST:
Laboratory pump test shall be carried out as per IS: 9137 / for each pump to assess the pump discharge V/s head, horse power and efficiency figures. The pump shall be subjected to a test pressure of 1.5 times of the shut off pressure or twice the working (rated) pressure which ever higher.

(O) FIELD TEST:
The field test shall be carried out as per IS : 1710 and 5126.
The successful BIDDER will ensure the Engineer-in-charge of work or any other Senior Engineer nominated by the COMMISSIONER, Municipal Corporation Singrauli will inspect and witness tests conducted on the pumps and motors at manufacturer's place with respect to their characteristic and performance as specified by the department.

1.2 GUARANTEED PERFORMANCE & TECHNICAL PARTICULARS:
The contractor shall submit the details of guaranteed performance & technical particulars as desired in the Performa enclosed vide schedule's with the TENDER along with the preliminary out line drawing indicating principal dimensions & weight of pumping equipments and cross section drawing indicating the assembly of pumps & manor parts thereof with materials of constructions and special features. Complete descriptive and illustrated literature on the equipment and accessories offered.

1.3 SPECIAL NOTES FOR BIDDER:
1.3.1 Pump should be capable of throttling. The throttle point discharge should be quoted. The extent to which pump can be throttle and the corresponding discharge to be mentioned.
1.3.2 Duty point discharge should be specifically mentioned along with the head at which the same will be attained. Efficiency at different operating heads and discharge should be mentioned.
1.3.3 The accessories like surface, discharge head/underground discharge head with elbow, prelub tank with fittings, motor stand with NRR and thrust bearing housing, column assembly bowl,
assembly, basket strainer, as per specifications shall be quoted, individually. The drawing to
the scale showing the proposed arrangements for the pumps and the positions of various
parts with detail drawing must accompany the TENDERs along with detailed specification,
make, guarantee period etc.

1.3.4 Head capacity curve shall be rising type and shut off head must be higher than the maximum
operating head for paralleled operations of pumps. Performance covers for each individual
pump sets and also for the four pump sets working in parallel should be given for full load and
for throttled conditions also. All pumps to be of identical in all respect.

2.0 SPECIFICATIONS FOR 415-V INDUCTION MOTORS:
2.1 TYPE :
The motor shall be vertical hollow shaft squirrel cage type induction motors suitable
to operate on 415 V, 3 Phase, 50 Cycle A.C. Supply at 1500 RPM directly coupled
with vertical turbine pump. The motor shall generally confirm to latest revision of IS:
325/1978 and other relevant ISS. Duly fitted with space heater and RTDs & BTDs.
The motor shall be of KIRLOSKAR, JYOTI, BHEL, CROMPTON, NGEF, make only.

2.2 VARIATION IN SUPPLY VOLTAGE :
The motors shall be capable of delivering rated out put and rated power factor with
following variations:
Voltage : ± 10%
Frequency : ± 5%
Combined : As per IS 325

2.3 RATED CAPACITY :
The minimum conditions rated capacity of motors shall be such that it meets the
power requirements of pumps in the complete range of its operation. It shall also
provide on additional power requirement on the motor. By 5% at the maximum power
requirement or by 10% at the duty point of operation whichever is maximum. The
contractor shall ascertain the K.W. requirement and provide the motors of suitable
capacity.

2.4 ACCELERATION CHARACTERISTICS:
The acceleration characteristics of motor shall be matched with the driven equipment
so that acceleration is obtained without over heating of motor.

2.5 METHOD OF STARTING :
The motors shall be designed for star/delta/soft starting at full voltage with starting
current not exceeding four times the rated full load current. The motor shall also be
designed for a minimum pull out torque of 200%.

2.6 CONDITION OF START :
Motor when started with the drive imposing its full starting torque under the specified
supply voltage variation shall be capable of withstanding at least one successive
starts from hot condition to start from cold condition without damage to the winding.

2.7 CLASS OF INSULATION :
The motor winding shall be provided with insulation conforming to thermal class "F".
The maximum temperature rise of the winding shall not exceed the limits specified
from class "B" insulation. The insulation can be given tropical and fungicidal
treatment for successful operation of motor in hot humid tropical climate. It shall of
thermos setting type and shall remain unaffected by heat. The coils shall be highly
uniform with uniform insulation strength and uniform dielectric losses.

2.8 MOTOR CONSTRUCTION :
The motor construction shall be suitable for easy dismantling and reassemble at site with the help of simple overhead crane. The motor shall be of core pack construction attached to the stator frame to facilitate easy removal and replacement of the winding for maintenance purpose. The overhead for winding at both ends of the core shall be accessible for usual inspection without resorting to major dismantling.

2.9 MOTOR FRAME:
Motor frames shall be rigid fabricated steel they shall be suitably annealed to eliminate any residual stress introduced during process of fabrication and machining. Motor frame should be identical with existing Jyoti make motor 260 K.W. to maintain interchangeability.

2.10 STARTOR LAMINATIONS:
Stator laminations shall be made from suitable grade sheet steel varnished on inner side and shall be adequately designed to over heating during starting and running conditions stipulated above.

2.11 ROTOR SHORT CIRCUITING RINGS:
Rotor short circuiting and rings shall be such that it is free to move with expansion of bars without distortion. The connections of the bars to the end rings shall be made by bracing.

2.12 LOCKING ROTOR WITH STAND TIME:
Locked rotor with stand time under hot conditions at 110% voltage shall be more than starting time at minimum permissible voltage by at least two seconds.

2.13 TYPE OF ENCLOSURE & DEGREE OF PROTECTION:
The degree of protection provided by the enclosures of motor shall conform to IS: 4691. The enclosure for the motors shall be screen protected Drip Proof (SPDP) IP 23.

2.14 SHAFT INSULATION:
Suitable insulation shall be provided on shaft/bearing house to prevent shaft current. The insulation provided shall be such that it shall retain its dielectrically properties even after its handled for number of times during dismantling and reassemble.

2.15 BEARING ASSEMBLY:
Bearing assembly shall be such that it prevents dust and water from getting to the bearing. Further, bearing lubricant shall not find access to the motor winding. The bearing assembly shall be provided with proper lubricating nipples.

2.16 EARTHING:
The motor body shall have two separate earthing terminals for earthing in compliance with I.E. Rules.

2.17 DIMENSIONS OF MOTORS:
Motors shall be properly dimensioned to have greater stability and low vibration limit.

2.18 TESTING
All the motors shall be routine tested at manufacturers workshop and test certificate shall be provided with motors.
1.1 GENERAL DESIGN CONDITIONS

The pumps shall be high head single stage horizontally split casing type to facilitate easy inspection & maintenance. The pumps shall be designed to operate satisfactorily while handling a minimum suction lift of 4.0 from all causes. [Three] units of pump sets each of capacity of 262 lps against approximate total Head of 105.0 meters for pumping clear water from WTP to Singrauli.

The pump shall be horizontally split with the suction and delivery branches cast INLINE on the bottom half of the casing. The top half should be constructed to allow easy dismantling. There by providing the facility of inspection and repair to the equipment with out any difficulty.

The rotating elements of pumps will be dynamically balanced and over stressing should not occur due to sudden failure of power, Reverse rotation should not damage the pumps.

The pumps shall be so designed as to have a maximum flow capacity of not less than 110% of the rated flow capacity.

The pumps shall be designed for continuous operation at any point of head capacity curve between 50% & 110% of pump rates flow without under vibration or over heating.

The pumps shall be so designed as to have a stable non overloading characteristics, capacity head curve shall be continuously from shut-off point to operating point and shall be suitable for parallel operation of pumps without any haunting possibility. The shut-off head should not exceed 120% of duty point head.

The impeller adjustment shall be designed in such a way that impellers run free in any installed condition.

1.2 GENERAL SPECIFICATION

The pump shall be complete with suction pipe, foundation plate/sole plate and all other necessary accessories.

The pumps should generally comply with the requirement of following standard.

1. IS 1520-1972 : Horizontal Centrifugal Pumps for clear, cold and fresh water.


PUMP MAKE KIRLOSKAR, JYOTI, WORTHINGTON, BEACON AND MATHER & PLATT ONLY.

1.3 PUMP CASING

The casing should be made of closed grain Cast Iron smoothly finished and smooth surface finish inside free from any casting defects capable of with standing twice the hydrostatic pressure at rated capacity or 1.5 time the shut off head. Which ever is greater. The water passage shall be completely smooth.

1.4 IMPELLERS

The pump impellers shall be of double suction type and of non-ferrous materials, preferably zinc free phosphorus, bronze,(LTBR IS318 –LTB2 ) designed to inherently provide dynamic-static axial balance. Design of impeller should be such as to prevent cavitations during the working condition specified. The impeller shall be statically and dynamically balanced depending on design considerations to minimum vibration at the pump bearings, thereby prolonging their working life.

1.5 PUMP SHAFT

The pump shaft shall be manufactured from high tensile carbon steel and provided with renewable zinc free bronze sleeves to protect the spindle from the water being pumped.

1.6 INTERNAL PARTS
The pump internal shall be constructed of bronze materials of suitable composition so as to provide compatibility with regard to rubbing surface. Hardness of wearing surface shall be so adjusted as to provide maximum economy in terms of replacement of wearing component i.e. casing neck rings shall be more soft than the impeller neck.

Facilities for gland drainage shall be provided and gland lubrication shall suitably arranged by means of providing connection from the discharge volutes.

1.7 PUMP BEARING
The pump is to be provided with suitably white metal lined split bush bearing and a deep groove ball thrust bearing to take up residual axial balance. These bearing should be oil lubricated.

1.8 PUMP COUPLING
This shall be of flexible pin type equipped with a suitable coupling guard.

1.9 SOLE PLATE
Each pump shall be provided with a heavy structural steel sole plate. Sole plate shall be provided and grouted with foundation. The sole plates shall be designed to permit removal of entire pump without disturbing sole plate.

1.10 PRESSURE INDICATION DEVICE
Each pump shall be provided with pressure gauges of good quality make to give indications of delivery pressure & vacuum pressure separately. The pressure gauges should be designed in such a way that the readings shall not be affected due to mechanical vibrations. The connections sizes shall be 12mm and diameter size 150mm. In addition to above each pump shall be fitted with electronic pressure transducer with electronic digital display type indicator in control panel to indicate the delivery vacuum pressure of the pumps.

