Agra Smart City Limited
Agra (U.P)

Tender Document For:-

Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission-Fourth Call

Agra Smart City Limited (ASCL), Office of Nagar Nigam,

Agra, UP-282001

FOR THE WORK: Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission-Fourth Call

AGRA SMART CITY LIMITED
AGRA

COVER-1
TECHNICAL BID

SECTION 1

LIST OF IMPORTANT DATES
NOTICE INVITING TENDER

SECTION I

List of Important Dates of Bids for Construction Related to Project under ASCL

1	Name of Work:	Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission-Fourth Call
2	Completion Period for construction:	AS PER NIT including rainy Season.
3	Date of Issue of Notice Inviting Bid.	**15.02.2019**
4	Period and Places of Availability of Bidding Documents From:	15.02.2019 To 23.02.2019 Till 17:30 Hrs **On line on http://etender.up.nic.in**
5	Deadline for Receiving Bids online only,	Date 23.02.2019 Time– 05:30 P.M.
6	Time and Date for opening Technical Bid/Bids online,	Date 25.02.2019 Time:- 04.00 PM onwards At Office of Agra Smart City Limited, ASCL, Agra.
7	Time and Date of opening Financial Bids online	Date to be notified after technical evaluation
8	Last Date of Bid Validity	90 days from date of submission of Bid
9	Officer inviting Bids	**Office of the Chief Executive Officer, Agra Smart City Limited, Agra**

Notice Inviting Tender

No-* 02/ ASCL/Water supply /Feb-19** ***Dated 15.02.2019

1. The **CEO, Agra Smart City Limited, Agra** on behalf of Government of Uttar Pradesh invites the Item rate bids online from the eligible and approved Contractors registered with UP PWD and other state government department, class 'A', **The Bidder may submit bids for any or all of the works. Bidders are advised to note the minimum qualification criteria specified in Clause 4 of the Instructions to Bidders to qualify for the award of the contract.**
2.

S N	Name of Work	Estimated cost (Rs)	EMD (Rs)	Cost of Document (in Rs.)	Address of the Executing the work
1	2	3	4	5	6
1.	Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission-Fourth Call	142,53,63,000.00 (Including GST)	1,26,30,000.00	Rs.5,000 +18% GST = 5,900.00	ABD area under Smart City Mission, Agra

3. **Time allowed for completion of Whole work is 24 Month, including rainy season.**
4. The bids shall remain valid for acceptance for a period of **THREE MONTHS** days from the last date of submission of Bids. Bids once submitted cannot be withdrawn.
5. Bids must be accompanied by non-refundable fee as indicated in Column 5 of the above table, in the form of **Demand Draft on any Schedule bank, for amount indicated in favour of "Chief Executive Officer, Agra Smart City Limited, Agra" payable at Agra. A set of bidding documents (SBD) will be available online on website http://etender.up.nic.in.**
6. Bids must be submitted online on or before **05:30 PM on dated 23.02.2019** and the technical bids will be opened online, dated **25.02.2019 at 04:00 PM**. If the office happens to be closed on the date of opening of the bids as specified, the bids will be opened online on the next working day, at the same time and validity of bid will be considered from the original date. The date and time of opening of the financial bid shall be notified on website. The Financial bids shall be accordingly opened online.
7. A pre-bid Querries shall be mail and corresponding to clarify the issues and to answer questions on any matter that may be raised in mail shall be uploaded in website.
8. Bids must be accompanied with security of the amount specified for the work in the table. Bid security will have to be in any one of the forms as specified in the bidding document and shall be valid for 45 days beyond the validity of the bid. Bid security pledged in favour of "**Chief Executive Officer, Agra Smart City Limited, Agra.**
9. No Engineer of Gazetted rank or other Gazetted officer employed in Engineering or Administrative duties in an Engineering Department of the State / Central Government is allowed to work as a Contractor for a period of two years after his retirement from Government service, without Government permission. This contract is liable to be cancelled if either the Contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government as aforesaid before submission of the tender or engagement in the Contractor's service.
10. Bid documents and other details consisting of qualification information and eligibility criterion of bidders, plans, specifications, drawings, the schedule of quantities of the

various classes of work to be done and the set of terms & conditions of contract to be complied with by the Contractor can be seen in the office of the CEO, Agra Smart City Ltd., Agra between hours of 11.00 am and 04.00 PM on any working day between **15.02.2019 & 23.02.2019**

11. Any bidder who is having criminal record is not allowed to participate in the bidding process.
12. Any bidder who is registered with the state Bar Council is not allowed to participate in the bidding process.
13. Each bidder is required to furnish an affidavit online on a non-judicial stamp paper of Rs. 100/-giving all information on prescribed Performa required for evaluation of the bidding capacity of the bidder.
14. Bidder must submit scan copy of original information/document on prescribed Performa i.e., T4, T5, T6 with each bid original must be produced when asked for at the time of opening of the bid.
15. 1% Labour Cess will be deducted from the Contractor Bill.
16. The Extra Security /Performance Guarantee will be accepted as per G.O. No. 622/23-12-202-2Audit/08TC-2Lucknow Dated 08.06.2012.
    A. Up to 10 Percent below Rates on BOQ @ 0.50 % Per 1 % below Rate.
    B. In case of Bidders Quote the Rate More Than 10% below on BOQ Then Bidder Has to Provide Extra Security @ 1% Per 1% Below Rate
17. Bidder have to quote all the rates inclusive of all taxes, levies and royalties if any but exclusive of G.S.T. GST Shall Be Applicable As Per G.O.No 1614/23-10-2017-12(Samanya)/2017 Date 09.11.2017.

Section 2: Instructions to Bidders

Table of Clauses

Instructions to Bidders (ITB)

A. General

1. Scope of Bid

1.1. The Employer as defined in the Appendix to ITB invites bids for the construction of Works as described in these documents and referred to as "the works". The name and identification number of the works is provided in the Appendix to ITB. The bidders may submit bids for any or all of the works detailed in the table given in the Notice Inviting Tender. Bid for each work should be submitted separately.

1.2. The successful Bidder will be expected to complete the Works by the Intended Completion Date specified in the Part I General Conditions of Contract.

1.3. Throughout these documents, the terms "bid" and "tender" and their derivatives (bidder/ tendered, bid/ tender, bidding/ tendering, etc.) are synonymous.

a) Assessment of Distribution System on Area based development metering areas (ABDMA) Basis

Infrastructure Consultants have formulated the ABDMAs after proper assessment of the distribution network. These will be made available to the Contractor. Contractor shall immediately start working on DMA's, in accordance with the priorities set forth.

b) Distribution Network Improvement on ABDMA basis

The Distribution Network Improvement shall be executed in ABDMAs. The Contractor shall isolate the ABDMAs without affecting the adjoining areas for water supply. Contractor shall be responsible to provide alternative arrangement as suggested.

Each ABDMA will preferably have one inflow point and be isolated by installing valves / end plugs. ABDMA at entry point shall be provided with a bulk flow meter. Each ABDMA will have at least five Critical Measurement Points (CMPs) for continuous logging of pressure, and the CMPs shall be such that they should be at the highest and farthest points from the command reservoir.

c) Establishment of ABDMA's

The Contractor shall make arrangements for maintaining the service of the presently connected consumers at the current level during the execution of the Works or arrange for alternative arrangement for water supply at his own cost. The Works shall be implemented ABDMA wise. Works in priority ABDMAs shall be completed and commissioned first in parallel to construction works in other ABDMA's. All Works involving excavation shall be finalized through reinstatement of the surface to the initial condition.

d) ABDMA Creations

The scope of work for each ABDMA established includes (but is not limited to):

Detailed site investigations, updating of distribution network drawings provided by PMC, complete with all trial bores that might be required to verify pipe connections (and the consequent re- instatement of road, sidewalk or any other surface);
Verification and finalization of suggested ABDMA boundaries; locating of existing boundary valves, functioning and tightness checks of existing boundary valves, identification of location for additional boundary valves to be installed, identification of locations where the pipes shall be disconnected and capped.
Selection of location for ABDMA inflow chamber;

Site survey for ABDMA inflow point Conducting Pressure Zero Test (PZT) to ensure water tightness of ABDMAs.

e) Consumer Survey

A complete consumer survey to ground truth the footprints and the properties in the sub project area shall be carried out. It may happen that the base map image available with Agra Municipal corporation (AMC) may give one footprint but the footprint may be divided in several properties internally either horizontally or vertically. The foot print shall be divided to show clear distinction. The Contractor shall undertake a door-to-door survey of all properties whether connected to the network or un-connected and obtain the details in regard to name, address, number of resident members, categories of general residential households (independent housing, group housing connections and apartments), urban poor households, government housing, non-domestic, commercial, institutional, religious places, industrial and fire services and any other category of resident, consumers income status in the Service Area ,availability of water connection, metering status, estimated consumption levels, alternate water supply arrangements, willingness to pay, etc. The Contractor shall get the data from AMC billing department about the authorized water connection and their location of properties. The data collected from household survey shall be geo-coded to the satellite image / base map. This database shall be used for the water demand of each property at the junction of distribution network pipe.

f) Leak Detection

Electronic sounding rods and Leak Noise Correlate shall be used in conjunction to locate leaks. The Contractor may suggest alternative ways of leak detection if he so desires but the same shall be approved prior to leak detection.

g) Providing, laying and hydraulic testing of DI pipes of various diameters in different ABDMAs as per drawings, specifications and as per BOQ items. (All incidental works related to pipeline works, which are not specified in BOQ item description however required for completion of works, are considered incidental to the respective BOQ item and the cost of same are deemed to be included in the respective items in BOQ.

h) Providing , supplying , lowering , fixing and satisfactory testing sluice valves , air valves, pressure reducing valves, pressure loggers, quality analyzers, flow meters , road boxes household meters etc. as per specifications , drawings and as per BOQ items.

i) Interconnections of pipe network,

j) Providing household connections,

k) Diversion of flow by installing end cap/adaptor at pipe end.

l) Repairing damaged water and drainage connections.

m) Repairing damaged drainage connections

n) Providing and fixing specials as per specifications, drawings and BOQ items.

o) Pipeline Alignment. The knowledge of exact alignment of the pipelines is important. As such it is necessary to have spatial data of the pipelines. It is proposed that the contractor should prepare “As Built” drawings of the pipelines laid newly. The contractor should also prepare the alignment drawings of the existing DI-K9 pipelines.

14. Road Reinstatement works

a) Scarifying/breaking asphalt and concrete road for relaying and excavation for trenches for water supply and drainage pipeline work.
b) Refilling the trenches with compaction to receive the road crust as per specification.
c) Providing and laying road reinstatement items as per specifications.

1.5. Providing SCADA system for entire Water Supply system

Contractor shall provide the SCADA system as per specifications covering all incidental items which are not specified in BOQ items required for functioning of SCADA system

1.6. Providing Operation & Maintenance Services (O &M).

Contractor shall provide the Operation and maintenance services as specified in BOQ Scope of work includes but not limited to operation and maintenance of Water supply system for the period specified in BOQ .

1.7. Carrying out Leak detection study.

1.8. Providing Training to Corporation staff.

1.9. Program Background and Objectives

Government of India has selected Agra as one of the smart city project in Uttar Pradesh. Improvements to water supply for ABD area is one of the components of Agra smart city project. By implementing this project the adequate water supply with required pressure will be ensured in project area.

Water Supply improvement works

a) Pumping station at Geoni Mandi water works
b) Transmission main from Geoni Mandi water works to ZPS at TajGanj
c) Balancing CWR at Taj Ganj ZPS
d) Pumping station at Taj Ganj ZPS
e) Feeder main from Taj Ganj ZPS to zonal OHTs at Zone-1, Zone-2A,2B&2C, Zone-3, Zone-4, Zone-5 & Zone-6.
f) Distribution mains for entire ABD area.
g) House service connections for entire ABD area.
h) SCADA system for entire water supply system.

Project Objective

The objectives of the project are:

i. Water supply

- To establish continuous pressurised water supply system to consumers with quality and quantity at required pressure.
- to implement non-revenue water (NRW) management plan using Area based development metering areas (ABDMA) approach
- To ensure 100 % house service connections with metering for water supply to ensure sustainability of the project by implementing a comprehensive asset management plan focussing on an integrated approach to operation & maintenance to minimize lifecycle costs.
- To adopt energy efficient water treatment processes

This part describes extent of works and Employer's requirements for works in brief. In respect of water supply, the contract includes design, construction, supply, installation, testing, trial run, operation of works and commissioning, and thereafter Operation and Maintenance services for 5 years for the entire works from commissioning date upto contract completion date and as per the stipulations of the bid document.

The contractor shall ensure the technical feasibility of the offer submitted after visiting the site. It must be clearly understood all the existing conditions and necessary improvements proposed in the project. The Contractor shall be required to design and execute every such item(s) of work(s) which are considered required or necessary for the satisfactory completion and functioning of the entire work and creating additional storage tanks, OHTs, even if such items of work are not specified in this bid document, but are essential to complete the works.

The Scope of work includes but is not limited to all necessary investigation of present system, checking the site conditions for executing all the proposals, feasibility to accommodate the proposed structures &, pipelines and ensure the land availability in respect of size and ownership. Getting prior approval from Engineer–In-Charge before marking and after marking the structure on ground, adopting pipe sizes and materials strictly as per the design drawings, Ensuring necessary permissions and clearances before laying of pipelines and structures. Taking care of other utilities above and below the ground, Choosing best alignment to lay the pipelines to reduce or nullify any damage caused to existing above ground and underground utilities, Damage caused to utilities above and below ground shall be borne by contractor at his own risk and cost, Contractor shall prepared his own geotechnical investigation and structural design for all CWRs & OHTs suitable to accommodate at the proposed land and get approval from competent authorities, Contractor shall follow relevant IS codes and standards for executing all works.

The Contractor shall, to the maximum extent practical and feasible, endeavour to standardize on the manufacturing and supply of Plant and equipment so as to minimize the maintenance requirements. The Contractor shall ensure that his designs are "maintenance friendly" and that all items of Plant and equipment are designed and installed in a manner which will facilitate routine and periodic maintenance operations.

All works, plants, equipment etc. shall also conform to specifications incorporated in the bid documents.

All materials and services required for procurement of the whole works shall be provided by the Contractor. Thus, the works included under this contract require design, inspection, supply, installation and commissioning within two years from contract commencement date and Operation and Maintenance for five years from commissioning date till issue of contract completion certificate.

The Employer/Employers Representative provides drawings for lump sum works as reference in the Bid. The Contractor shall review Employer/Employers

Representative's data, designs and come up with its own designs for the clear water reservoir, over head tanks (OHTs) and all other associated works, based on the data and alignment suggested/allowed by the Employer/Employers Representative. The changes in the suggested works that include technical; allowed alignments etc. shall be considered only due to compelling site conditions or unforeseen technical reasons, subject to the approval of the Employer/Employers Representative or its authorised representative.

The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents, desired output/performance of the Works, whether specifications, drawings and other documents have been approved by the Employer/Employers Representative or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer Representative. Contractor shall not deviate from the specifications prescribed by the Employer Representative unless the proposed changes will result in better performance and cost effectiveness.

2. Source of Funds

2.1. Agra Smart City Limited as defined in the Appendix to ITB has decided to undertake the works of water supply scheme in ABD area Agra.

2.2. Agra Smart City Limited has decided to provide funds for the water supply scheme in ABD area Agra.

3. Eligible Bidders

3.1. This Invitation for Bids is open to all bidders as defined in the Appendix to ITB.

3.2. Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices by the Central Government, the State Government or any public undertaking, autonomous body, authority by whatever name called under the Central or the State Government.

3.3. Any bidders having **criminal record** is not allowed to participate in the online bidding process. Any person who is having criminal cases against him or involved in the **organized crime or gangster activities or Mafia or Goonda or Anti social activity** are strictly prohibited to participate in the bidding process. If it is established that any bidder has **criminal record, his bid shall be automatically cancelled.**

3.4. The bidder has to produce attested true copies of the solvency & character certificates issued by the competent authority with the bid document along with an affidavit verifying that these two documents are valid. However, these original certificates should be produced by them at the time of opening the bids. If the competent authority is not satisfied after comparing attested copies with the originals, it may reject the bid as if the required documents were not produced all. The bidder has also to produce self declaratory affidavit (on the attached prescribed proforma) in original with the bid documents.

3.5. Any bidder who is an Advocate and Registered with any State Bar Council Shall not be allowed to participate in the bidding. If it is established that the contractor is registered with the state bar council**, his bid shall be automatically cancelled.**

4. Qualification of the Bidder

4.1. All bidders shall provide in Section 3, Forms of Bid and Qualification information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

4.2. All bidders shall include the following information and documents with their bids in Section 3, Qualification Information unless otherwise stated in the Appendix to ITB:

(a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;

(b) Total monetary value of civil construction works performed for each of the last five years;

(c) Experience in works of a similar nature and size for each of the last five years, and details of works in progress or contractually committed with certificates from the concerned officer or equivalent;

(d) Evidence of ownership of major items of construction equipment named in Clause 4.4 B (b) (i) of ITB or evidence of arrangement of possessing them on hire/lease/buying as defined therein.

(e) Details of the technical personnel proposed to be employed for the Contract having the qualifications defined in Clause 4.4 (b) (ii) of ITB for the construction.

(f) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past three years;

(g) an undertaking that the bidder will be able to invest a minimum of cash up to the percentage (defined in the Appendix to ITB) of the contract price of works, during the implementation of the works;

(h) Evidence of access to line(s) of credit and availability of other financial resources/ facilities (10 percent of the contract value) certified by banker (the certificate being not more than 3 months old.)

(i) Authority to seek references from the Bidder's bankers;

(j) information regarding any litigation or arbitration during the last five years in which the Bidder is involved, the parties concerned, the disputed amount, and the matter;

(k) Proposal for subcontracting the components of the works for construction/ Up gradation aggregating not more than 25% of the contract price and

(l) The proposed methodology and program of construction, backed with equipment and material planning and deployment, duly supported with broad calculations and Quality Management Plan proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications and within the stipulated period of completion.

4.3. Bids from joint venture with three consortiums are allowed.

4.4. A To qualify for award of the Contract, each bidder should have in the last five years:

I. Achieved in any one year a minimum financial turnover (in all cases of civil engineering construction works only) volume of construction work of at least the amount equal to the estimated cost of works (excluding maintenance cost for five

years for which bid has been invited (Turnover of **Rs.93,26,30,000.00 (Rs. Ninety Three Crores Twenty Six Lakhs Thirty thousand only**). The turnover will be indexed at the rate of 8 percent per year.

II. Satisfactorily completed , as prime Contractor, at least one similar work equal in value to one third of estimated cost of work (similar work of value of **Rs. 42,07,00,000.00 (Rupees Forty Two Crores seven lakhs only**) for which the bid is invited , The value of similar work will be indexed at the rate of 8 percent per year.
International experience with any Government entities can be considered. All the certificates submitted have to be in English language with proper relevant and authorized translation as per the relevant rules. Any verification of experience shall be done at the expense of bidder.

Similar work shall mean
At least one satisfactorily completed water supply project equal in value to one third of estimated cost of work as mentioned above and any of the consortium members should have experience in the following:-
i. Laying of transmission/feeder main/Laying of water distribution system,
ii. Design, plan and construction of OHT,
iii. Providing house service connection using water meter.
iv. Should have satisfactorily completed, at least one work of successfully implementing SCADA for water supply system
v. Bidder shall have successfully operated and maintained at least one water supply system for a minimum period of two years in the last five years.

4.4.B (a) Each bidder must attach:

(i) The current income-tax clearance certificate;

(ii) An affidavit that the information furnished with the bid documents is correct in all respects; and

(iii) Such other certificates as defined in the Appendix to ITB. Failure to produce the certificates shall make the bid non-responsive.

(b) Each bidder must demonstrate:

(i) Availability for construction work, of the owned, key equipment stated in the Appendix to ITB including equipment required for establishing field laboratory to perform mandatory tests, and those stated in the Appendix to ITB;

(ii) Availability for construction work of technical personnel as stated in the Appendix to ITB.

(iii) Liquid assets and /or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of not less than the amount specified in the Appendix to ITB;

(c) The bidder must not have in his employment:

(i) The near relations (defined as first blood relations, and their spouses, of the bidder or the bidder's spouse) of persons listed in the Appendix to ITB.

(ii) Without Government permission, any person who retired as gazetted officer within the last two years of the rank and from the departments listed in the Appendix to ITB.

4.4. C To qualify for a package of contracts made up of this and other contracts for which

bids are invited in the Notice Inviting Tender, the bidder must demonstrate having

experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.

4.5. Sub contractors experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria except to the extent stated in 4.4 A above

4.6. Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity for construction work is equal to or more than the total bid value. The available bid capacity will be calculated as under:

Assessed Available Bid capacity = (A*N*M -B)

Where

A = Maximum value of civil engineering works executed in any one year during the last five years (updated to the price level of the last year at the rate of 8 percent a year) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which bids are invited (period up to 6 months to be taken as half-year and more than 6 months as one year).

M = M is taken 2.5

B = Value, at the current price level, of existing commitments and on-going works to be completed during the period of completion of the works for which bids are invited.

Note: The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent.

4.7. Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

(i) Made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/or

(ii) Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.

(iii) Participated in the previous bidding for the same work and had quoted unreasonably high or low bid prices and could not furnish rational justification for it to the Employer.

5. One Bid per Bidder

5.1. Each Bidder shall submit only one Bid for one work. A Bidder who submits more than one Bid will cause the proposals with the Bidder's participation to be disqualified.

6. Cost of Bidding

6.1. The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will, in no case, be responsible or liable for those costs.

7. Site Visit

7.1. The Bidder, at his own cost, responsibility and risk, is encouraged to visit, examine and familiarize himself with the Site of Works and its surroundings including source of earth, water, road aggregates etc. and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense. He may contact the person whose contact details are given in the Appendix to ITB.

B. **Bidding Documents**

8. Content of Bidding Documents

8.1. The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10 of ITB.

1. Notice Inviting Tender
2. Instructions to Bidders
3. Qualification Information
4. Conditions of Contract

(Part I General Conditions of Contract, and Contract Data; Part II Special Conditions of Contract)

5. Specifications
6. Drawings
7. Bill of Quantities
8. Form of Bid
9. Form of Acceptance, Form of Agreement, Issue of Notice to Proceed with the Work, form of Unconditional Bank Guarantee.

8.2. Bidding document will be available online on the website http://etender.up.nic.in.

8.3. The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms and specifications, bill of quantities, forms and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk. Pursuant to clause 25 hereof, bids, which are not substantially responsive to the requirements of the Bid Documents, shall be rejected.