1.11 BOLTS, NUTS & WASHERS
All bolts, nuts and washers shall be of superior quality conforming to relevant Indian Standard Specification.

1.12 MATERIAL OF CONSTRUCTION
MATERIAL OF CONSTRUCTION OF PUMP SHALL BE SUCH AS TO RESIST EROSION & CORROSION. MATERIALS OF CONSTRUCTION OF VARIOUS COMPONENTS SHALL BE AS UNDER

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump casing</td>
<td>CI</td>
</tr>
<tr>
<td>Impellers</td>
<td>Zinc free Bronze conforming to relevant IS.</td>
</tr>
<tr>
<td>Pump shaft</td>
<td>High Tensile Carbon Steel with renewable Zinc free Bronze sleeves conforming to relevant IS.</td>
</tr>
<tr>
<td>Pump Internal</td>
<td>Bronze materials of suitable composition as per relevant IS.</td>
</tr>
<tr>
<td>Sole Plate</td>
<td>Fabricated as per IS 226.</td>
</tr>
<tr>
<td>Nuts, Bolts &amp; Washers</td>
<td>High Tensile Mild Steel conforming to relevant IS.</td>
</tr>
</tbody>
</table>

1.13 INSPECTION & TESTING
All the inspection, examination and testing shall be carried out in accordance with relevant Indian Standard Specification.

1. LABORATORY TEST
Laboratory pump test shall be carried out as per IS : 5120-1968 each pump to assess the pump discharge Vs head, horse power and efficiency figure. The pump casing shall be subjected to a pressure test of 1.5 times the working pressure at duty point.

2. FIELD TEST
The field test shall be carried out as per IS : 1520-1972 & IS : 5120-1968. These test may be witnessed by the Engineer-in-charge or his authorized representative. If they desire. The tolerance as specified in relevant IS code of practice shall not be application on the efficiency & KW out put. The contractor shall have to demonstrate the quoted efficiency of pump during testing.

1.14 GUARANTEES PERFORMANCE & TECHNICAL PARTICULARS
The contractor shall submit the details of guaranteed performance and technical particulars as desired in the proforma enclosed vide schedule 'B' along with the TENDER & the preliminary out line drawing indicating principal dimension and weight of pumping equipment and cross-section, drawing indicating the assembly of pumps & major parts there of with materials of construction and special features, complete descriptive and illustrated literature on the equipment and accessories offered.
PART - II
SPECIFICATION FOR 415 V INDUCTION MOTORS

2.1 TYPE
The motor shall be horizontal SOLID shaft squirrel cage type for clear water pumps suitable to operate on 415 V, 3 phase, 50 Hz. AC supply (with allowable variation of 10%) directly coupled with pumps. The rotations of clear water pumps shall be 1500 RPM. The motor rating generally conform to latest revision of IS 325-1971 and other relevant I.S.S.

2.2 VARIATION IN SUPPLY VOLTAGE
The motors shall be capable of deliver integrated output and rated power factor with following variations:

- VOLTAGE : +10%
- FREQUENCY : +5%
- COMBINED : +10%
- PHASE IN BALANCE : ±5%

2.3 RATES CAPACITY
The minimum continuous rated capacity of motors shall be such that it meets the power requirements of pumps in the complete range of its operations. It shall also provide additional power requirement in the motor by 5% at the maximum power requirement or by 10% at the duty point of operation whichever is maximum. The contractor shall ascertain the KW requirement and provide the motors of suitable capacity.

2.4 ACCELERATION CHARACTERISTICS
The accelerating characteristics of motor shall be matched with the driven equipment so that acceleration is obtained without overheating of motors.

2.5 METHOD OF STARTING
The motors shall be designed for star/delta/soft/starting at full voltage with starting current not exceeding 2 times the rated full load current. The motor shall also be designed for a minimum pull out torque of 200%.

2.6 NUMBER OF START
Motors when started with the drive imposing its full starting torque under the specified supply voltage variation shall be capable of withstanding at least two successive starts from hot condition and one start from cold condition without damage to the winding.

2.7 CLASS OF INSULATION
The motor winding shall be provided with insulation conforming to thermal class F. The maximum temperature rise of the winding shall not exceed the limits specified for class 'B' insulation. The insulation shall be given tropical and fungicidal treatment for successful operation of motor in hot, humid tropical climate. It shall be of thermo-setting type and shall remain unaffected by heat. The coils shall be highly uniform with uniform insulation strength and uniform dielectric lose. The dielectric losses shall be low and the star delta measurement should be not exceed 1% at 440V.

MAKE OF MOTOR CROMPTON, KEC, ABB AND SEIMENS ONLY.

2.8 MOTOR CONSTRUCTION
The motor construction shall be suitable for easy dismantling and reassembly at site with the help of simple over head crane. The motor shall be of core pack construction attached to the stator frame to facilitate easy removal and replacement of the winding for maintenance purpose. The over head for winding at both ends of the core shall be accessible for usual inspection without resorting to major dismantling.

2.9 MOTOR FRAME
Motor frame shall be of rigid casted steel. They shall be suitably annealed to eliminate up any residual stresses introduced during process of fabrication and machining.

2.10 STATOR LAMINATIONS

Stator laminations shall be made of suitable grade sheet varnished on either side and shall be adequately designed to avoid over heating during the starting and running conditions stipulated above.

2.11 ROTOR

Rotor should be desisted dynamically balanced and having carbon steel shaft hydraulically fitted.

2.12 LOCKED ROTOR WITH STAND TIME

Locked rotor with stand time under hot conditions at 110% voltage shall be more than starting time at minimum permissible voltage by at least two seconds.

2.13 TYPE OF ENCLOSURE & DEGREE OF PROTECTIONS

The degree of protection provided by the enclosures of motor shall conform to IS : 4691. The enclosure for the motors shall be closed air circuit air cooled (CMUIDSSMT) type, having of protection I.P. 55.

2.14 SHAFT INSULATION

Suitable insulation shall be provided on shaft bearing housing to prevent shaft current. The insulation provided shall be such that it shall retain its dialectical properties even after its handling for number of times during dismantling and reassembly.

2.15 BEARING ASSEMBLY

Bearing assembly shall be such that it prevents dust and water from getting into the bearing. Further, bearing lubricant shall not find access to the motor winding. The bearing assembly shall be provided with proper lubricating nipples.

2.16 EARTHING

The motor body shall have two separate earthing terminals for earthing in compliance with I.E. RULES.

2.17 TERMINAL BOXES

Separate terminal boxes shall be provided for main-Terminals of the motors and for R.T.D. and for space heaters. The terminals box for main terminals of motor shall be segregated type suitable for 3 core. 440 V. Aluminum conductor PVC insulated armored cables. The terminal boxes shall be spacious, dust & house proof designed and properly insulated. Adequate clearance should be given between live motor terminals and covers.

2.18 TEMPERATURE DETECTORS

Motors shall be provided with embedded temperature detectors, two for each phase winding at the location where the high temperatures may be expected in the stator winding. The temperature detectors shall also be provided in bearing assembly for monitoring the bearing temperature. The temperature detectors shall be connected with digital temperature scanners with alarm and trip points in the control panel.

2.19 ANTI - CONDENSATION HEATERS

Motors shall be have space heaters suitable for 240 V. single phase 50 Hz. A.C. supply, space heaters shall have adequate capacity to maintain motor internal temperature above due point to prevent moisture condensation on insulation during shut down periods.

2.20 DIMENSIONS OF MOTORS

Motors shall be properly dimensioned to have greater stability and low vibration limits. Mounting dimensions should confirm to IS : 2254.

2.21 COUPLING TO PUMPS
The motors shall be coupled to the pumps by means of polished steel shaft and flexible coupling. The size of line shaft and flexible coupling shall be calculated on the basis of maximum combined shear stress as per the relevant IS and shall not exceed 30% of the elastic limit in tension or 10% of ultimate tensile stress, shaft shall be designed taking into consideration that critical speed of the shaft which shall be higher than the operating or runaway speed.

2.22 DETAILS OF MOTORS TO BE FURNISHED
The TENDERs shall furnish along with their offer, the details of efficiency, total losses and power at different loads etc. as required in the form of guaranteed performance and technical particulars of motors in schedule 'B'.

2.23 TESTING
All the motors shall be routine an type tested at the supplier's workshop in the presence of Engineer-in-charge of work or his authorized representative or a third party inspection directed by Municipal approve the design.
PART-III  CABLING AND MOTOR CONTROL PANNEL

3.1  CABLE CLEAR WATER PUMP HOUSE

In case of clear water pump house the soft starter panel of each motor of clear water centrifugal pump shall be connected in L.T. panel in the pump house, through 300sqmm 3-1/2 core armored cable. Thus in all 2 Nos. of 300sqmm 3-1/2 core armored cable shall be laid in suitable duct and as per I.E.RULE. And a loop of about 1m should be given in each cable.

3.2  REACTOR TYPE MOTOR SOFT STARTER  [MOTOR CONTROL PANEL]

TECHNICAL SPECIFICATIONS:

<table>
<thead>
<tr>
<th>TYPE OF SOFT STARTER</th>
<th>NEUTRAL/LINE REACTOR SOFT STARTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRINCIPAL</td>
<td>SRSS[SERIES REACTOR SOFT STARTER]</td>
</tr>
<tr>
<td>APPLICABLE STANDARD</td>
<td>IS 3914 [MOTOR STARTER STANDARD GUIDELINE]</td>
</tr>
<tr>
<td>REACTOR</td>
<td>AIR CORE TYPE 100% COPPER WINDING</td>
</tr>
<tr>
<td>REACTOR CONNECTION</td>
<td>REACTOR TO BE IN SERIES ON LINE OF MOTORS</td>
</tr>
<tr>
<td>STARTING CURRENT LIMIT</td>
<td>2-3 TIMES OF FLSC IN STEPS [DEPENDING UPON LOAD TORQUE REQUIREMENT AND SETTABLE AT SITE]</td>
</tr>
<tr>
<td>HARMONIC</td>
<td>REACTORS USED IN SOFT STARTERS CIRCUITS OF AIR CORE SHOULD NOT DEVELOP HARMONIES IN THE CIRCUITS</td>
</tr>
<tr>
<td>DUTY CYCLE</td>
<td>6 NO EQUAL SPACED STARTS /PER HOUR</td>
</tr>
<tr>
<td>METHOD OF COOLING</td>
<td>AIR COOLED</td>
</tr>
</tbody>
</table>

SPECIFICATIONS FOR OTHER ITEMS SHOULD BE EQUIPPED WITH REQUIRED SWITCH GEAR PROTECTIONS AND INDICATIONS

3.3  PUMP WELL WATER LEVEL INDICATOR

One No. electrical water level indicator with alarming system shall be provided for the pump well near which the pump house of clear water has been constructed.