9. Clarification of Bidding Documents and Pre-bid Meeting

9.1. A prospective bidder requiring any clarification of the bidding document may notify the employer in writing or by cable ("cable" includes Telex and facsimile) at the employer address indicated in the Notice inviting tenders. The Employer will respond to any request for clarification received earlier than 10 Days prior to the dead line for submission of bid. Copies of the employer's response will be forwarded to all purchasers of the bidding documents, including a description of the enquiry, but without identifying its source

9.2. If a pre-bid meeting is to be held, the bidder or his authorized representative is invited to attend it. Its date, time and address are given in the Appendix to ITB.

9.2.1. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

9.2.2. The bidder is requested to submit any questions in writing or by cable so as to reach the Employer not later than one week before the meeting.

9.2.3. Minutes of the meeting, including the text of the questions raised (without identifying the source of the enquiry) and the responses given will be transmitted online (or otherwise). Any modifications of the bidding documents listed in Clause 8.1 of ITB, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively online through the issue of an Addendum pursuant to Clause 10 of ITB and not through the minutes of the pre-bid meeting.

9.2.4. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

10. Amendment of Bidding Documents

10.1. Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda online.

10.2. Any addendum thus issued shall be part of the bidding documents.

10.3. To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend, as necessary, the deadline for submission of bids, in accordance with Clause 20.2 of ITB.

C. Preparation of Bids

11. Language of Bid

11.1. All documents relating to the Bid shall be in the language specified in the Appendix to ITB.

12. Documents Comprising the Bid

12.1. The Bid submitted by the Bidder shall be in two separate parts:

Part I This shall be named Technical Bid and shall comprise of:

I. Earnest Money;

II. Qualification information, supporting documents, affidavit and undertaking as specified in Clause 4 of ITB.

III. Undertaking that the bid shall remain valid for the period specified in clause 15.1 of ITB.

IV. Any other information / documents required to be completed and submitted by bidders, as specified in the appendix to ITB, and

V. An affidavit affirming that information he has furnished in the bidding document is correct to the best of his knowledge and belief.

Part II. It shall be named Financial Bid and shall comprise of:

i) Form of Bid as specified in Section 6;

ii) Priced bill of quantities for items specified in Section 7;

12.2. The following documents, which are not submitted with the bid, will be deemed to be bid is non responsive.

Section	Particulars
1.	Notice inviting Tender
2.	Instruction to the bidders
3.	Conditions of Contract
4.	Contract Data
5.	Specifications
6.	Drawings

13. Bid Prices

13.1. The Contract shall be for the whole Works, as described in Clause 1. 1 of ITB, based on the priced Bill of Quantities submitted by the Bidder.

13.2. The Bidder shall adopt the Item Rate Method as specified in the Appendix to ITB; only the same option is allowed to all the Bidders. Item Rate Method requires the bidder to quote a rates for each item specified in the Appendix to ITB.

13.3. All duties, taxes, royalties and other levies payable by the Contractor under the Contract, or for any other cause, shall be included in the rates, prices, and total Bid price submitted by the Bidder (except GST).

13.4. The rates and prices quoted by the Bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment.

14. Currencies of Bid

14.1. The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees.

15. Bid Validity

15.1. Bids shall remain valid for a period of ninety days after the deadline date for bid submission specified in Clause 20 of ITB. A bid valid for a shorter period shall be rejected by the Employer as non-responsive.

15.2. In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidders‟ responses shall be made in writing or by cable. A bidder may refuse the request without forfeiting his Earnest Money. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his earnest money for a period of the extension, and in compliance with Clause 16 of ITB in all respects.

16. Earnest Money

16.1. The Bidder shall furnish, as part of the Bid, Earnest Money, in the amount specified in the Appendix to ITB.

16.2. The Earnest Money shall, at the Bidder's option, be in the form of Bank Guarantee (as per format given in Section-8 (f)/ Fixed Deposit Receipt of a scheduled Indian bank/NSC/Post office saving Bank issued in favor of the name given in the Appendix to ITB. The Fixed Deposit Receipt/ Bank Guarantee/ Fixed Deposit Receipt of a scheduled Indian bank/NSC/Post office saving Bank shall be valid for six months or more after the last date of receipt of bids. Other forms of Earnest Money acceptable to the Employer are stated in the Appendix to ITB. Earnest money will be deposited, physically, with officer calling tender, before last date of submission of tender. A scanned copy of earnest money document will be submitted along with the tender

16.3. Any bid not accompanied by an acceptable Earnest Money, unless exempted in terms given in the Appendix to ITB, shall be rejected by the Employer as non-responsive.

16.4. The Earnest Money of unsuccessful bidders will be returned within 28 days of the end of the Bid validity period specified in Clause 15.1 of ITB.

16.5. The Earnest Money of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the required Performance Security.

16.6. The Earnest Money may be forfeited:

a) If the Bidder withdraws the Bid after bid opening (technical bid) during the period of Bid validity;

b) In the case of a successful Bidder, if the Bidder fails within the specified time limit to

   i. Sign the Agreement; and/or

   ii. Furnish the required Performance Security.

17. Alternative Proposals by Bidders

17.1. Bidders shall submit offers that comply with the requirements of the bidding documents, including the Bill of Quantities and the basic technical design as indicated in the drawings and specifications. Alternative proposals will be rejected as non-responsive.

18. Format and Signing of Bid

18.1. The Bidder shall submit one set of the bid comprising of the documents as described in Clause 12 of ITB.

18.2. The Bid shall be submitted on line and shall be digitally signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to Clause 4.3(a) of ITB. The person or persons signing the Bid shall sign all pages of the Bid.

D. Submission of Bids

19. Sealing and Marking of Bids

19.1. The Bidder shall have to bid on line separately for Technical and financial bid . Technical Bid: To be opened on AS PER NIT (Date and time of Technical Bid opening as per clause 22.1 of ITB.) Financial Bid: Not to be opened except with the approval of the Employer.

20. Deadline for Submission of Bids

20.1. Complete Bids (including Technical and Financial) must be received by the Employer in the Appendix to ITB not later than the date and time indicated in the Appendix to ITB.

20.2. The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10.3 of ITB, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

21. Late Bids

21.1. No Provision/Consideration on Late Bid/Bids Submission.

E. Bid Opening and Evaluation

22. Bid Opening

22.1. The Employer will open the bids received, on line in the presence of the bidders/ bidder's representatives who choose to attend at the time, date and place specified in the Appendix to ITB. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the Bids will be opened at the appointed time online on the next working day.

22.2. The technical bid shall be opened online.

22.3. The Employer will prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Clause 22.3 of ITB.

22.4. Evaluation of the technical bids with respect to bid security, qualification information and other information furnished in Part I of the bid in pursuant to Clause 12.1 of ITB, shall be taken up and completed within Ten working days of the date of bid opening, and a list will be drawn up of the responsive bids whose financial bids are eligible for consideration.

22.5. The Employer shall inform, by E-mail (or otherwise the bidders, whose technical bids are found responsive, date, time and place of opening as stated in the Appendix ITB. In the event of the specified date being declared a holiday for the Employer, the bids will be opened at the appointed time online on the next working day through they or their representative, may attend the meeting of opening of financial bids.

22.6. At the time of the opening of the "Financial Bid", the names of the bidders whose bids were found responsive in accordance with clause 22.5 of ITB will be announced. The financial bids of only these bidders will be opened. The responsive bidder's names, the Bid prices, the total amount of each bid, and such other details as the Employer may consider appropriate will be announced by the Employer at the time of bid opening. Any Bid price, which is not read out and recorded, will not be taken into account in Bid Evaluation.

22.7. The Employer shall prepare the minutes of the opening of the Financial Bids.

23. Process to be Confidential

23.1. Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any attempt by a Bidder to influence the Employer's processing of bids or award decisions may result in the rejection of his Bid.

24. Clarification of Bids and Contacting the Employer

24.1. No Bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the contract is awarded.

24.2. Any attempt by the bidder to influence the Employer's bid evaluation, bid comparison or contract award decision may result in the rejection of his bid.

25. Examination of Bids and Determination of Responsiveness

25.1. During the detailed evaluation of "Technical Bids", the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clauses 3 and 4; (b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the bidding documents. During the detailed evaluation of the "Financial Bids", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications and drawings.

25.2. A substantially responsive "Financial Bid" is one that conforms to all the terms, conditions, and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive bids.

25.3. If a "Financial Bid" is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation

26. Correction of Errors

26.1. Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

a) Where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and

b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

26.2. The amount stated in the Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid will be rejected, and the Earnest money shall be forfeited in accordance with Clause 16.6(b) of ITB.

27. Evaluation and Comparison of Bids

27.1. The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 25 of ITB.

27.2. In evaluating the bids, the Employer will determine for each Bid the evaluated Bid price by adjusting the Bid price by making correction, if any, for errors pursuant to Clause 26 of ITB

27.3. If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 32 of ITB be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased performance security shall be decided at the sole discretion of the Employer, which shall be final, binding and conclusive on the bidder.

27.4. If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of routine maintenance of works to be performed for five years under the contract, the Employer may require the Bidder to produce detailed price analyses for routine maintenance. After its evaluation, the Employer may require that the amount of the performance security set forth in Clause 32 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased performance security shall be decided at the sole discretion of the Employer, which shall be final, binding and conclusive on the bidder.

28. Price Preference

28.1. There will be no price preference to any bidder.

F. Award of Contract

29. Award Criteria

29.1. Subject to Clause 31 of ITB, the Employer will award the Contract to the Bidder whose Bid has been determined:

i. to be substantially responsive to the bidding documents and who has offered the lowest evaluated Bid price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause 3 of ITB, and (b) qualified in accordance with the provisions of Clause 4 of ITB; and

ii. To be within the available bid capacity adjusted to account for his bid price which is evaluated the lowest in any of the packages opened earlier than the one under consideration.

30. Employer's Right to accept any Bid and to Reject any or all Bids

30.1. Notwithstanding Clause 29 above, the Employer reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Employer's action.

31. Notification of Award and Signing of Agreement.

31.1.1. The bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the Part I *General Conditions of Contract* called the "Letter of Acceptance") will state the sum that the Employer will pay to the Contractor in consideration of the execution, completion by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

31.2. The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause 32.

31.3. The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the Employer and the successful Bidder after the performance security is furnished.

31.4. Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

32. Performance Security

32.1. Within 10 (ten) days after receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer a Performance Security of five percent of the Contract Price, for the period of two years and the time for completion of works plus additional security for unbalanced Bids in accordance with Clauses 27.3 and 27.4 of ITB and Clause 46 Part I General Conditions of Contract and sign the contract.

32.2. The performance security shall be either in the form of a Bank Guarantee or fixed deposit Receipts, in favour of "Chief Executive Officer, Agra Smart City Limited Payable at Agra**,** U.P., from a Scheduled Commercial Bank.

32.3. Failure of the successful Bidder to comply with the requirements of Clause 32.1.shall constitutes sufficient grounds for cancellation of the award and forfeiture of the Earnest Money. He will also be debarred from participating future bids under ASCL for one year.

33. Advances:

33.1. The employer will provide mobilization advances and advance against security of equipment as provided in Part I General Condition of Contract.

34. Corrupt or Fraudulent Practices

The Employer requires the bidders/Contractors to strictly observe the laws against fraud and corruption in force in India, namely, Prevention of Corruption Act, 1988.

35. Deleted:

36. Completion Certificate:

It is obligatory for the contractor to obtain the completion certificate within 01 (one) months of completion of time period or valid extension period. Only 90 % payment for the work shall be released to the contractor upon 100 % physical work completion. Upon completion of 90 % physical work, the contractor shall apply for Completion Certificate and balance amount of 10 % shall be released along with Completion

Certificate and Final Bill. It shall be mandatory on the contractor to receive completion certificate from ASCL / Consultant within 01 months of completion of Tender Period or Valid Extension Period failing which suitable amount shall be deducted from his Security Deposit as directed by the Engineer- in – Charge.