3.4  CIVIL WORK

1. Construction of covered cable trenches / tray from L.T. panel to panel board in pump house. The cable trenches should be covered with sand and type should be broken type connected to bridge with bolts etc. by suitable civil work and shall be covered with chequered plates of minimum thickness 7mm.

2. Construction of all other civil works required for erection of pump and motor with all foundation bolts, washers including all work pertaining to it.
PART - IV - BUTTER - FLY VALVE

4.1 GENERAL REQUIREMENT
Each pump shall be provided with a butterfly valve in the delivery pipe, and in addition one no common butter fly valve shall be also required in manifolds of each pump house. The butterfly valve shall be flanged, water works pattern eccentrically pivoted.
The valve shall have head stock, extension rod & wheel for operation and gearing system if the size is 300mm diameter or above. The valve shall generally confirm to relevant I.S.: 51450.

4.2 CONSTRUCTION
Butter fly valve having diameter equal to the diameter of delivery line suitable for individual flange bolting of flanges of pipe, with the disc to form a section cut through a sphere, working in conjunction with a cone shaped seating in body and synthetic rubber seal ring fitted to the disc with the help of a retaining ring & stainless steel screws, shall be provided, confirming to relevant I.S. STANDARDS. The disc shaft bearing shall be off set along the pipe axis from the place of the seating so as to get an unbroken position in full closed position.

4.3 MATERIALS OF CONSTRUCTION
1. Body : Close grained homogenous cast steel construction tested to 40 kg/cm²
2. Disc : Same as body tested to 20 kg/cm²
3. End housing and cover gear box housing for manual operation
4. Bearing : P.T.F.E. (Glass filled or carbon filled) having friction coefficient 0.04 (Note : Water itself acts as a lubricant for PTFE bearings).
5. Stub Shaft : 18/8 quality stainless steel AIST 304/ASTMA351 Gr. CF.
6. Rubber Seal Ring: For standard water works valve precision moulded nitrite rubber ring (shore hardness 55 to 65).
7. Hardware used : Stainless steel.

4.4 TESTING
The valves shall be subjected to closed ends tests as per relevant IS standard. Test certificate in triplicate shall be furnished. If necessary, test shall be witnessed by the Engineer's representative.

Working Pressure : 20 kg/sq.cm.
Test Pressure : Body : 40 kg/sq.cm
               Seating : 20 kg/sq.cm.
Gear Box Outside : 1 kg/sq.cm.
PART - V - NON RETURN VALVE

5.1 GENERAL
The non-return valves shall be single door type, free acting quick opening, giving rapid non-clam
closure & with low head loss characteristics when in open position. The valves shall be provided with
by passes and isolating valves conforming to relevant Indian Standard.
Specification of the valves shall generally conform to IS : 5321 (Part-II)

5.2 MATERIALS OF CONSTRUCTION
Body, Cover, Door and Hinges : Cast steel construction
Hinge pins, Door pins & Door : 12% Chromium steel conforming to IS:1570
Suspension pins
Bearing Bushes : Leaded Gun Metal Gr. 2, Conforming to IS:318
Body rings and door faces : Leaded Gun Metal Gr.2, conforming to IS:318

5.3 TESTING
The valves shall be subjected to closed ends tests as per relevant IS standard. Test certificate in triplicate shall be furnished. If necessary, test shall be witnessed by the Engineer’s representative.
WORKING PRESSURE : 20 KG/SQ.CM.
TEST PRESSURE BODY : 40 KG/SQ.CM.
SEATING : 20 KG/SQ.CM.
PART - VI  DELIVERY PIPES

6.1 GENERAL

The scope of the work is providing, laying & jointing of all delivery pipes, specials valves of all the pump and their connection to the common manifold as shown in drawing inclusive of the jointing of the manifolds to the respective conveyance mains fixing with one main butterfly valve.

1. The contractor shall design and fabricate the common manifold which would be made out of MS 6mm thick plates conforming to IS : 226 in such a way that it gives minimum frictional loss of head to the flow of water and also avoid cavitations or vortices in the manifold. The manifolds should be in line and coated with suitable material to protect it from corrosion in case of clear water ultimate carrying capacity shall be 59.60 MLD.

2. The contractor shall provide an expansion joint of his own design duly approved by the Engineer-in-charge.

3. Flanged joints shall be adopted for valves and butt welding joints or flanged joints in jointing of delivery pipe with dismantling joints.

4. Concrete saddles for valves and thrust blocks shall be provided by the contractor as per the design and drawings to be furnished by the contractor and subsequently approved by Engineer-in-charge.

6.2 MATERIAL OF CONSTRUCTION

All the pipes of works shall be fabricated out of steel plates conforming to IS:226-1962. The fabrication of pipes shall generally conform to IS : 3589-1966.

6.3 TESTING

The pipes and common manifold shall be hydraulically tested to a pressure of 2 times the working pressure. Test certificate to that effect shall be furnished by the contractor. The Engineer-in-charge witness the above test if so desired, the contractor shall arrange for such test in presence of Engineer-in-charge.
PART - VII  RATING AND NAME PLATES

7.1  RATING PLATE
Each main and auxiliary item of plate shall have permanently attached to it a rating plate in a conspicuous position. This shall be a non-corrodible material preferably chromium plates steel. The inscription shall be engraved in black on the plate.

7.2  NAME PLATE
1. Each item of plant shall be provided with a name plate or label designating the service of the particular equipment. The shape and size of the plate and inscription shall be approved by the Engineer-in-charge.
2. Such name plate shall be non-corrodible material preferably chromium plated steel having engraved black lettering.
3. In case of indoor equipment like circuit breakers, starters etc. the plate shall be of transparent plastic material with black lettering engraved on the back.
4. The name plate shall be screwed to the body of the equipment.
DETAILED TECHNICAL SPECIFICATION FOR 695 KVA /suitable ELECTRIC SUBSTATION (1 nos. for Raw water)

1. LOCATION OF WORK:-
Providing, supplying, erection and commissioning of Transformer of 695 KVA or suitable rating to be installed in an electric sub-station of 33KV/695 KVA located at Intake well at near Rihind Dam.

2. SCOPE OF WORK
The Scope of works includes design, supply erection construction commissioning and testing of 695 KVA, 33KV/695 KVA electric sub station (as per I.E. rules and specification) which mainly includes supply of transformer, outdoor, sub station structure, cables, other electrical equipment, accessories, and other allied required civil work etc. complete.

The details specifications of the proposed work are given below. However specifications laid down in relevant in diameter standards shall be strictly followed.

2.1 SUB STATION STRUCTURE AND ASENSSORIES.:
33/3.3KV outdoor substation comprising of 1 pole substation structure made of Double M.S. Girders & channels of adequate section (not less than ISHC 200x10 and ISMB 100x50) and length, with provision of 33 KV lightening arrester, A.B. switch, D.I. set, disc and post insulators with hardware sub station premises as per I.e. rules. Structure shall be complete with necessary painting of primary red oxide and finished with two coat of aluminum paint.

2.2 TRANSFORMER
One number transformer of rating 695 KVA, 33/0.44 KV 3 phase, double, would Dy 11, ONAN cooled out door distribution transformer with off load top changer as per IS 2026 (with all standard fitting and bi directional rollers and accessories as per I.E. rules) and as per other detailed specification. The transformer shall be fixed on suitable plinth as per I.E. rules.

2.3 EARTHING SYSTEM:
Double earthing of entire electrical system connected to earthing plates buried in ground and surrounded in charcoal and salt up to adequate depth. The contractor shall have to carry out earth continuity tests earth resistance measurement and all other required test in the presence o the Engineer-in-charge, which are necessary to prove that complete job. If earthing system is already in working conditions then rectifications if required is to be done only

2.4 CIVIL WORK:
All related civil works such as construction of transformer plinth, foundation of sub station structure, partition wall between transformer, earth pits, cable trenches/cable trays, cable markers, foundation of Fencing pole structure, providing and spreading 40mm B.T. metal as per I.E. Rules complete job.

2.5 FENCING FOR 33 KV SUBSTATION YARD.
Industrial yard fencing arrangement using 65 mm x 6mm angle iron post complete as per I.E. rules complete job if require at site

2.6 LIGHTING :
Sub station yard lighting provision in panel.

2.7 SUPPLY OF SAFETY DEVICES:
Supply of safety devices like rubber mating, hand gloves, first Aid box, danger boards, first Aid, charts, 0.5 Kg. Capacity Co2 type fire extinguishers and sand buckets etc. complete required as per specification and I.E. rules One set.

2.8 OPERATION OF SUBSTATION:
The contract include as operation and maintenance of the contract includes substation after commissioning and training to departmental staff for 7 days complete job.

2.9 **ANY WORKS** Equipment not specified in particular but considered necessary to complete the work as per specification and I.E. Rules are also include in this TENDER and scope of works.

2.10 **PANEL INSTALLATIONS**;

Panel is to be installed in substation or at place specified by the department.

3.0 **IMPORTANT CONDITIONS** :-

3.1 The BIDDER shall submit the brand names, & efficiencies at various points and design calculation for each and every equipment so as to assess and decide suitable offer.

3.2 A licensed class A electrical contractor authorized under I.E. Rules shall only carry out the work.

3.3 The Successful BIDDER on award of contract shall have to prepare and submit the detailed drawing of the work duly approved by the COMMISSIONER Electrical Inspector and Electrical Adviser, Govt. of M.P. After completion of work the representative of the COMMISSIONER Electrical Inspector and Electrical Adviser shall inspect the same. The inspection the same. The inspection fee shall be born by the contractor and electrical sub station shall be charged only after approval and permission of the competent authority as per I.E. Rules.