If during any period the contractor fails to complete the operation and maintenance of the work as specified in the Detailed Tender Notice, the cost of this work shall be deducted from the balance SD payable to the contractor.

Appendix to Invitation to Bidders (ITB)

Instructions to Bidders

Clause Reference

(1.1) The Employer is CEO, Agra Smart City Limited Represented by: **CEO, Agra Smart City Limited Agra.**

(1.1) The Works is Construction of following road with allied works as shown below

FOR THE WORK: Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission-Fourth Call.

(2.1) The State is Uttar Pradesh

(3.1) Eligible Bidders Are: contractors registered with CPWD or Public Works Department in class A or any Uttar Pradesh Govt. department or Other State Govt. department certificate.

(4.2) The information required from bidders in Clause 4.2 is modified as follows: NONE

4.2 (g) The percentage is Ten

(4.4 B) (a) (iii) Other certificates required with the bid are: As per ITB

(4.4. B) (b) (i) The key equipment for road works and field testing laboratory Road Works are:

SI	Name of Equipment (Documents to be attached)	**Cost Of Work Up To 2 Crores**	**Quantity /No Cost Of Work More Then 2 Crores**
1	R.M.C. plant	**-**	**1**
2	Transport Miller	**-**	**4**
3	Tar Boiler	**2**	**-**
4	Mixture/Mixol	**1**	**1**
5	Concrete Mixture	**1**	**1**
6	Water Tanker	**8**	**8**
7	Diesel Road Roller (8-10 Ton Capacity)	**4**	**-**
8	Vibratory Roller	**-**	**-**
9	Tractor	**-**	**2**
10	Truck	**-**	**2**
11	Hot mix plant with sensor paver	**-**	**-**
12	Air compressor	**1**	**-**
13	Mechanical Broom	**1**	**-**
14	Bitumen Distributor/ mechanical sprayer	**1**	**-**
15	Tipper	**-**	**4**
16	J.C.B.	**-**	**2**
17	Pockland	**-**	
18	Wet Mix Macadam Plant with paver	**-**	**-**
19	Pin vibrator	**2**	**-**
20	Generator 250 KVA	**1**	**1**

21	Grader	-	-
22	Soil Compactor	**1**	**1**
23	Concrete Vibrator with niddle	**1**	**1**
24	Field Laboratoy	**1**	**1**
25	Hydra (CAPACITY 8 TON)	-	As per requirement
26	Mastic Cooker	-	-
27	Trolly	-	As per requirement
28	Barrier	-	-
29	Cone	-	-
30	Reflective Tape	-	As per requirement
31	Pressure pump for testing of pipeline	-	As per requirement

For field testing Laboratory:

- Contractor will have to establish one Laboratories in between of stretch of working site fully equipped and consumable as per SP-20-2002 i.morth/up.p.w.d instructions
- Contractor will have to provide 2 Jeeps in good condition with driver and POL etc. exclusively to departmental officers for checking and inspection execution of work free of cost.

  Note: (a) The bidder must produce the following documentary evidence in support of his owning the above equipment: Documents showing proof of ownership.

(4.4 B) (b)(ii) The Number of Technical personnel, Qualifications and Experience will be as follows:

A. The technical Personal are

Technical Personnel	**Number**	**Experience in water Supply Works**
A. Degree Holder in Civil / Mechanical/ Electrical Engineering	1	Minimum 20 years of Experience out of which five years of experience of having handled/executed independently large water supply work project.
B. Degree Holder in Civil Engineering	1	Minimum 5 years of Experience
C. Degree Holder in Mechanical Engineering	1	Minimum 5 years of Experience
D. Degree Holder in Electrical/ Electronic Engineering	1	Minimum 5 years of Experience
E. Diploma holder in Civil Engineering	2	Minimum 2 years of Experience
F. Diploma holder in Mechanical / Electrical Engineering	2	Minimum 2 years of Experience in Maintenance of plant & machinery
G. Surveyor	3	Minimum 2 years of Experience
H. ITI Certified Plumber/ Electrician/ Welder/ Fitter	10	Minimum 2 years of Experience
For Field Test Laboratory		
Technical Personnel	**Number**	**Experience in Water Supply Works**
A. Degree Holder in Civil/Mechanical/Electrical Engineering	2	Minimum 05 years of Experience in testing and quality control in water supply works
C. Lab Assistant/Technical Assistant (ITI/BSc)	2	Minimum 2 years of Experience in maintenance of plant & machinery

E. Surveyor	1	Minimum 2 years of Experience in testing
For Routine Maintenance		
Technical Personnel	**Number**	**Experience in water supply Works**
A. Diploma holder in Civil/Mechanical/Electrical Engineering (Supervisor)	1	At least 2 Years
Diploma holder in Mechanical & Electrical Engineering	1	At least 2 years
Lab assistant/Technical assistant (nITI/BSc)	1	At least 2 years

(4.4 B) (b)(iii) The minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the successful Bidder shall be 10% of the contract value.

(4.4 B) (c) (i) The bidder must produce an affidavit stating that the near relations of the following departmental officers are not in his employment: J.E's, A.E.'s, E.E.'s, S.E.'s, and other staff of equivalent rank

(4.4 B) (c) (ii) The bidder must produce an affidavit stating the names of retired gazetted officer (if any) in his employment who retired within the last two years with the following ranks from the departments listed below: U.P.P.W.D., R.E.S. and. U.P. Irrigation. (Assistant Engineer, Executive Engineer, Superintending Engineer, Chief Engineer, Director cum Chief Engineer, Engineer-in-Chief) In case there is no such person in his employment, his affidavit should clearly state this fact.

(4.6) M = 2.5

(7.1) The contact person is:

Designation: Chief Executive Officer,

Office of Agra Smart City Limited, Agra

Ph No-0562-2520615

(9.2.1) Place, Time and Date for pre-bid meeting are:

As per NIT

(11.1) Language of the bid is: *English*

(12.1) Part I (v) The other documents required are: NONE

T-4,T-5,T6

(13.2.) Bids may be submitted only in Item Rate Method

(16.1) **The amount of Earnest Money shall be as per NIT**

(16.2) Fixed Deposit Receipt must be drawn in favour of:

Chief Executive Officer, Agra Smart City Limited, Agra.

(16.2) Other acceptable forms of Bid Security pledged in favour of : **Chief Executive Officer, Agra Smart City Limited, Agra** Bank Guarantee/ National savings certificate issued by P&T Deptt., Post Office Saving account Pass book .

(16.3) Exemption from Earnest Money is granted to: As per N.I.T/G.O.

(20.1)	The Employer's address for the purpose of Bid submission is online submission
(20.1)1.	The deadline for submission of bids shall be: **As per NIT**
(22.1) & (22.6)	The date, and time for opening of the Technical Bids online are: (A) Technical Bid **As per NIT**
(32.1)	The amount and validity period of the performance guarantee is: (i) Performance security shall be valid until a date 45 days after the expiry of Defect Liability Period of 2 years after intended completion date. (ii) Additional Performance Security for unbalanced Bid shall be valid for 45 days plus intended completion period.

Signature of Employer/ Authorized Signatory

Date :

Section 3 Qualification Information

(Following information's shall be furnished by the contractor on a non-judicial stamp paper of Rs. 100/- only)

Notes on Form of Qualification Information
The information to be filled in by bidders in the following pages will be used for Purposed of post-qualification as provided for in clause 4 of the Instructions to Bidders. This Information will not be incorporated in the Contract. Attach additional pages as necessary

1. Individual Bidders

1.1	Constitution or legal status of Bidder Place of registration: Principal place of business Power of attorney of signatory of Bid	[Attach copy] _____ _____ [Attach]
1.2	Total annual volume of civil engineering construction work executed and payments received in the last five years preceding the year in which bids are invited. (Attach certificate from Chartered Accountant)	(Rs in Lacs)

1.3.1	Work performed as prime Contractor (in the same name and style) on construction works of a similar nature and volume over the last five years. Attach certificate from the Engineer-in-charge

Project Name	Name of Employer	Description of work	Value of contract	Contract No.	Date of Issue of work order	Stipulated Date of Completion	Actual Date of Completion	Remarks explaining reasons for Delay. if any

1.3.2. Information on Bid capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this

(A) Existing commitments and on-going construction works:

Description of Work	Place & State	Contract No & Date	Name & Address of Employer	Value of Contract (Rs. In lakhs)	Stipulated period of completion	Value of works remaining to be completed (Rs. Lakhs) *	Anticipated Date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

* Enclose certificate(s) from Engineer(s)-in-charge for value of work remaining to be completed.

(B) Works for which bids already submitted:

Description of Work	Place & State	Name & Address of Employer	Estimated Value of Works (Rs. Lakhs)	Stipulated period of completion	Date when decision is expected	Remarks, if any
(1)	(2)	(3)	(4)	(5)	(6)	(7)

1.4. Availability of Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below. Refer also to Clause 4.2(d) and Clause 4.4 b (b) of the Instructions to Bidders.

Item of Equipment	Description, make, and age (Years), and capacity	Condition (new, good, poor) and number available	Owned, leased (from whom?), or to be purchased

1.5. Qualifications of technical personnel proposed for the Contract. Refer also to Clause 4.2(e) of the Instructions to Bidders and Clause 9.1 of Part-1 General Conditions of Contract

Position	Name	Qualification	Years of experience		
			Water Supply Works	Road/Bldg Works	Other

1.6. Proposed sub-contractors and firms involved for construction. Refer to Clause 7 of Part I General Conditions of Contract.

Sections of the Works	Value of subcontract	Sub-contractor (name and address)	Experience in similar work

1.7. Note: The capability of the sub-Contractor will also be assessed (on the same lines as for the main Contractor) before according approval to him.

1.8. Financial reports for the last five years: balance sheets, profit and loss statements, auditors' reports, etc.
List below and attach copies.

1.9. Name, address, and telephone, telex, and facsimile numbers of banks that may provide references if contacted by the Employer.

1.10. a. Information on current litigation in which the Bidder is involved.

Name of Other party(s)	Cause of dispute	Litigation where (Court/arbitration)	Amount involved

1.11. Proposed Program (work method and schedule). Descriptions, drawings, and charts as necessary, to comply with the requirements of the bidding documents.

SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT FACILITIES

BANK CERTIFICATE

This is to certify that M/S ----------is a reputed company with a good financial standing.

If the contract for the work, namely,_____ is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs._____to meet their working capital requirements for executing the above contract.

Signature of Senior Bank Manager ……
Name of the senior Bank Manager ……
Address of the Bank……

Stamp of the Bank

Note: Certificate should be on the letterhead of the bank.

Under Taking From bidders to Invest minimum 10% of the Value of the work.

FOR THE WORK: : Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission-Fourth Call

It is to be certified that I have Rs. ……. In Cash, Rs. …… in Bank and Rs…….. by other sources with proceed with the proposed work.

Date :-
Place :-

Signature of Contractor.

Section 4

Part I General Conditions of Contract

A. General

1. Definitions

1.1. Terms, which are defined in the Contract Data, are not also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.

Compensation Events are those defined in Clause 40 hereunder.

The Completion Date is the date of completion of the Works as certified by the Engineer, in accordance with Clause 48.1.

The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3.

The Contract Data defines the documents and other information, which comprise the Contract.

The Contractor is a person or corporate body whose Bid to carry out the Works, including routine maintenance, has been accepted by the Employer.