3.4 Supply and inspection of all the equipments shall be as per relevant BIS/ I.S. Specification and latest I.E. Rules.

3.5 Make, Materials, Technical specification, Circuit diameter grams and connection details of each and every equipment and its major parts offered should be clearly specified in the TENDER.

3.6 Test certificates guarantee, certificate and operation manual shall be submitted along with the supply of equipment.

3.7 After commissioning of all the equipment successful trial will have to be given for at least 72 Hours.

3.8 Maintenance and training of department staff:-

After installation, commission and official testing of electric sub station and other equipment satisfactorily, the contractor shall have to run and maintain and electric sub station to the complete satisfaction of the Engineer in charge for a period of at least 7 days round the clock through his experienced and competent staff under supervision of his experienced and qualified engineer.

3.9 Any work equipment not specified in particular but considered necessary to complete the works as per specification and I.E. Rules are also included in this TENDER.

4. **DESIGN DATA**:-

4.1 All the equipment shall be designed for operation in tropical humid climate subject to heavy rainfall and frequent thunderstorms with ambient air temperature of 50 deg. c (max)

4.2 The single line diameter gram of proposed 33 KV sub station, main electric panel board bus bar is shown in the enclosed drawing. The proposed site plan showing the relative location of sub station with respect to pump house are shown in separate drawing, which can be seen in office. The above drawing is enclosed only for the guidance of the BIDDER.
4.3 The rating and specification of transformers and other electrical equipment shown in the drawing and specification are indicative only. The BIDDER shall checkup the rating of the equipment and satisfy thoroughly regarding their adequacy.

4.4 All the materials used in this work must be strictly in accordance with the relevant I.S. specification and I.E. rulers.

4.5.1 On completion of work, the contractor shall submit the completion drawing. Circuit diameter grams and detailed electrical mechanical drawing of the equipments and the maintenance manuals in form as desired by the engineer-in-charge.

5. DETAILED TECHNICAL SPECIFICATION:

5.1 TRANSFORMER :-

(a) 695 KVA 33/3.3 KV 3 phase, 50 Hz Oil immersed, Natural self cooled type Onan, core type with class "A" insulation, double wound with off load tape changer outdoor distribution transformer with accessories designed and manufactured with particular reference to tropical condition conforming to IS 1026: 1981 as per IE rules and as per detailed specification.

<table>
<thead>
<tr>
<th>Rating</th>
<th>695 KVA OR OF SUITABLE RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>No load voltage ratio</td>
<td>(HV/LV 33 KVA/3.3 KV)</td>
</tr>
<tr>
<td>Winding materials</td>
<td>copper</td>
</tr>
<tr>
<td>No of phases</td>
<td>Three</td>
</tr>
<tr>
<td>Vector</td>
<td>Dy 11</td>
</tr>
<tr>
<td>Connection On (HV/LV)</td>
<td>Delta Star</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Installation</td>
<td>Outdoor</td>
</tr>
<tr>
<td>Type of cooling</td>
<td>Onan</td>
</tr>
<tr>
<td>Temperature rise in oil by thermometer</td>
<td>45 Deg. C</td>
</tr>
<tr>
<td>In winding of resistance</td>
<td>55 Deg. C</td>
</tr>
<tr>
<td>Terminal Arrangement</td>
<td></td>
</tr>
<tr>
<td>*(a) Primary</td>
<td>Bare</td>
</tr>
<tr>
<td>*(b) Secondary</td>
<td>Weather proof bare bushing</td>
</tr>
<tr>
<td>Type of tap changer</td>
<td>Off load top changer</td>
</tr>
<tr>
<td>Tapes step on HV</td>
<td>+5% - 5% in steps of 2.50%</td>
</tr>
<tr>
<td>Fitting and accessories</td>
<td>shall be provided as per IS 2026: 1981</td>
</tr>
</tbody>
</table>

5.2 CONSTRUCTION:

CORE
The core shall be of C.R.G.IO. annealed steel materials having low losses and good grain properties, bolted, together to the frames firmly to prevent vibration and noise,

WINDING:--
Winding shall be made out of electrolytic grade copper paper covered wire strips. Generally H.V. winding shall be cross order of disc type with paper covered conductor and the L.V. winding, shall be cylindrical type disc or helical type depending upon the voltage currents.
TANK :-
Transformer tank shall be robust construction and shall be fabricated with M.S. plate proper enforcement shall be provided so as to ensure that no building occurs during service.

FITTING AND ACCESSORIES:-
All the fitting and accessories as mentioned below shall be of the good quality and confirming to Relevant IS specification.

1. Rating and diameter gram plate.
2. Earthing terminals
3. Lifting lugs
4. Off load tape changing switch
5. Drain cum sampling valve with plug.
6. Conservator with oil level gauge
7. Thermometer
8. Air release plug.
11. Radiameteror.

PAINTING:-
Thank inside, core clamp and other fitting exposed to the oil shall be painted by heat and oil resistant paint. the exterior of the transformer and other ferrous fitting shall be first thoroughly cleaned, scraped and ten given two coats of zinc chromate, red oxide, primer following by two finishing coats of synthetic enamel paints as per shade No.631, of IS 5/1978.

DRAWING :-
Three copies of GA drawing showing details dimension and position of fitting and accessories shall be submitted with equipment.

v. Indicating lamps for breaker ON/OFF Spring charge trip circuit healthy.
vii. Push button for test /reset/acknowledge.

7 PANEL BOARD
The LT AC Switch Board shall be of volts, 3 phase and neutral 50 Hz Distribution board, indoor type, sheet clad by 1.5mm thick CRC sheet over S channel structure frame, floor mounted free standing type, cubical pattern, dust & vermin proof having protection group IP 53, and shall comprise of following.

1 Nos. of incoming ACB OF suitable rating make L&T siemens, Alsthan C&S and Schinder
1Nos. SFU OF suitable rating
- 1Nos. off 144 sq. mm flush tie ampere meter with selector switch.
- 1Nos. set of Indication Lamps for all three phase, On OFF auto Trip .
- 1 Nos. set of CT for protection and metering.
- 1 Nos. of solid state Triple pole on directional IDMTL over load and earth fault relay.
- The bus bar shall be suitable for 3 Phase and applicable amps,. the bus bar shall be with colored insulated sleeves. The supports shall be suitable spaced to give mechanical rigidity for with standing stress due to system fault,. The panel compartments shall have adequate space for termination of incoming and outgoing feeder cables equipped with gland, lugs etc.

8 CABLES:-
Power cable of PVC, aluminum armored cable of size 3x400mmx3.5 with require lugs gland. Total to be considered for lump sum offer is 20 meter. each from transformer to panel.

Control cable of PVC, copper cable of size 1 x 2.5 sq.mm x 3 and 6 core with required lugs, glands. Total length to be considered for lump sum offer is 50mtr, for various connections.

Units rates of cable to be quoted for any addition as required at time of execution.

9 SUB STATION STRUCTURE ADN ACCESSORIES.

9.1 33/0.44 KVA outdoor substation comprising of suitable substation structure and other required sub station material as given below:

9.2 SUB STATION STRUCTURE :-

Sub station structure extension made of 1 Nos. of two pole structure made out Two Nos. of 200xc 100mm M.S. channels fabricated and welded using 33 x 5 mm. M.S flat to make one pole of substation total substructure have our poles MS channels shall be not less than 100x 50mm and length as required to complete the sub station structure, clamps, nut bolts and other necessary MS Material as required for construction of sub station structure. These structures shall be made as per detailed drawing enclosed.

9.3 3 KV Lightning arresters:

Station class 1- KA rating, single pole lightning arrester for use of 33 KV solidly ground natural system and suitable for pedestal mounting complete with bolts and nuts. One SET of three numbers.

9.4 AIR BREAK SWITCHES:-

Air break switches 33 KV 400 amp. Triple pole with earth blades, gang operated, double break isolators suitable for horizontal mounting, complete with locking arrangement in both On/Off position post type insulators operating pipe arcing horns, hand operated machismo. The isolators will be complete with fixing bolts and nuts. all hardware parts shall be hot dip Galvanized.

9.5 DROP OUT FUSES:-

Drop out fuses 33 KV out doors drop out fuse cut out of expulsion type compete with insulators mounted on bas channels and suitable for cross arm mounting for a working current up to 400 amps. complete with fuse holders, fuse elements and operating rod. All hardware pa5rts shall be hot dip galvanizd Each set comprise for 3 Mps single pole drops fuses. The drop out fuse set shall be for control of 500 KVA Transformer Primary One set.

9.6 Post pin and Disc insulators

33 KV disc insulator complete with hardware.

33 KV pin post complete with GI pin

9.7 ALUMINUM TUBULAR BUSBAR:-

Aluminum tabular bus bar required for internal connection of 33 KV equipment such as transformer Isolator, DO fuse etc. Jumpers, Terminal connectors connection supports. insulators bolts nuts etc complete

9.8 PAINTING

Structure shall be complete with necessary painting of primary red oxide and finished with two coat of aluminum paint.

10 SHIFTING OF TRANSFORMER

There is no work of shifting of old transformer.

11 CIVIL WORK
All related civil work such as construction of transformer plinth foundation of substation structure earth pits cable trenches/ cable trays, cable markers, providing and spreading 40 mm BT metal as per IE rules complete job.

12 EARTHING SYSTEM:-
Double earthing of entire electrical system connected to earthing plates buried in ground and surrounded in charcoal and salt up to adequate depth, where damaged earth is encountered at a distance of 2 meters from any permanent structure shall be provided. It shall also included digging of pits earth plates as per latest IS, watering pipe with funnel of required length and diameter earth strip per without kinks lugs and clamps, salt and charcoal earth chamber etc as per EI rules the contractor shall have to carry out earth continuity tests, earth resistance measurement and all other required test in the presence of the Engineer in charge which in his opinion are necessary to prove that the system is in accordance with design specification and as per IE rules complete.