The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.

The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A Defect is any part of the Works not completed in accordance with the Contract.

The Defects Liability Certificate is the certificate issued by Engineer, after the Defect Liability Period has ended and upon correction of Defects by the Contractor.

The Defects Liability Period is Two years calculated from the Completion Date.

Drawings include calculations and other information provided or approved by the Engineer for the execution of the Contract.

The Employer is the party as defined in the Contract Data, who employs the Contractor to carry out the Works, including Routine maintenance,. The Employer may delegate any or all functions to a person or body nominated by him for specified Functions.

The Engineer is the person named in the Contract Data (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Engineer) who is responsible for supervising the execution of the Works and administering the Contract.

Equipments is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.

The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works.

The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Plant is any integral part of the Works that shall have a mechanical, electrical, electronic, chemical, or biological function.

The Site is the area defined as such in the Contract Data.

Site Investigation Reports are those that were included in the bidding documents and are reports about the surface and subsurface conditions at the Site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer.

The Start Date is given in the Contract Data. It is the date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

A Sub-Contractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the construction work in the Contract, which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.

A. Variation is an instruction given by the Engineer, which varies the Works.
The Works, as defined in the Contract Data, are what the Contract requires the Contractor to construct, install, maintain, and turn over to the Employer. Routine maintenance is defined separately.

2. Interpretation

2.1. In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about these Conditions of Contract.

2.2. If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

2.3. The documents forming the Contract shall be interpreted in the following order of priority:
(1) Agreement,
(2) Notice to Proceed with the Work,

(3) Letter of Acceptance,
(4) Contractor's Bid
(5) Contract Data,
(6) Special Conditions of Contract Part II,
(7) General Conditions of Contract Part I,
(8) Specifications,
(9) Drawings,
(10) Bill of Quantities, and
(11) Any other document listed in the Contract Data.

3. **Language and Law**.

The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer's Decisions

Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer. However, if the Engineer is required under the rules and regulations and orders of the Employer to obtain approval of some other authorities for specific actions, he will so obtain the approval.

Except as expressly stated in the Contract, the Engineer shall not have any authority to relieve the Contractor of any of his obligations under the contract.

5. Delegation

The Engineer, with the approval of the Employer, may delegate any of his duties and responsibilities to other people, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

6. Communications

All Certificate, notices or instructions to be given to the contractor by Employer / Engineer shall be sent on the address or contact details given by the contractor in Section 6- Form of Bid. The address and contact details for communication with the Employer/ Engineer shall be as per the details given Contract Data to GCC. Communications between parties that are referred to in the conditions shall be in writing. The Notice sent by Facsimile (fax) or other electronic means shall be effective on confirmation of the transmission. The Notice sent by Registered post or Speed post shall be effective on delivery or at the expiry of the normal delivery period as undertaken by the postal service.

7. Subcontracting

7.1- The contractor may subcontract part of the construction work with the approval of the Employer in writing, up to 25% of the contract price but will not assign the Contract. Subcontracting shall not alter the contractor's obligations.
Beyond what has been stated in clauses 7.1, if the contractor proposes sub contracting any part of the work during execution of the works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, the Employer will consider the following before according approval:

a. The Contractor shall not sub-contract the whole of the works.
b. The Contractor shall not sub-contract any part of the work without prior consent of the Employer. Any such consent shall not relieve the contractor from any liability or

obligation under the contract and he shall be responsible for the acts, defaults and neglects of any his sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents and workmen.

7.1. The Engineer should satisfy himself before recommending to the Employer whether

a. The circumstances warrant such sub-contracting: and
b. The sub-contractor so proposed for the work possess the experience, qualification and equipment necessary for the job proposed to be entrusted to him in proportion of the Quantum of works to be sub-contracted.

8. Other Contractors

8.1. The contractor shall co-operate and share the site with other contractors. Public authority's utilities and the employer between the dates given in the schedule of other contractors, as referred to in the contract data. The contractor shall also provide facilities and services for them as described in the schedule. The employer may modify the schedule of other contractor, and shall notify the contractor of any such modification.

8.2. The contractor should take up the work in convenient reaches as decided by the Engineer to ensure there is least hindrance to the smooth flow of traffic including movement of vehicles and equipment of other contractors till the completion of the works.

9. Personnel

9.1. The Contractor shall employ for the construction work and routine maintenance the technical personnel named in the Contract Data or other technical persons approved by the Engineer. The Engineer will approve any proposed replacement of technical personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel stated in the Contract Data.

9.2. If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the Works in the Contract.

9.3. The Contractor shall not employ any retired Gazetted officer who has worked in the Engineering Department of the State Government and has either not completed two years after the date of retirement or has not obtained State Government's permission to employment with the Contractor.

10. Employer's and Contractor's Risks

10.1. The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks that this Contract states are Contractor's risks

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11. Employer's Risks

11.1. The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Employer's country, the risks of war, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), natural calamities and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor's design.

12. Contractor's Risks

12.1. All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other

than the excepted risks, referred to in clause 11.1, are the responsibility of the Contractor.

13. Insurance

13.1. The Contractor at his cost shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the date of completion, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

a) loss of or damage to the Works, Plant and Materials;
b) loss of or damage to equipment;
c) loss of or damage to property (except the Works, Plant, Materials, and equipment) in connection with the Contract; and
d) Personal injury or death.

13.2. Insurance policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the completion date/ Start Date. All such insurance shall provide for compensation to be payable in Indian Rupees to rectify the loss or damage incurred.

13.3. (a) The Contractor at his cost shall also provide, in the joint names of the Employer and the Contractor, insurance cover from the date of completion to the end of defect liability period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:
(a) Personal injury or death.

13.4. (b) Insurance policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the completion date/ start date. All such insurance shall provide for compensation to be payable in Indian Rupees.

13.5. Alterations to the terms of insurance shall not be made without the approval of the Engineer.

13.6. Both parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports

14.1. The Contractor, in preparing the Bid, may rely on any Site Investigation Reports referred to in the Contract Data, supplemented by any other information available to him, before submitting the bid.

15. Queries about the Contract Data

15.1. The Engineer will clarify queries on the Contract Data.

16. Contractor to Construct the Works

16.1. The Contractor shall construct, and install and maintain the Works in accordance with the Specifications and Drawings.

16.2. The contractor shall construct the works with intermediate technology, i.e., by manual means with medium input of machinery required to ensure the quality of works as per specifications. The contactor shall deploy the equipment and machinery as given in Contract Data.

17. The Works to Be Completed by the Intended Completion Date

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Programme submitted by the Contractor, as

updated with the approval of the Engineer, and complete them by the Intended Completion Date.

18. Approval by the Engineer

18.1. The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Engineer, who is to approve them.

18.2. The Contractor shall be responsible for design of Temporary Works.

18.3. The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4. The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

18.5. All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Engineer before their use.

19. Safety

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

20. Discoveries

20.1. Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

21. Possession of the Site

21.1. The Employer shall handover complete or part possession of the site to the Contractor 7 days in advance of construction program. At the start of the work, the employer shall handover the possession of at-least 75% of the site.

22. Access to the Site

22.1. The Contractor shall allow access to the Site and to any place where work in connection with the Contract is being carried out, or is intended to be carried out to the engineer and any person/persons/agency authorized by:

a. The Engineer
b. The Employer
c. The Ministry of Rural Development, Government of India.
d. National Rural Roads Development Agency, New Delhi

23. Instructions

23.1. The Contractor shall carry out all instructions of the Engineer, which comply with the applicable laws where the Site is located.

24. Dispute Redressal System

24.1. If any dispute or difference of any kind what-so-ever shall arises in connection with or arising out of this Contract or the execution of Works or maintenance of the Works there under, whether before its commencement or during the progress of Works or after the termination, abandonment or breach of the Contract, it shall, in the first instance, be referred for settlement to the competent authority, described along with their powers in the Contract Data, above the rank of the Engineer, The competent authority shall, within a period of forty-five days after being requested in writing by the Contractor to do so, convey his decision to the Contractor. Such decision in respect of every matter so referred shall, subject to review as hereinafter provided, be final and binding upon the Contractor. In case the Works is already in progress, the Contractor shall proceed with the execution of the Works, including maintenance thereof,

pending receipt of the decision of the competent authority as aforesaid, with all due diligence.

24.2. Either party will have the right of appeal, against the decision of the competent authority, to the arbitration if the amount appealed exceeds rupees one lakh.

25. Procedure for Resolution of Disputes

25.1.1. The Competent Authority mentioned in clause 24.1 shall give a decision in writing within 45 days of receipt of a notification of a dispute.

25.1.2. Either party may refer a decision of the Competent Authority to Arbitration within 28 days of the Competent Authority's written decision. Arbitration shall be under the Arbitration and Conciliation Act 1996. If neither party refers the dispute to Arbitration within the above 28 days, the Competent Authority's decision will be final and binding.

25.1.3. The Arbitration shall be conducted in accordance with the following procedure, in case Initial Contract Price is more than Rs. 5 Crore or the Contractor is a Foreign Contractor, who has bid under ICB:-

a) In case of a decision of the Competent Authority in a dispute or difference arising between the Employer and a Contractor relating to any matter arising out of or connected with this Agreement, the matter will be referred to an Arbitral Tribunal. The Arbitral Tribunal shall consist of three Arbitrators, one each to be appointed by the Employer and the contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the parties and shall act as presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the Arbitrator appointed subsequently, the presiding Arbitrator shall be appointed by the Chairman of the Executive Committee of the Indian Roads Congress.

b) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) above within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the Chairman of the Executive Committee of the Indian Roads Congress shall appoint the arbitrator.

A certified copy of the order of the Chairman of the Executive Committee of the Indian Roads Congress, making such an appointment shall be furnished to each of the parties.

c) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the Arbitral Tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.

25.2. Where the Initial Contract Price as mentioned in the Acceptance Letter is Rs. 5 Crore and below, disputes and differences in which an Adjudicator has given a decision shall be referred to a sole Arbitrator. The sole Arbitrator would be appointed by the agreement between the parties; failing such agreement within 15 days of the reference to arbitration, by the appointing authority, namely the Chairman of the Executive Committee of the Indian Road Congress.

25.3. Arbitration proceedings shall be held at Agra (U.P.) , India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.

25.4. Performance under the contract shall continue even after reference to the arbitration and payments due to the contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.

B. TIME CONTROL

26. Programme

26.1. Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works, along with monthly cash flow forecasts for the construction of works.

26.2. The Contractor shall submit the list of equipment and machinery being brought to site, the list of key personnel being deployed, the list of machinery/ equipments being placed in field laboratory and the location of field laboratory along with the Program. The Engineer shall cause these details to be verified at each appropriate stage of the program.

26.3. An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities.

26.4. The Contractor shall submit to the Engineer for approval an updated Program at intervals of *60 Days* no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.

26.5. The Engineer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Engineer again at any time. A revised Program shall show the effect of Variations and Compensation Events.

27. Extension of the Intended Completion Date

27.1. The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining Works, which would cause the Contractor to incur additional cost

27.2. The Engineer shall decide whether and by how much time to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

28. Delays Ordered by the Engineer

28.1. The Superintending Engineer may instruct the Contractor to delay the start or progress of any activity within the Works. Delay/delays totaling more than 30 days will require prior written approval of the Employer.

29. Management Meetings

29.1. The Engineer may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the plans for the Works.

29.1 The Engineer shall record the business of management meetings and provide copies of the record to those attending the meeting. The responsibility of the parties for actions to be taken shall be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all those who attended the meeting.

C. Quality Control

30. Identifying Defects

30.1. The Engineer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's

responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

31. Tests

31.1. For Carrying out mandatory tests as prescribed in the specification. The Contractor shall establish field laboratory at the location decided by Engineer. The field laboratory will have minimum equipment as specified in the Contract Data. The contractor shall be solely responsible for :

a. Carrying out the mandatory tests prescribed in the Specifications, and
b. For the correctness of the test results, whether preformed in his laboratory or elsewhere.

31.2. If the Engineer instructs the Contractor to carry out a test not specified in the Specification/ Rural Roads Manual to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples.

32. Correction of Defects noticed during the Defect Liability Period for two year.

32.1.1. The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion of work. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

32.1.2. Every time notice of Defect/Defects is given, the Contractor shall correct the notified Defect/Defects within the duration of time specified by the Engineer's notice.

32.1.3. Request for Information: The RFI procedure is used in the construction industry where it is necessary to confirm the interpretation of a detail, specification, or note on the construction drawings, or to secure a documented directive or clarification from the architect or client that is needed to continue work. The RFI system will be followed for execution of work.

33. Uncorrected Defects

33.1. If the Contractor has not corrected a Defect pertaining to the Defect Liability Period under clause 32.1.1 and of these Conditions of Contract, to the satisfaction of the Engineer, within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount, on correction of the Defect.

D. Cost Control

34. Bill of Quantities

34.1. The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning, maintaining works, and lump sum figures for yearly routine maintenance for each of the five years separately, to be done by the Contractor.

34.2. The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item for the construction of roads. The payment to the Contractor is performance based for routine maintenance of roads.

35. Variations

35.1. The Engineer shall, having regard to the scope of the Works and the sanctioned estimated cost, have power to order, in writing, Variations within the scope of the Works he considers necessary or advisable during the progress of the Works. Such Variations shall form part of the Contract and the Contractor shall carry them out and include them in updated Programs produced by the Contractor. Oral orders of

the Engineer for Variations, unless followed by written confirmation, shall not be taken into account.

36. Payments for Variations

36.1.1. If rates for variation items are specified in Bill of Quantity, the contactor shall carry out such work at the same rate. This shall apply for variation only up to the limit prescribed in the contract data.

36.1.2. If the rates for Variation are not specified in the Bill of Quantities, the Engineer shall derive the rate from similar items in the Bill of Quantities.

36.1.3. If the rate for Variation item cannot be determined in the manner specified in Clause 36.1 or 36.2, the Contractor shall, within 14 days of the issue of order of variation work, inform the Engineer the rate which he proposes to claim, supported by analysis of the rates. The Engineer shall assess the quotation and determine the rate based on prevailing market rates within one month of the submission of the claim by the Contractor. As far as possible, the rate analysis shall be based on the standard data book and the current schedule of rates of the district public works division. The decision of the Engineer on the rate so determined shall be final and binding on the Contractor.

37. Cash Flow Forecasts

When the Program is updated, the Contractor shall provide the Engineer with an updated cash flow forecast.

38. Payment Certificates

38.1. The payment to the contractor will be as follows for construction work:

a) The Contractor shall submit to the Engineer fortnightly/ monthly statements of the value of the work executed less the cumulative amount certified previously supported with detailed measurement of the items of work executed in measurement books authorized by UP. P.W.D.
b) The Engineer shall check the Contractor's fortnightly/monthly statement within 14 days and certify the amount to be paid to the Contractor.
c) The value of work executed shall be determined, based on measurements by the Engineer.
d) The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.
e) The value of work executed shall also include the valuation of Variations and Compensation Events.
f) The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
g) The Payment of final bill shall be governed by the provisions of clause 50 of GCC.

39. Payments

Payments shall be adjusted for deductions for advance payments security deposit, other recoveries in terms of the Contract and taxes at source, as applicable under the law. The Engineer shall pay the Contractor the amounts he had certified within 15 days of the date of each certificate.

The Employer may appoint another authority, as specified in the Contract Data (or any other competent person appointed by the Employer and notified to the contractor) to make payment certified by the Engineer.

Items of the Works for which no rate or price has been entered in the Bill of Quantities, will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

40. Compensation Events

40.1. The following shall be Compensation Events unless they are caused by the Contractor

a) The Engineer orders a delay or delays exceeding a total of 30 days.
b) The effects on the Contractor of any of the Employer's Risks.

40.2. If a Compensation Event would prevent the Works being completed before the Intended Completion Date, the Intended Completion
Date shall be extended. The Engineer shall decide whether and by how much the Intended Completion Date shall be extended.

41. Tax

41.1. The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other levies, duties, royalties, cess, toll, taxes of Central and State Governments, local bodies and authorities that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

42. Currencies

All payments will be made in Indian Rupees.

43. **Security Deposit/ Retention and Release of Performance Security and Security Deposit/ Retention**.

43.1. On the completion of the whole of the construction Work half the total amount retained as Security Deposit is repaid to the contractor and half when the defect liability period has passed and the Engineer has certified that all defects notified by the Engineer to the contractor before the end of his period have been corrected.

43.2. The additional performance security for unbalanced bids as detailed in Clause ~~51~~ 46 of ~~Conditions of Contract~~GCC is repaid to the contractor when the construction work is complete.

43.3. The performance security equal to the five percent of the contract price in Clause ~~51~~ 46 of ~~Conditions of contract~~GCC is repaid to the contractor when the period of two years finished or defect liability period is over and the Engineer has certified that the contractor has satisfactorily carried out the Works.

43.4. If the contractor so desires then the Security Deposit can be converted into any interest bearing security of schedule commercial bank in the name of the Employer or National Saving Certificates duly pledged in favor of the Employer for Defect Liability Period.

44. Liquidated Damages

44.1. The Contractor shall pay liquidated damages to the Employer at the rate per week or part thereof stated in the Contract Data for the period that the Completion Date is later than the Intended Completion Date. Liquidated damages at the same rate shall be withheld if the Contractor fails to achieve the milestones prescribed in the Contract Data. However, in case the Contractor achieves next milestone the amount of the liquidated damages already withheld shall be restored to the Contractor by adjustment in the next payment certificate. The total amount of liquidated damages

shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's other liabilities.

44.2. If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

45. Advance Payment

45.1. The Employer will make the following advance payment to the contractor against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a Commercial bank acceptable to the Employer in amounts equal to the advance payment:

a) Mobilization advance up to 10 percent of the contract price.
b) Equipment advance up to ninety percent of the cost of the new equipment brought to the site, subjects to a maximum of 5 percent of the contract price.

The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on advance payment.

45.2. The Contractor is to use the advance payment only to pay for equipment, plant and mobilization expenses required specifically for execution of works. The Contractor shall demonstrate the advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.

45.3. The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor for the construction work, following the schedule of completed percentage of the work on payment basis. No account shall be taken of the advance payment or the repayment in assessing valuation of work done. Variations, price adjustments, Compensation events or liquidated damages.

45.4. Employer will make a secured advance for non perishable materials brought to the site subject to maximum of 75 percent of invoice value subject to

a. The materials are in accordance with the specification for Works
b. Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the Engineer. The contractor shall store the bulk material in measurable stacks
c. The contractors records of the requirements , orders , receipt and use of materials and kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer
d. The contractor has submitted with his monthly statement the estimated value of the material on site together with such document as may be required by the Engineer for the purpose of valuation of the materials and providing evidence of ownership and payment thereof
e. Ownership of such material shall be deemed to vest in the employer for which the contractor has submitted an Indemnity Bond in an acceptable format
f. The quantities of material are not excessive and shall be used within a reasonable time as determined by the Engineer

46. Securities

46.1. The Performance Security equal to five percent of the contract price and additional security for unbalanced bids shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in the form given in the Contract Data and by a scheduled commercial bank. The Performance Security shall be valid until a date 45 days from the date of expiry of Defect Liability Period and the additional security for unbalanced bids shall be valid until a date 45 days from the date of issue of the certificate of completion.

47. Cost of Repairs

47.1. Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by

the Contractor at his cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

48. Completion of Construction and Maintenance

48.1. The contractor shall request the Engineer to issue a certificate of completion of the construction of the works, and the Engineer will do so upon deciding that the works is completed.

49. Taking Over

49.1. The Employer shall take over the works within seven days of the Engineer issuing a certificate of completion of works.

50. Final Account

50.1. The contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable for works under the contract within 21 days of issue of certificate of completion of construction of works. The Engineer shall issue a defect liability certificate and certify any payment that is due to the correct and complete. If the account is not correct or complete, the engineer shall issue within 42 days a schedule that states the scope of the corrections or additions that are necessary. If the account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the contractor and issue a payment certificate with in 28 days of receiving the Contractor's revised account. The payment of final bill for construction of works will be made within 14 days thereafter.

50.2. In case the account is not received within 21 days of issue of Certificate of Completion as provided in clause 50. I above, the engineer shall proceed to finalize the account and issue a payment certificate within 28 days. The payment of final bill for construction of works will be made within 14 days thereafter.

51. Operating and Maintenance Manuals

51.1. If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

51.2. If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

52. Termination

52.1. The Employer may terminate the Contract if the Contractor causes a fundamental breach of the Contract.

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

a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Engineer;
b) the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;
c) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
d) the Contractor does not maintain a Security, which is required;
e) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in clause 44.1;
f) the Contractor fails to provide insurance cover as required under clause 13;
g) if the Contractor, in the judgment of the Employer, has engaged in the corrupt or fraudulent practice in competing for

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

h) if the Contractor has not completed at least thirty percent of the value of construction Work required to be completed after half of the completion period has elapsed;
i) if the Contractor fails to set up a field laboratory with the prescribed equipment, within the period specified in the Contract Data; and
j) Any other fundamental breaches as specified in the Contract Data.
k) if the Contractor fails to deploy machinery and equipment or personnel as specified in the contract Data at the Appropriate time.

52.3. Notwithstanding the above, the Employer may terminate the Contract for convenience.

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

53. Payment upon Termination

53.1. If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done and Materials ordered less liquidated damages, if any less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the Contract Data. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be recovered from the security deposit, and performance security. If any amount is still left un-recovered it will be a debt payable to the Employer.

53.2. If the Contract is terminated at the Employer's convenience, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the Contract, and less taxes due to be deducted at source as per applicable law.

54. . Property

54.1. All Materials on the Site, Plant, equipment, Temporary Works, and Works shall be deemed to be the property of the Employer for use for completing balance construction work if the Contract is terminated because of the Contractor's default, till the Works is completed after which it will be transferred to the Contractor and credit, if any, given for its use.

55. Releases from Performance

55.1. If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of the Employer or the Contractor, the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

F. Other Conditions of Contract

56. Labour

56.1. The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

56.2. The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

57. COMPLIANCE WITH LABOUR REGULATIONS

57.1. During continuance of the Contract, the Contractor and his sub Contractors shall abide at all times by all existing labor enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labor law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labor law in future either by the State or the Central Government or the local authority. Salient features of some of the major labor laws that are applicable to construction industry are given in Appendix to Part I General Condition of Contract. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

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

58. Drawings and Photographs of the Works

58.1. The contractor shall do photography/video photography of the site firstly before the start of the work, secondly mid-way in the execution of different stages of work and lastly after the completion of the work. No separate payment will be made to the contractor for this.

58.2. The Contractor shall not disclose details of Drawings furnished to him and works on which he is engaged without the prior approval of the Engineer in writing. No photograph of the works or any part thereof or plant employed thereon, expect those permitted under clause 58.1, shall be taken or permitted by the Contractor to be taken by any of his employees or any employees of his sub-Contractors without the prior approval of the Engineer in writing. No photographs/ Video photography shall be published or otherwise circulated without the approval of the Engineer in writing.