12.1 EARTHING MATERIAL
Copper earthing plate of size 3.15 x 600x 600mm 6 nos
Copper earthing strip 50x 5 mm as required
GI earthing plate of size 6.3 x 600x600mm
GI earthing strip 50 x 5mm as required for earthing arrangement
CI main hole cover for earthing pits.
GI pipe for earthing pits 50 mm diameter of length 1.5 meter
Funnel and other required earthing materials as per IE rules & IS

13 FENCING FOR 33 KV SUBSTATION YARD
Industrial type fencing arrangement using 65 mm x 6mm angle iron post each of 3 meter height fixed as required at a spacing of 2 meter with 2 meter high GI chain link wire mesh fencing of minimum opening of 75mm x 75mm 2 meter wide main gate with locking arrangement and etc complete as per IE rules complete job.

14 LIGHTING
Sub station lighting provision in pasnel is to be done.

15 SUPPLY OF SPARES
Supply of essential spares like DO fuses, HRC fuses indication lamps cable lugs for maintenance one set

16 Supply of essential tools
Supply of essential tools and equipment like DO operating rod earthing rod sets, required for operation of sub station helmet HD one set of each item.

17. SUPPLY OF SAFETY DEVICES :
Supply of safety devices like rubber mating gloves, first Aid box leather apron danger boards, first and charge 0.5 kg capacity CO2 type fire extinguisher and sand buckets etc complete required as per specification and IE rules one set.

Note : The quantities given in annexure E&F are approximate. However the contractor shall have to execute the complete works as per specification and IE rules.
The equipment of following brand shall be required & accepted.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Equipment</th>
<th>Acceptable makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Transformer</td>
<td>NGEF, crompton, Alsthom, Kirlosker, Voltemp, btcl, TESLA</td>
</tr>
<tr>
<td>2.</td>
<td>3 KV VCB</td>
<td>CROMPTON, ALSTHOM, AB, JYOTI, SIEMENS, BHEL, NIEPE-BANGLORE</td>
</tr>
<tr>
<td>4.</td>
<td>CTS PTS</td>
<td>CROMPTON, ALSTHOM, UNIVERSAL, JYOTI, C&amp;S</td>
</tr>
<tr>
<td>5.</td>
<td>44 KV LIGHTING ARRESTER</td>
<td>IGE, OBLUM, ALPRO, CROMPTON</td>
</tr>
<tr>
<td>7.</td>
<td>AIR BREAKS SWITCHES</td>
<td>SIL, WSL, KIRON, TEXTILE</td>
</tr>
<tr>
<td>8.</td>
<td>POST AND DIS INSULATORS</td>
<td>SIL, WSI, KIRON, TEXTILE, ATLAS, JAIPURIA, JYOTI</td>
</tr>
<tr>
<td>9.</td>
<td>ALUMINUM TUBULAR BUSBAR</td>
<td>AS PER IE RULE AND AS PER RELATIVE STANDARD</td>
</tr>
<tr>
<td>10.</td>
<td>CABLES</td>
<td>FINOLEX, UNIVERSAL, HAVELLS, NICCO, CCI</td>
</tr>
<tr>
<td>11.</td>
<td>DROP OUT FUSES</td>
<td>SIL, WSI, KRON, TEXTILE, ATLAS, JAIPURIA</td>
</tr>
<tr>
<td>12.</td>
<td>EARTHING MATERIAL</td>
<td>AS PER IE RULES AND AS PER RELATIVE STANDARD D</td>
</tr>
<tr>
<td>13.</td>
<td>SAFETY DEVICE</td>
<td>AS PER IE RULE AND AS PER RELATIVE STANDARD</td>
</tr>
<tr>
<td>14.</td>
<td>METERS</td>
<td>AE, MECO.</td>
</tr>
</tbody>
</table>
The following manufacturers are recommended to be used for the proposed work. The Bidders may substitute alternative brand names with prior approval of Engineer in charge.

<table>
<thead>
<tr>
<th>Item / Component</th>
<th>Recommended makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT and Centrifugal Pump</td>
<td>Kirloskar / Jyoti / Mather+Platt / WPIL</td>
</tr>
<tr>
<td>Pump motor</td>
<td>Kirloskar / Jyoti / Crompton / ABB / Elsthom / Siemens</td>
</tr>
<tr>
<td>Sluice Valve / Scour Valve</td>
<td>Kirloskar / IVC / VAG / IVI</td>
</tr>
<tr>
<td>Non-return / Check Valve</td>
<td>Kirloskar / IVC / VAG / IVI</td>
</tr>
<tr>
<td>Kinetic Air Valve</td>
<td>Kirloskar / IVC / VAG / IVI</td>
</tr>
<tr>
<td>Butterfly Valve</td>
<td>Fouress / IVC / VAG / L&amp;T (Audco)</td>
</tr>
<tr>
<td>Valve Actuator</td>
<td>Auma / Rotork / Limitork</td>
</tr>
<tr>
<td>Single faced Sluice Gate / Stop-log</td>
<td>Kirloskar / JASH / VAG</td>
</tr>
<tr>
<td>Flow &amp; Pressure regulating Valve</td>
<td>Darling Muesco / VAG / Keystone</td>
</tr>
<tr>
<td>Electro-magnetic Flow meters – Battery operated</td>
<td>Emerson / Krohne Marshall / Yokogawa</td>
</tr>
<tr>
<td>Water Hammer Control</td>
<td>Sureseal or equivalent</td>
</tr>
<tr>
<td>D.I. pipe Specials &amp; Fittings</td>
<td>Electrosteel / KISWOK / Jindal / Kejariwal</td>
</tr>
<tr>
<td>Electro-fusion &amp; Compression fittings</td>
<td>Glynwed / Georg Fisher/Astore/Magnum</td>
</tr>
<tr>
<td>Chlorinators</td>
<td>Pennwalt (W&amp;T), SIEMENS, Alldos</td>
</tr>
<tr>
<td>Chlorine leakage detectors</td>
<td>Pennwalt (W&amp;T), Capital Control(US), Alldos</td>
</tr>
<tr>
<td>WTP Equipments:</td>
<td>Voltas / Shivpad / Triveni / Hindustan Dorr-Oliver</td>
</tr>
<tr>
<td>(Bar Screen, Flash mixer, Clariflocculator,</td>
<td></td>
</tr>
<tr>
<td>Clarifier,</td>
<td></td>
</tr>
<tr>
<td>Pressure Sand filter,</td>
<td></td>
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<tr>
<td>Activated Carbon filter,</td>
<td></td>
</tr>
<tr>
<td>Chemical dosing system etc.</td>
<td></td>
</tr>
<tr>
<td>Power Transformers</td>
<td>ABB / Crompton / Emco / Siemens / Alstom</td>
</tr>
<tr>
<td>HT Switch Gear</td>
<td>Alstom / Jyoti / Crompton / Siemens</td>
</tr>
<tr>
<td>Vacuum Circuit Breaker (VCB)</td>
<td>Siemens / Schneider M.G. / Jyoti / L &amp; T</td>
</tr>
<tr>
<td>Air Circuit Breaker (ACB)</td>
<td>Siemens / Schneider M.G. / Jyoti / L &amp; T</td>
</tr>
<tr>
<td>Moulded Case Circuit Breaker MCCB</td>
<td>Siemens / Schneider M.G. / Jyoti / L &amp; T</td>
</tr>
<tr>
<td>Soft starters</td>
<td>Siemens / Alstom / Jyoti / ABB</td>
</tr>
<tr>
<td>Relay and Contactors</td>
<td>Siemens / Alstom / Jyoti / ABB / L&amp;T</td>
</tr>
<tr>
<td>Cables</td>
<td>Tropodur / Finolex / Asian / Gloster / Incab / Universal / Polycab</td>
</tr>
<tr>
<td>EOT crane</td>
<td>Hitech / Indef / Hiking / Ambika</td>
</tr>
<tr>
<td><strong>FOR INSTRUMENTATION, AUTOMATION AND SCADA SYSTEM:</strong></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--</td>
</tr>
<tr>
<td>Programmable Logic Controllers (PLC)</td>
<td>Rockwell *(Allen Bradley) / Siemens / Honeywell</td>
</tr>
<tr>
<td>Panel Enclosures and Consoles</td>
<td>Rittal / MAYOR / Cutler Hammer</td>
</tr>
<tr>
<td>Ultrasonic Type Level Measurement Device</td>
<td>Endress+Hauser / Krohne Marshall / Hycontrol UK.</td>
</tr>
<tr>
<td>Float &amp; Board Type Level Measuring system</td>
<td>Nivo (Toshniwal), Endress + Hauser, Pune Techtrol</td>
</tr>
<tr>
<td>Switch fuse Disconnector</td>
<td>L &amp; T, FN Type, Siemens, GEPC</td>
</tr>
<tr>
<td>Multi-Function Energy Meters</td>
<td>Enercon, L &amp; T, SOCOMEC</td>
</tr>
<tr>
<td>Capacitor bank</td>
<td>Crompton Greaves, Khatau Junker, Malde, L &amp;T</td>
</tr>
<tr>
<td>Cable Termination kit</td>
<td>Raychem, Denson, M-Seal</td>
</tr>
<tr>
<td>Battery</td>
<td>HBL NIFE, Exide, Amco</td>
</tr>
<tr>
<td>Battery Charger</td>
<td>Chaabi Electrical, Masstech</td>
</tr>
<tr>
<td>Tacho Meter on line</td>
<td>Kana Electric, Proton, Jay Shree Electronics</td>
</tr>
<tr>
<td>Pressure switch</td>
<td>Indfoss, Switzer, Tag Process Instruments</td>
</tr>
<tr>
<td>Flow switch</td>
<td>Switzer, General Instrument, Forbes Marshall</td>
</tr>
<tr>
<td>Pressure gauge</td>
<td>WAREE, WIKA, AN Instruments, Guru, Hitek</td>
</tr>
<tr>
<td>Pressure Transmitter</td>
<td>Emerson, Foxbro, Druck, Endress – Hauser, ABB, Honeywell Automation</td>
</tr>
<tr>
<td>Engineering cum Operator work Station</td>
<td>IBM, Compaq, Dell</td>
</tr>
<tr>
<td>Printer</td>
<td>EPSON, HP, CANNON, WIPRO</td>
</tr>
<tr>
<td>Local Supervisory Station</td>
<td>IBM, Compaq, Dell</td>
</tr>
<tr>
<td>HMI Software</td>
<td>Wincc, Rs View, Monitorpro, Intellution, Indusoft</td>
</tr>
<tr>
<td>Alarm Annunciator</td>
<td>Minilec, Peacon, ICA, APLAB</td>
</tr>
<tr>
<td>Uninterruptible Power Supply</td>
<td>HI-Real, Pulse, Tata Libert, APC, APLAB</td>
</tr>
<tr>
<td>Instruments &amp; Control Cables</td>
<td>Delton, Asian, Servel, TCL, Thermopad</td>
</tr>
<tr>
<td>Receiver Indicator/Digital panel meter</td>
<td>Masibus, Yokogawa, Lectrotek, NISHKO, SaiTech, MTL INSTS</td>
</tr>
<tr>
<td>Intercom system</td>
<td>Betel, Samsung, Tata, Panasonic, Matrix</td>
</tr>
<tr>
<td>Conductivity level switch</td>
<td>Pune techtrol, Krohne Marshall, E+H</td>
</tr>
<tr>
<td>Multifunction power monitor</td>
<td>MASIBUS, L&amp;T, ENERCON, SOCOMECH, SECURE, DAE</td>
</tr>
<tr>
<td>Temperature Scanner</td>
<td>SaiTech, Masibus, Nishko, Lectrotek</td>
</tr>
<tr>
<td>Analog Signal Multiplier</td>
<td>MASIBUS, Sai Tech, MTL INSTS, NISHKO</td>
</tr>
<tr>
<td>Portable vibration measuring equipment</td>
<td>Shrenk Every, IRD, STM Instrument, TIME</td>
</tr>
<tr>
<td>Portable sound measuring equipment</td>
<td>CENTER, MECORD, CYNGET</td>
</tr>
</tbody>
</table>
**Specification of Operation and Maintenance:**

The successful bidder shall carry out the operation and maintenance of the project facilities for 10 years after the successful commissioning of the project. The Lumpsum offer submitted by the Bidder shall include the operation and maintenance cost of the project for a period of 10 years from the date of successful completion of the work. During O&M the scope of Contractor shall be,

1.0 Repairs and replacements in all project components including Pipeline, Pumps, Electrical installations, valves, specials, OHTs, Intakewell etc. complete.
2.0 Electrical expenditure shall be borne by Municipal Council as per actual.
3.0 It shall be the responsibility of Bidder that the system runs at desired capacity and at efficiency not less than 90% during the O&M period.
4.0 Bidder shall ensure that all metering equipments (Consumer meter, Bulk meter, Sensors etc.) shall be working efficiently and effectively.
5.0 Bidder shall be responsible for reading the consumer meter and distributing the Bills in every 1st week of month.

ULB shall extend all the necessary support to the Bidder for fulfilling the Obligations for operating and maintaining the system successfully. Also it shall be the responsibility of ULB to enforce suitable water tariff and also ensure effective collection of water bills distributed by the bidder.

The Bidder shall employ following minimum Manpower for the O&M of the project. (Bidder shall be employing other staff as per requirement following is only the minimum staff).

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Particulars</th>
<th>Minimum Qualification</th>
<th>Experience</th>
<th>No. of personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Project Manager</td>
<td>B.E.</td>
<td>5 years</td>
<td>01</td>
</tr>
<tr>
<td>2.0</td>
<td>Dy. Project Manager</td>
<td>Diploma</td>
<td>5 years</td>
<td>02</td>
</tr>
<tr>
<td>2.0</td>
<td>Electrician</td>
<td>ITI (Elect.)</td>
<td>3 years</td>
<td>05</td>
</tr>
<tr>
<td>3.0</td>
<td>Fitter</td>
<td>ITI</td>
<td>3 years</td>
<td>03</td>
</tr>
</tbody>
</table>

ULB shall release 25% of the total contract price during O&M period @ 2% pa with an increase of 5% in every succeeding year till the 10th year of O&M. The payment against the O&M shall be made every year on satisfactory upkeep and running of the system.

**Note:**

In case of any increase/decrease in length of distribution pipes for 100% coverage of the Municipal area the payment will be adjusted as per the latest SOR issued by Department of Urban Administration and Development, Madhya Pradesh without any escalation.
IS Code (with latest Amendments as per BIS) of practices shall be used are

<table>
<thead>
<tr>
<th>S. No.</th>
<th>IS Code No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>IS 269:1989</td>
<td>33 grade ordinary Portland cement</td>
</tr>
<tr>
<td>2.</td>
<td>IS 8112:1989</td>
<td>43 grade ordinary Portland cement</td>
</tr>
<tr>
<td>3.</td>
<td>IS 12269:1987</td>
<td>53 grade Ordinary Portland cement</td>
</tr>
<tr>
<td>4.</td>
<td>IS 1489:1991</td>
<td>Portland pozzolana cement</td>
</tr>
<tr>
<td></td>
<td>Part I:1991</td>
<td>Fly ash based</td>
</tr>
<tr>
<td></td>
<td>Part II:1991</td>
<td>Calcined clay based</td>
</tr>
<tr>
<td>5.</td>
<td>IS 1786:1985</td>
<td>High strength deformed steel bars and wires for concrete reinforcement</td>
</tr>
<tr>
<td>6.</td>
<td>IS 875:1987</td>
<td>Code of practice for design loads for building structure</td>
</tr>
<tr>
<td></td>
<td>Part I:1987</td>
<td>Dead loads</td>
</tr>
<tr>
<td></td>
<td>Part II:1987</td>
<td>Imposed loads</td>
</tr>
<tr>
<td></td>
<td>Part III:1987</td>
<td>Wind loads</td>
</tr>
<tr>
<td></td>
<td>Part IV:1987</td>
<td>Snow loads</td>
</tr>
<tr>
<td></td>
<td>Part V:1987</td>
<td>Special loads and load combinations</td>
</tr>
<tr>
<td>7.</td>
<td>IS 13920:1993</td>
<td>Ductile detailing of reinforcement concrete structures subjected to seismic forces</td>
</tr>
<tr>
<td>8.</td>
<td>IS 1893:2002</td>
<td>Criteria for earthquake resistant design of structures</td>
</tr>
<tr>
<td>11.</td>
<td>IS 1343:1980</td>
<td>Code of practice for pre-stressed concrete (first revision)</td>
</tr>
<tr>
<td>13.</td>
<td>Part 1:1965</td>
<td>General requirement</td>
</tr>
<tr>
<td></td>
<td>Part 2:1965</td>
<td>Reinforced concrete structure</td>
</tr>
<tr>
<td></td>
<td>Part 3:1967</td>
<td>Pre-stressed concrete structures</td>
</tr>
<tr>
<td></td>
<td>Part 4:1967</td>
<td>Design tables</td>
</tr>
<tr>
<td>15.</td>
<td>IS 5330:1984</td>
<td>Criteria for design of anchor block for penstock with joints (first revision)</td>
</tr>
<tr>
<td>No.</td>
<td>IS Number</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>IS 3913:1966</td>
<td>Suspended sediment load samplers</td>
</tr>
<tr>
<td>18</td>
<td>IS 3917:1966</td>
<td>Scoop type bed material samplers.</td>
</tr>
<tr>
<td>19</td>
<td>IS 4890:1968</td>
<td>Method for measurement of suspended sediment in open channels.</td>
</tr>
<tr>
<td>20</td>
<td>IS 4926:1976</td>
<td>Ready mix concrete (first revision)</td>
</tr>
<tr>
<td>21</td>
<td>IS 6295:1986</td>
<td>Code of practice for water supply and drainage high altitude and/or sub-zero temperature regions (first revision)</td>
</tr>
<tr>
<td>22</td>
<td>IS 5477</td>
<td>Method for fixing the capacities of reservoir</td>
</tr>
<tr>
<td></td>
<td>Part 1:1969</td>
<td>General Requirement</td>
</tr>
<tr>
<td></td>
<td>Part 2:1969</td>
<td>Dead storage</td>
</tr>
<tr>
<td></td>
<td>Part 3:1969</td>
<td>Live storage</td>
</tr>
<tr>
<td></td>
<td>Part 4:1971</td>
<td>Flood storage</td>
</tr>
<tr>
<td>23</td>
<td>IS 9668:1980</td>
<td>Code of practice for provision and maintenance of water supply for fire fighting</td>
</tr>
<tr>
<td>24</td>
<td>IS 8062</td>
<td>Code of practice for cathodic protection for steel structure</td>
</tr>
<tr>
<td></td>
<td>Part 1:1976</td>
<td>General principles</td>
</tr>
<tr>
<td></td>
<td>Part 2:1976</td>
<td>Underground pipelines</td>
</tr>
<tr>
<td>25</td>
<td>IS 10221:1982</td>
<td>Code of practice for coating and wrapping of underground steel pipes</td>
</tr>
<tr>
<td>26</td>
<td>IS 8329:1977</td>
<td>Centrifugally cast(spun) ductile iron pressure pipes for water, gas, and sewerage</td>
</tr>
<tr>
<td>27</td>
<td>IS 9523:1980</td>
<td>Ductile iron fittings for pressure pipes for water, gas, and sewerage</td>
</tr>
<tr>
<td>28</td>
<td>IS 11906:1986</td>
<td>Recommendation for cement mortar lining cast iron, mild steel and ductile iron pipes</td>
</tr>
<tr>
<td>29</td>
<td>IS 12288:1987</td>
<td>Code of practice for laying of ductile iron pipes</td>
</tr>
<tr>
<td>30</td>
<td>IS 4984:1987</td>
<td>HDPE pipes for potable water supplies, sewage and industrial effluents(third revision)</td>
</tr>
<tr>
<td>31</td>
<td>IS 7634 Part 2:1975</td>
<td>Laying and jointing polyethylene(PE) pipes.</td>
</tr>
<tr>
<td>32</td>
<td>IS 8008 Part 1:1976</td>
<td>Injection moulded HDPE fittings for potable water supplies</td>
</tr>
</tbody>
</table>

NOTE:- Quality assurance program of the manufacturer shall have to be enclosed with the Tender along with BIS registration.
ANNEXURE -G

SAFETY CODE

1. **Scaffolding:**
   
   (i) Suitable scaffold should be provided for workman for all works that cannot safely be done from the grounds or from solid construction except such short period work as can be done safely from ladders. When a ladder is used extra Mazdoor shall be engaged for holding the ladder for carrying materials as well suitable foot holds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to (1/4 Horizontal and 1 Vertical).