59. The Apprentices Act 1961

59.1. The Contractor shall duly comply with the provisions of the Apprentices Act 1961 (III of 1961), the rules made there under and the orders that may be issued from time to time under the said Act and the said Rules and on his failure or neglect to do so he shall be subject to all liabilities and penalties provided by the said Act and said Rules.

60. Criminals are prohibited from bidding

60.1. Any bidders having **criminal record** is not allowed to participate in the bidding process. Any person who is having criminal cases against him or involved in the **organized crime or gangster activities or Mafia or Goonda or Anti social activity** are strictly prohibited to participate in the bidding process. If it is established that any bidder has **criminal record, his bid shall be automatically cancelled.**

60.2. The bidder has to produced character certificate, Solvency certificate, self declared affidavit (on the prescribed Performa which is attached with the bid document) etc., issued by the competent authority in original with bid document.

61. Any bidder who is an Advocate and Registered with any State Bar Council Shall not be allowed to participate in the bidding. If it is established that the contractor is registered with the state bar council**, his bid shall be automatically cancelled.**

Section- 4.

Conditions of Contract

Part – II Special Conditions of Contract

1. All the works shall be carried out as per MORTH specifications/PWD detailed specification and instruction of Engineer-in-charge of ASCL.
2. The quantities are liable to vary on either side to any extent as per actual requirement of work for which no claim whatsoever by the contractor shall be entertained.
3. Job mix for all granular and bituminous works will have to begot prepared from reputed institute as directed by Engineer-in-charge and submitted for approval by competent authority. The entire ingredient required for job mix will be collected and sealed in presence of Engineer-in-charge and sent for preparation of job mix. If during execution of work there is change in grading of stone Aggregate, fresh job mix is to be got prepared.
4. Payment of all bituminous works- will be made on the basis of least quantity Arrived as by the following method:-
   (I) Volume of bituminous work will be calculated by taking levels before and after the execution of particular activity at regular grids as prescribed by MORTH.
   (II) Mix in each tipper will be taken at contractors cost and divided by the actual average field density of the stretch of each day of work and deemed volume will be arrived at. However, the contractor must note that density of any point should not be less than the permissible limit with respect to job mix.
5. Any recovery imposed by Technical Audit cell or by higher authority will be deducted from contractors running final bills during execution of works and will be adjusted from performance security if final bill is processed during defect liability period.
6. All the defects appeared' during execution of work will have to be rectified as directed by Engineer in charge within shortest possible time. During defect liability period contractor will be deploy sufficient technical staff as mention in contract document for, proper maintenance of work. If contractor fails to attend the defects. Within reasonable time period, the same will be attended by department and all expenses so incurred will be adjusted from performance security of contractors.
7. The contractor will adopt CNOON/PERT to complete the project in time. A detailed program and weekly working program will have to be submitted by contractor regularly.
8. Contractor shall procure Bitumen from Indian Oil Corporation, Hindustan Petroleum and shall produce the original C.R.C. issued by the company at the time of claiming the payment for bitumen and get reconciled against consumption in each running 'bill. If bitumen brought by the contractor is less than the calculated quantity arrived at by the measured quantity of works, the difference in such quality will be deducted from contractor's bill.
9. For earth work, each borrow pit will have get to be approved from competent authority by furnishing all physical/chemical characteristic of earth of each borrow pit before start of work.

10. MAINTENANCE DURING DEFECT LIABILITY PERIOD

The Defect Liability for this work is 24 months. During this period, it shall be the responsibility of the contractor to clean the area and furniture, tree/shrub cutting, etc at an acceptable serviceability level as directed by the Engineer in charge.

During the operation and maintenance period 60 months contractor shall provide a supervisor level staff for attending to all the O&M activities during the O&M Period.

The monthly report on the Operation and Maintenance shall be submitted to the Engineer and Security deposit for O&M as per the BOQ shall be released to the contractor based on appearance of defect year to year till entire of Operation and maintenance. and assessment made by Engineer in Charge of ASCL

11. Project Management Consultancy:

OBJECTIVE The objective of this Consultancy (the "Objective") is to assist the ASCL in implementation of the Project till the successful completion and handing over of all works to the ASCL and comprehensively supervise the works and activities carried out by the Contractors Engineer's Representative" under the respective contract(s) in a manner that would ensure:

a. Total compliance of technical specifications and various other requirements contained in the respective contracts by the Contractor
b. High standards of quality assurance system in the Consultancy as well as the works and activities of the Contractor
c. Comprehensive and documented reporting to the ASCL of Consultant's own activities, progress of the Project(s) and compliances/ non-compliances by the Contractor
d. Proper verification of measurements and bills submitted by the contractor so that payments made by the ASCL against these bills truly reflect the actual work done at site complying with the requirements of the respective contract(s);
e. proper interface and coordination among the ASCL, contractor other contractors and local bodies/ state government; and
f. Full documentation of the completed works including applications for various approvals.

The objectives of the PMC is not limited to the above, CEO of ASCL have discretion implement other objectives or the completion of the project.

12. Security Deposit

In the event of the contractor failing or neglecting to complete rectification work within the period up to which the contractor has agreed to maintain the work in good order, then, subject to provisions of clause 28and 31 hereof the amount of security deposit retained by ASCL shall be forfeited without any notice.

13. Compensation for delay

The time allowed to carry out the work as entered in the **Contract** shall be strictly observed by the contractor and shall be reckoned from the date on which the order to commence work is given to the Contractor. The work shall through the stipulated period of the contract be proceeded with, all due diligence (time being deemed to be of the essence of the contract on the part of the Contractor) and the Contractor shall pay as compensation and amount equal to one percent or such smaller amount as the Chief Executive Officer ASCL(whose decision in writing shall be final) may decide of the amount of estimated cost of the whole work as shown by the tenderer of everyday the work remains un commenced or unfinished after the proper dates.

And further to ensure good progress during execution of the work, the contractor shall be bound, in all cases in which the time allowed for any work exceeds one month to complete.

¼ of the working 1/3 of the time
¼ of the working ½ of the time
¼ of the working ¾ of the time

and full work should be completed in (24 Calendar months)

In the event of the Contractor failing to comply with these conditions he shall be liable to pay as compensation, an amount an equal to one percent or such smaller amounts as the Chief Executive Officer ASCL(whose decision in shall be final) may decide of the said estimated cost of the whole work for everyday that the due quantity of work remains incomplete provided always that the total amount of compensation to be paid under the provisions of this clause shall not exceed 10 percent of the estimated cost of the work as shown in the tender. Chief Executive Officer, ASCL, should be the final authority in the respect.

14. Additional Action when whole of security Deposit is forfeited

In any case in which under any clause of this contract the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit whether paid in one sum or deducted by the instalments or in the case of abandonment of the work owing to serious illness or death of the Contractor or any other cause the Project Engineer, on behalf of the Corporation, shall have the power to adopt any of the following courses, as he may deem best suited to the interest of the Corporation.

(a) To rescind the contract (for which rescission notice in writing to the Contractor under the hand of Project Engineer shall be conclusive evidence) and in that case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the Corporation.

(b) To carry out the work or any part of the work departmentally debiting the Contractor with the cost of the work, expenditure incurred on the tools and plant, and charges on additional supervisory staff including the cost of the work–charged establishment employed for getting the un-executed part of the work completed and crediting him with the value of the work done departmentally in all respect in the same manner and at the same rates as if it had been carried out by the Contractor under terms of his contract. The certificate of the Project Engineer as to the costs and other allied expense so incurred and as to the value of the work so done departmentally shall be final and conclusive against the Contractor

(c) i) To order that the work of the Contractor be measured up and to take such part thereof as shall be un-executed out of his hands, and to give it to another Contractor to complete, in which case all expenses incurred on advertisement for fixing a new contracting agency ,additional supervisory staff including the cost of the work charged establishment and the cost of the work executed by the new Contractor agency will be debited to the Contractor and the value of the work done or executed through the new Contractor in all respects and in the same manner and at the same rates as if it had been carried out by the Contractor under the terms of his contract. The certificate of the Project Engineer as to the costs and other allied expense so incurred and as to the value of the work so done departmentally shall be final and conclusive against the contractor.

ii) In case the contract shall be rescinded under clause (a) above the Contractor shall not be entitled to recover or be paid, any sum for any work thereof actually performed by him under this contract unless and until the Project Engineer shall have certified in writing the performance of the such work and the amount payable to him in respect thereof and he shall only be entitled to be paid the amount so certified. In the event of either of courses referred to clause (b) or (c) being adopted and the cost of the work executed departmentally or through new contractor and other allied expense exceeding the value of such work credited to the Contractor the amount of excess shall be deducted from any money due to the Contractor, by Corporation under the contractor or otherwise howsoever or from his security deposit or the sale proceeds thereof provided; however that Contractor shall have no claim against Corporation even if the certified value of the work done departmentally or through a new Contractor exceeds the certified cost of such work and allied expenses, provided always that

whichever of the three courses mentioned in clause (a), (b) or (c) is adopted by the Chief Executive Officer ASCL, the Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials, or entered into any engagements, or made any advance on account of or with a view to the execution of the work or the performance of the contract.

15. **Action when the progress of any particular portion of the work is unsatisfactory** If the progress of any particular portion of the work is unsatisfactory, the Chief Executive Officer ASCL shall notwithstanding that the general progress of the work is in accordance with the conditions mentioned in clause 2 be entitled to take action under clause 3 (b) after giving the Contractor 10 days' notice in working. The contractor will have no claim for compensation, for any loss sustained by him owing to such action.

16. **Contractor remains liable to pay compensation if action not taken under clause 14 and 15**

In any case in which any of the powers conferred upon the Project Engineer by clause 3 and 4 shall have become exercisable and the same shall not have been exercised the non-exercise thereof shall not constitute a waiving of any of the condition here of the such power shall notwithstanding be exercisable in the event of any future case of default by the Contractor for which under any clause hereof he is declared liable to pay compensation amounting to the whole of his security deposit and the liability of the Contractor for past and future compensation shall remain unaffected,. In the event of the Project Engineer taking action under sub-clause (a) or (c) of clause 3, he may, if he so desires, take possession of all or any tools and plant, materials and stores in or upon the work of the site thereof belonging to the Contractor, or procured by him and intended to be used for the execution of the work or any part thereof, paying or allowing for the same in account at the contract rates, or in the case of contract rates not being applicable at current market rates to be certified by the Project Engineer whose certificate thereof shall be final. In the alternative, the Project Engineer may, after giving notice in writing to the Contractor or his clerk of any work, foreman or other authorized agent required him to remove such tools and plant, materials, or stores from the premises within a time to be specified in such notice, and in the event of the Contractor failing to comply with any such requisition, the Project Engineer may remove them at the Contractor's expenses or sell them by auction or private sale on account of the Contractor and at his risk in all respects, and the certificate of Project Engineer as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the Contractor

17. **Extension of time limit**

If the Contractor shall desire an extension of the time for completion of work on the ground of his having been unavoidably hindered in its execution or on any other ground he shall apply in writing to the Project Engineer before the expiration of the period stipulated in the tender or before the expiration of 30 days from the date on which he was hindered as aforesaid or on which the clause for asking for extension occurred, whichever is earlier and the Project Engineer, or in the opinion of Project Engineer as the case may be if in his opinion, there were reasonable ground for granting an extension, grant such extension as he thinks necessary or proper, the decision of the Chief Executive Officer ASCL in this matter shall be final.