   (ii) Scaffolding or staging more than 3.5 M above ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly attached, bolted, braced or otherwise secured at least 1 meter high above the floor platform of such scaffolding or staging and extending along the entire length of the ends thereof with only such opening as may be necessary for the delivery of the materials. Such scaffolding or staging shall be fastened as to prevent it from swaying from the building of structure.

   (iii) Working platform gangways and stairways should be so constructed that they should not sway unduly or unequally and if the platform of the Gangway or the stairway it more than 3.54 meter above ground level and or floor level they should be closely boarded, should have adequate width and should be suitably fenced as described (ii) above.

   (iv) Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the falling of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 meter.

   (v) Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable ladder shall be over 9 meter in length while the width between side rails in ring ladder shall be no case be less than 0.3 meter for ladder upto and including 3 meter length. For longer ladder this width should be increased at least 2 cm. for each additional meter of length. Uniform step spacing shall not exceeding 0.3 wt. Adequate precaution shall be taken to prevent danger from electrical equipment. No material on any of the work site shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall also provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit action or other precautions of law that may be brought by any person for injury sustained owing to neglect of the above and to pay any damages and costs which may be awarded in any such suit action or proceeding to any such person or which may with consent of the contractor be paid to compromise any claims by any such person.

2. **Excavation and Trenching:** All trenches 1.2 meter or more in depth, shall at all time be supplied with at least one ladder for each 30 meter in length of fraction thereof. Ladder shall be extended from bottom of the trench to at least 1 meter above the surface of the ground. The side of the trenches which are 1.5 meter or more in depth shall be stopped back to give suitable slopes or securely held by timber bracing so as to avoid the danger or sides to collapse. The excavated material shall not be placed within 1.5 meter of the edge of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

3. **Demolition:** Before any demolition work is commenced and also during the process of the work -
   
   (a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
(b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

(c) All precautionary steps shall be taken to prevent danger to persons employed from risk of fire or explosion of flooring. No floor roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

4. **Painting** : All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of person employed on the site and maintained in a condition suitable for adequate steps to ensure proper use of equipment by those concerned.

(a) Workers employed on mixing asphalting materials cement lime mortars shall be provided with protective footwear and protective goggles.

(b) Stone breakers shall be provided with protective goggles and protective clothing's, and seated at sufficiently safe intervals.

(c) Those engaged in welding works shall be provided with welder's protect.

(d) When workers are employed in sewers and manholes which are in use the contractors shall ensure that the manholes covers are open and are ventilated at least for an hour before the work shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.

(e) The contractor shall not employed man below the age of 18 and women on the work of painting with products containing lead in any form whenever men above the age of 18 are employed on the work of lead painting the following precaution should be taken:

   (i) No paint containing lead or shall be used except in the form of paste or ready made paint.

   (ii) Suitable face marks should be supplied for use by the workers when paint applied in the form of spray or a surface having lead paint dry rubble and scrapped.

   (iii) Overhauls shall be applied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessations of work.

5. **Drawing** : When the work is done near any place where there is risk of drawing all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment for all injuries likely to be sustained during the course of the work.

6. **Machines** : Use of hoisting machines and tackle including their attachments anchorage and support shall conform to the following standard or condition.

(a) These shall be good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

   Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.

(b) Every crane driver or hoisting appliances operator shall be properly qualified and no persons under an age of 21 years should in-charge of any hoisting machine including any scaffold which or give signals to the operator.
(c) In case of every hoisting machine and every chain ring lowering or as means of suspensions, the safe working load shall be ascertained by adequate means. Every hoisting machine and gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for load purpose of testing.

(d) In case of department machine the safe working and load shall be notified by the Electrical Engineer-in-Charge. As regards contractor machine the contractor shall notify the safe working load of the machine to the Engineer-in-Charge, whenever he brings any machinery to site of work and get verified by the Electrical Engineer concerned.

(e) Motors, gearing Transmission, Electric wiring and other dangerous parts of the hoisting appliance should be provided with efficient safe guards and with such means as well reduce the minimum of the risk of accidental descent of the load, adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load be coming accidentally displaced. When workers employed on Electrical installations which are already unregistered, insulating mats, wearing apparel such as gloves sleeves and boots as may be necessary should be provided, the workers should not wear rings, watches and carry keys, or other materials which are good conductors of electricity.

7. All scaffolds, ladders and their safety device mentioned or described herein shall be maintained in safe condition and no scaffold ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near places of work.

8. These safety provisions should be brought to the notice of all concerned by display on a Notice Board at prominent places at the work spot. The persons responsible for compliance of the safety code shall be named therein by the contractor.

9. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangement made by the contractor shall be open to inspection by the Labour, Engineer-in-Charge, or the Department or their representatives.

10. Notwithstanding the above clause (1) to (9) there is nothing in these to exempt the contractors to exclude the operations of any other act or rule in force in the Republic of India.
## List Of Key Equipments/ Machines For Quality Control Labs

<table>
<thead>
<tr>
<th>Minimum requirement</th>
<th>Available with the Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S. No.</strong></td>
<td><strong>Name of Equipment/ Machinery</strong></td>
</tr>
<tr>
<td>1 Digging tools like pick axe, shovel, etc.</td>
<td></td>
</tr>
<tr>
<td>2 IS Sieves Nos. with lid and pan (90 mm, 80 mm, 63 mm, 53 mm, 45 mm, 37.5 mm, 26.5 mm, 19 mm, 13.2 mm, 11.2 mm, 9.5 mm, 4.75 mm, 2.8 mm, 5.6 mm, 3.35 mm, 2.36 mm, 600 Micron, 425 Micron, 300 Micron, 150 Micron, 180 Micron, 90 Micron and 75 Micron)</td>
<td>ONE SET</td>
</tr>
<tr>
<td>3 Sand Pouring Cylinder with tray complete for field Density test</td>
<td></td>
</tr>
<tr>
<td>4 Speedy moisture meter complete with chemicals</td>
<td></td>
</tr>
<tr>
<td>5 Straight Edges 3.00 metre width</td>
<td></td>
</tr>
<tr>
<td>6 Liquid Limit and plastic limit testing apparatus complete with water bottle and glass wares</td>
<td></td>
</tr>
<tr>
<td>7 Electronic/digital balance 5 kg</td>
<td></td>
</tr>
<tr>
<td>8 Pan balance with weight box, 5 kg.</td>
<td></td>
</tr>
<tr>
<td>9 Slump cone</td>
<td></td>
</tr>
<tr>
<td>10 Concrete cube moulds (150 mm X 150mm)</td>
<td></td>
</tr>
<tr>
<td>11 Free swelling index test Apparatus</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Flakiness and elongation testing gauges</td>
</tr>
<tr>
<td>13</td>
<td>Water absorption test apparatus</td>
</tr>
<tr>
<td>14</td>
<td>Specific gravity test apparatus</td>
</tr>
<tr>
<td>15</td>
<td>B.S. compaction apparatus</td>
</tr>
<tr>
<td>16</td>
<td>Proving rings</td>
</tr>
<tr>
<td>17</td>
<td>Glass ware</td>
</tr>
<tr>
<td>18</td>
<td>Auto level and staff</td>
</tr>
<tr>
<td>19</td>
<td>Rapid moisture meter</td>
</tr>
<tr>
<td>20</td>
<td>Post Hole Auger with extensions</td>
</tr>
<tr>
<td>21</td>
<td>Measuring tape, spatula, glassware, porcelain dish, pestle mortar</td>
</tr>
<tr>
<td>22</td>
<td>Standard Proctor Density Test Apparatus with rammer</td>
</tr>
<tr>
<td>23</td>
<td>Electronic/digital balance 1 kg with the least count of 0.01 gm</td>
</tr>
<tr>
<td>24</td>
<td>Camber Board</td>
</tr>
<tr>
<td>25</td>
<td>Core Cutter (10 cm dia)</td>
</tr>
<tr>
<td></td>
<td>10cm/15cm height complete with dolly and hummer.</td>
</tr>
<tr>
<td>26</td>
<td>CBR Testing machine</td>
</tr>
<tr>
<td>27</td>
<td>Oven (ambient to 200°C)</td>
</tr>
<tr>
<td>28</td>
<td>Digital Thermometers</td>
</tr>
<tr>
<td></td>
<td>Aggregate Soundness test apparatus</td>
</tr>
<tr>
<td>30</td>
<td>Concrete cube testing machine</td>
</tr>
<tr>
<td>31</td>
<td>First aid box</td>
</tr>
<tr>
<td>32</td>
<td>Sampling Pipette</td>
</tr>
<tr>
<td>No.</td>
<td>Item</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>33</td>
<td>Balance</td>
</tr>
<tr>
<td>34</td>
<td>Dial Gauges</td>
</tr>
<tr>
<td>35</td>
<td>Thickness gauge</td>
</tr>
<tr>
<td>36</td>
<td>Water still (4 ft.)</td>
</tr>
<tr>
<td>37</td>
<td>A.I.V. testing equipment</td>
</tr>
</tbody>
</table>

The above list of essential equipment for quality control is for guidance and is not complete.

Other apparatus and equipment as desired/required by the Engineer-in-Charge shall be procured by the Contractor.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of Equipment/ Machinery</th>
<th>Quantity</th>
<th>Name of Equipment/ Machinery</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concrete weigh batch mixer</td>
<td>02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plate Vibrator</td>
<td>02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pin/Needle vibrator</td>
<td>02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Concrete Lift</td>
<td>01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Welding machine</td>
<td>01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
List of Approved Makes

The equipment of following brand shall be required & accepted.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Equipment</th>
<th>Acceptable makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Transformer</td>
<td>NGEF crompton Alsthom Kirlosker Voltemp btl TESLA</td>
</tr>
<tr>
<td>2.</td>
<td>3 KV VCB</td>
<td>CROMPTON ALSTHOM AB JYOTI SIEMENS BHEL NIEPE-BANGLORE</td>
</tr>
<tr>
<td>3.</td>
<td>AIR CIRCUIT BREAKER</td>
<td>L &amp; T SIEMENCE ABB JYOTI CROMPTON C &amp; S</td>
</tr>
<tr>
<td>4.</td>
<td>CTS PTS</td>
<td>CROMPTON ALSTHOM UNIVERSAL JYOTI C&amp;S</td>
</tr>
<tr>
<td>5.</td>
<td>44 KV LIGHTING ARRESTER</td>
<td>IGE OBLUM ALPRO CROMPTON</td>
</tr>
<tr>
<td>6.</td>
<td>RELAYS</td>
<td>L &amp; T SIEMENCE ABB JYOTI C&amp;S</td>
</tr>
<tr>
<td>7.</td>
<td>AIR BREAKS SWITCHES</td>
<td>SIL WSL KIRON TEXTILE</td>
</tr>
<tr>
<td>8.</td>
<td>POST AND DIS INSULATORS</td>
<td>SIL WSI KIRON TEXTILE ATLAS JAIPURIA JYOTI</td>
</tr>
<tr>
<td>9.</td>
<td>ALUMINUM TUBULAR BUSBAR</td>
<td>AS PER IE RULE AND AS PER RELATIVE STANDER</td>
</tr>
<tr>
<td>10.</td>
<td>CABLES</td>
<td>FINOLEX UNIVERSAL HAVELLS NICCO CCI</td>
</tr>
<tr>
<td>11.</td>
<td>DROP OUT FUSES</td>
<td>SIL WSI KRON TEXTILE ATLAS JAIPURIA</td>
</tr>
<tr>
<td>12.</td>
<td>EARTHING MATERIAL</td>
<td>AS PER IE RULES AND AS PER RELATIVE STANDARD D</td>
</tr>
<tr>
<td>13.</td>
<td>SAFETY DEVICE</td>
<td>AS PER IE RULE AND AS PER RELATIVE STANDARD</td>
</tr>
<tr>
<td>14.</td>
<td>METERS</td>
<td>AE MECO.</td>
</tr>
</tbody>
</table>
The following manufacturers are recommended to be used for the proposed work. The Bidders may substitute alternative brand names with prior approval of Engineer in charge.

<table>
<thead>
<tr>
<th>Item / Component</th>
<th>Recommended makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT and Centrifugal Pump</td>
<td>Kirloskar / Jyoti / Mather+Platt / WPIL</td>
</tr>
<tr>
<td>Pump motor</td>
<td>Kirloskar / Jyoti / Crompton / ABB / Elsthom / Siemens</td>
</tr>
<tr>
<td>Sluice Valve / Scour Valve</td>
<td>Kirloskar / IVC / VAG / IVI</td>
</tr>
<tr>
<td>Non-return / Check Valve</td>
<td>Kirloskar / IVC / VAG / IVI</td>
</tr>
<tr>
<td>Kinetic Air Valve</td>
<td>Kirloskar / IVC / VAG / IVI</td>
</tr>
<tr>
<td>Butterfly Valve</td>
<td>Fouress / IVC / VAG / L&amp;T (Audco)</td>
</tr>
<tr>
<td>Valve Actuator</td>
<td>Auma / Rotork / Limitork</td>
</tr>
<tr>
<td>Single faced Sluice Gate / Stop-log</td>
<td>Kirloskar / JASH / VAG</td>
</tr>
<tr>
<td>Flow &amp; Pressure regulating Valve</td>
<td>Darling Muesco / VAG / Keystone</td>
</tr>
<tr>
<td>Electro-magnetic Flow meters – Battery operated</td>
<td>Emerson / Krohne Marshall / Yokogawa</td>
</tr>
<tr>
<td>Water Hammer Control</td>
<td>Sureseal or equivalent</td>
</tr>
<tr>
<td>D.I. pipe Specials &amp; Fittings</td>
<td>Electrosteel / KISWOK / Jindal / Kejariwal</td>
</tr>
<tr>
<td>Electro-fusion &amp; Compression fittings</td>
<td>Glynwed / Georg Fisher/Astore/Magnum</td>
</tr>
<tr>
<td>Chlorinators</td>
<td>Pennwalt (W&amp;T), SIEMENS, Alidos</td>
</tr>
<tr>
<td>Chlorine leakage detectors</td>
<td>Pennwalt (W&amp;T), Capital Control(US), Alidos</td>
</tr>
<tr>
<td><strong>WTP Equipments :</strong></td>
<td></td>
</tr>
<tr>
<td>Bar Screen, Flash mixer, Clarifloculator, Clarifier, Pressure Sand filter, Activated Carbon filter, Chemical dosing system etc.</td>
<td>Voltas / Shivpad / Triveni / Hindustan Dorr-Oliver</td>
</tr>
<tr>
<td>Power Transformers</td>
<td>ABB / Crompton / Emco / Siemens / Alstom</td>
</tr>
<tr>
<td>HT Switch Gear</td>
<td>Alstom / Jyoti / Crompton / Siemens</td>
</tr>
<tr>
<td>Vacuum Circuit Breaker (VCB)</td>
<td>Siemens / Schneider M.G. / Jyoti / L &amp; T</td>
</tr>
<tr>
<td>Air Circuit Breaker (ACB)</td>
<td>Siemens / Schneider M.G. / Jyoti / L &amp; T</td>
</tr>
<tr>
<td>Moulded Case Circuit Breaker MCCB</td>
<td>Siemens / Schneider M.G. / Jyoti / L &amp; T</td>
</tr>
<tr>
<td>Soft starters</td>
<td>Siemens / Alstom / Jyoti / ABB</td>
</tr>
<tr>
<td>Relay and Contactors</td>
<td>Siemens / Alstom / Jyoti / ABB / L&amp;T</td>
</tr>
<tr>
<td>Cables</td>
<td>Tropodur / Finolex / Asian / Gloster / Incab / Universal / Polycab</td>
</tr>
<tr>
<td>EOT crane</td>
<td>Hitech / Indef / Hiking / Ambika</td>
</tr>
<tr>
<td>FOR INSTRUMENTATION, AUTOMATION AND SCADA SYSTEM:</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Programmable Logic Controllers (PLC)</td>
<td>Rockwell (Allen Bradley) / Siemens / Honeywell</td>
</tr>
<tr>
<td>Panel Enclosures and Consoles</td>
<td>Rittal / MAYOR / Cutler Hammer</td>
</tr>
<tr>
<td>Ultrasonic Type Level Measurement Device</td>
<td>Endress+Hauser / Krohne Marshall / Hycontrol UK</td>
</tr>
<tr>
<td>Float &amp; Board Type Level Measuring system</td>
<td>Nivo (Toshiba), Endress + Hauser, Pune Techrol</td>
</tr>
<tr>
<td>Switch fuse Disconnector</td>
<td>L &amp; T, FN Type, Siemens, GEPC</td>
</tr>
<tr>
<td>Multi-Function Energy Meters</td>
<td>Enercon, L &amp; T, SOCOMECE</td>
</tr>
<tr>
<td>Capacitor bank</td>
<td>Crompton Greaves, Khatau Junker, Malde, L&amp;T</td>
</tr>
<tr>
<td>Cable Termination kit</td>
<td>Raychem, Denson, M-Seal</td>
</tr>
<tr>
<td>Battery</td>
<td>HBL NIFE, Exide, Amco</td>
</tr>
<tr>
<td>Battery Charger</td>
<td>Chaabi Electrical, Masstech</td>
</tr>
<tr>
<td>Tacho Meter on line</td>
<td>Kana Electric, Proton, Jay Shree Electronics</td>
</tr>
<tr>
<td>Pressure switch</td>
<td>Indfoss, Switzer, Tag Process Instruments</td>
</tr>
<tr>
<td>Flow switch</td>
<td>Switzer, General Instrument, Forbes Marshall</td>
</tr>
<tr>
<td>Pressure gauge</td>
<td>WAREE, WIKA, AN Instruments, Guru, Hitek</td>
</tr>
<tr>
<td>Pressure Transmitter</td>
<td>Emerson, Foxbro, Druck, Endress – Hauser, ABB, Honeywell Automation</td>
</tr>
<tr>
<td>Engineering cum Operator work Station</td>
<td>IBM, Compaq, Dell</td>
</tr>
<tr>
<td>Printer</td>
<td>EPSON, HP, CANNON, WIPRO</td>
</tr>
<tr>
<td>Local Supervisory Station</td>
<td>IBM, Compaq, Dell</td>
</tr>
<tr>
<td>HMI Software</td>
<td>Winc, Rs View, Monitorpro, Intellution, Indusoft</td>
</tr>
<tr>
<td>Alarm Annunciator</td>
<td>Minilec, Peacon, ICA, APLAB</td>
</tr>
<tr>
<td>Uninterruptible Power Supply</td>
<td>HI-Real, Pulse, Tata Libert, APC, APLAB</td>
</tr>
<tr>
<td>Instruments &amp; Control Cables</td>
<td>Delton, Asian, Servel, TCL, Thermopad</td>
</tr>
<tr>
<td>Receiver Indicator/Digital panel meter</td>
<td>Masibus, Yokogawa, Lectrotek, NISHKO, SaiTech, MTL INSTS</td>
</tr>
<tr>
<td>Intercom system</td>
<td>Betel, Samsung, Tata, Panasonic, Matrix</td>
</tr>
<tr>
<td>Conductivity level switch</td>
<td>Pune techrol, Krohne Marshall, E+H</td>
</tr>
<tr>
<td>Multifunction power monitor</td>
<td>MASIBUS, L&amp;T, ENERCON, SOCOMECH, SECURE, DAE</td>
</tr>
<tr>
<td>Temperature Scanner</td>
<td>SaiTech, Masibus, Nishko, Lectrotek</td>
</tr>
<tr>
<td>Analog Signal Multiplier</td>
<td>MASIBUS, Sai Tech, MTL INSTS, NISHKO</td>
</tr>
<tr>
<td>Portable vibration measuring equipment</td>
<td>Shrenk Every, IRD, STM Instrument, TIME</td>
</tr>
<tr>
<td>Portable sound measuring equipment</td>
<td>CENTER, MECORD, CYNGET</td>
</tr>
</tbody>
</table>