18. **Final Certificate**

On the completion of the work the Contractor shall be furnished with a certificate by the Project Engineer (hereinafter called the Engineer-in- Charge) of such completion; but no such certificate shall be given nor shall the work be considered to be complete

until the Contractor shall have removed from the premises on which the work shall have been executed, all scaffolding, surplus materials and rubbish, and shall have cleaned off, the dirt from all wood work, doors, windows, wall, floor or other parts of any building in or upon which the work has been executed, or of which he may have had possession for the purpose of executing the work, nor until the work shall have been measured by the Engineer-in –Charge or where the measurements have been taken by his subordinates until they have received approval of the Engineer-in-Change, the said measurements being binding and conclusive against Contractor. If the contractor shall fail to comply with the requirements of this clause as to the removal of scaffolding surplus materials and rubbish and cleaning of dirt on or before the date fixed for the completion of the work the Engineer-in- Charge may at the expense of the Contractor, removal such scaffolding, surplus material and rubbish, and dispose of the same as he thinks fit and clean off as such dirt as aforesaid and the Contractor shall from with pay the amount of the all expenses so incurred, but shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof

19. Payment on intermediate certificate to be regarded as advances

No payment shall be made for any work, estimated to cost less than rupees one thousand till after the whole of work shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than rupees one thousand the Contractor shall on submitting a monthly bill therefore be entitled to receive payment proportionate to the part of the work than approved and passed by the Engineer-in – Change, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against the Contractor. All such intermediate payments shall be regarded as payment by way of advance against the final payment only and not as payment for work actually done and completed and shall not preclude the Engineer-in-Charge from requiring any bad, unsound imperfect or unskillful work to be removed or taken away and reconstructed, or re-erected nor shall any such payment be considered as an admission of the due performance of the contract or any part thereof in any respect or the occurring of any claim nor shall it conclude, determine or effect in any other way powers of the Engineer-in-Charge as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary or effect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for the completion of the work, otherwise the Engineer-in-Charge's certificate of the measurements and of the total amount payable for the work shall be final and binding on all parties

20. Payment on reduced rates on account of items of work not accepted as completion discretion of Engineer-in- Charge

The rates of several items of work estimated to cost more than Rs. 1000/- agreed to within, shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In case where the item of work are not accepted as so completed by the Engineer-in Charge may make payment on account of such item at such reduced rates as he may consider reasonable in the preparation of final or on account bills.

21. Bill to be submitted

A bill shall be submitted by the Contractor in each month on or before the date fixed by the Engineer- in- Charge for all work executed in the previous month and the Engineer-in-Charge shall take or cause to be taken the requisite measurement for the purpose of having the same verified and the claim, so far as it is admissible, shall be adjusted, if possible, within 10 days from the presentation of the bill. If the contractor does not submit the bill within the time fixed as aforesaid, the Engineer-in-Charge

may depute a subordinate to measure up the said work in the presence of the contractor or his duly authorized agent whose counter signature to the measurement list shall be sufficient warrant, and the Engineer-in-Charge may prepare a bill from such a list which shall be binding on the contractor in all respects.

22. Bill to be on printed forms

The contractor shall submit all bills on the printed forms to be had in the application at the office of the Engineer- in-Charge. The charges to be made in the bill shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender at the rates hereinafter provided for such work.

23. Stores supplied by ASCL

If the specification or estimate of the work provides for the use of any special description of materials to be supplied from the store of the Engineering departmental store or if it is required that the contractor shall use certain stores to be provided by the Engineer in charge or General manager (such materials and stores and the prices to be charged therefore as hereinafter mentioned being so far as practicable for the convenience of the contractor but not so far as in any way to control the meaning or effect to this contract specified in the schedule or memorandum hereto annexed) the contractor shall be supplied with such materials and stored as may be required from time to time to be used only by him for the purpose of the contract only, and the value of the full quantity of the materials and stores so supplied shall be set off or deducted from any sums then due, or thereafter to become due to contractor under the contract, or otherwise, or from the security deposit or the proceeds of the sale thereof if the security deposit is held in pledged securities, the same or a sufficient portion thereof shall in that case be sold for the purpose. All materials supplied to the contractor shall remain the absolute property of Corporation and shall on no account be removed from the site of the work, and shall at all times be open for inspection by the engineer in charge. Any such materials unused and in perfectly good conditions at the time of completion or determination of the contract shall be returned by the engineering departmental store if the engineer in charge so requires by a notice in writing given under his hand but the contractor shall not be entitled to return any such materials except with consent of the Engineer in charge and shall have no claim for compensation on account of any such material supplied to him as foresaid but remaining unused by him or any wastage in or damage to any such materials

All stores of controlled materials such as cement, steel etc., supplied to the contractor by the ASCL should be kept by the contractor under lock and key and will be accessible for inspection by the Project Engineer or his agents all the time

24. Work to be executed in accordance to specifications, drawings, orders etc.

The contractor shall execute whole and every part of the work in the most substantial and workman like manner, and both as regards materials and every other respect in strict accordance with specifications. The contractor shall also conform exactly, fully, and faithfully to the designs, drawings and instructions in writing relating to the work signed by the Engineer-in-Charge and lodged in his office and to which the contractor shall be entitled to have access for the purpose of inspection at such office, or at the site of the work during office hours. The contractor will be entitled to receive three sets of contract drawings and working drawing as well as one certified copy of the accepted tender along with work order free of cost. Further copies of the contract drawings and working drawings if required by him, shall be supplied at the rate of Rs.200/- per set of contract drawings and Rs.100/- per working drawing except where otherwise specified

25. Alterations in specifications and designs not invalidate

The Engineer-in-Charge shall have the power to make any alterations in or additions to original specifications, drawings, designs, and the instructions that may appear to him to be necessary or advisable during the progress of the work, and the contractor

shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in the writing signed by the Engineer- in-Charge and such alterations shall not invalidate the contract, and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work, and if the additional and altered work includes any class of work for which no rate is specified in the contract, then such work or class shall be carried out at the rates entered in the Schedule of rates of the Government or the Corporation or at the rates mutually agreed upon between the Engineer- in -Charge or altered work for which no rate is entered in the rates agreed upon then the contractor shall within seven days of the date of receipt by him the order to carry out the work, inform the Engineer-in-Charge of the rate which it is his intention to charge for such class of work, and if the Engineer-in-Charge does not agree to this rate he shall by notice in writing be at liberty to cancel his order to carry out such class of work and arrange to carry out in such manner as he may consider advisable provided always that if the contractor shall commence work or incurred any expenditure in regard thereto before the rates shall have been determined as lastly herein before mentioned, then in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer- in-Charge in the event of a dispute, the decision of the Chief Engineer will be final.

Where, however, the work is to be executed according to the designs, drawings and specifications recommended by the contractor and accepted by the competent authority the alterations above referred to shall be within the scope of such designs, drawings and specifications appended to the tender.

The time limit for the completion of the work shall be extended in the proportion that the increase in its cost occasioned by alterations, or additions bears to the cost of the original contract work, and the certificate of the Engineer- in-Charge as to such proportion shall be conclusive

26. Extension of time in consequence of additions or alterations

1) If at any time after the execution of the contract documents the Engineer shall for any reason whatsoever (other than default on the part of the contractor for which the Corporation is entitled to rescind the contract) desires that the whole or the part of the work specified in the tender should be suspended for any period or that the whole or part of the work should not be carried out, at all he shall give to the contractor a notice in writing of such desire and upon the receipt of such notice the contractor shall forthwith suspend or stop the work wholly or in part as required, after having due regard to the appropriate stage at which the work should be stopped or suspended so as not to cause any damage or injury to the work already done or endanger the safety thereof provided that the design of the Engineer as to the stage at which the work or any part of it could be or could have been safely stopped or suspended shall be final and conclusive against the contractor. The contractor shall have no claim to any payment or compensation whatsoever by reason of or suspension, stoppage or curtailment except to the extent specified therein after.

No claim to any payment or compensation for alteration in or restriction of work

2) Where the total suspension of work ordered as aforesaid continued for a continuous period exceeding 90 days the contractor shall be at liberty to withdraw from the contractual obligations under the contract so far as it pertains to the unexecuted part of the work by giving a 10 days prior notice in writing to the Engineer, within 30 days of the expiry of the said period of 90 days, of such intention and requiring the Engineer to record the final measurements of the work already done to pay the final bill. Upon giving such notice the contractor shall be deemed to have been

discharged from his obligation to complete the remaining un-executed work under his contract. On receipt of such notice the Engineer shall proceed to complete the measurement and make such payment as may be finally due to the contractor within the period of 90 days from the receipt of such notice in respect of the work already done by the contractor. Such payment shall not in any manner prejudice the right of the contractor to any further compensation under the remaining provisions of this clause.

No claim to compensation on account of loss due to delay in supply of material by ASCL

3) Where the Engineer required the contractor to suspend the work for a period in excess of 30 days at any time or 60 days in the aggregate, the contractor shall be entitled to apply to the Engineer within 30 days of the resumption of the work after such suspension for payment of compensation to the extent of pecuniary loss suffered by him in respect of working machinery remained idle on the site or on the account of his having and to pay the salary or wages of labor engaged by him during the said period of suspension provided always that the contract shall be not entitled to any claim in respect of any working machinery, salary or wages for the first 30 days whether consecutive or in the aggregate or such suspension in respect of any suspension whatsoever occasioned by unsatisfactory work or any other default on his part. The decision of the Engineer in this regard shall be final and conclusive against the contractor.

(4) In the event of-

(i) Any total stoppage of work on notice from the Engineer under Sub clause (1) in that behalf.

(ii) Withdrawal from the contractor from the contractual obligation completes the remaining un-expected work under the sub-clause (2) on account of continued suspension of work for a period exceeding 90days

No claim to compensation on account of loss due to delay in supply of material by Corporation Curtailment in the quantity of item or items originally tendered on account of any alteration, omission on substitution in the specification, drawings, designs, or instructions under clause 15(1) where such curtailment exceeds 25 % in quantity and the value of quantity curtailed beyond 25 % at the rates for the items specified in the tender is more than Rs.50000/-.It shall be open to the contractor, within 90 days from the service of (i) the notice of stoppage of work or (ii) the notice of withdrawal from the contractual obligations under the contract on account of continued suspension of work or (iii) notice under clause 15(1) resulting in such curtailment, to produce to the Engineer satisfactory documentary evidence that he had purchased or agreed to purchase material for use in the contracted work, before receipt by him of the notice of stoppage, suspension or curtailment and require the Corporation to take over on payment such material at the rates determined by the Engineer, provided, however such rates shall in no case exceed the rates at which the same was required by the contractor. The contractor shall thereafter take over the materials so offered, provided the quantities offered, are not in excess of the requirements of the unexecuted work as specified in the accepted tender and are of quality and specifications approved by the Engineer

The contractor shall not be entitled to claim any compensation from the Corporation for the loss suffered by him on account of delay by Corporation in the supply of materials entered in Schedule „A‟ where such delay is caused by-

(i) Difficulties related to the supply of railway wagons,
(ii) Force Majeure,
(iii) Act of God,

(iv) Act of enemies of the State or any other reasonable cause beyond the control of Corporation.

In the case of such delay in the supply of materials, Corporation shall grant such extension of time for the completion of the works as shall appear to the Project Engineer to be reasonable in accordance with the circumstances of the case. The contractor shall accept the decision of the Project Engineer as to the extension of time as final

27. Time limit for unforeseen claims

Under no circumstances whatever shall the contractor be entitled to any compensation from the Corporation on any account unless the contractor shall have submitted a claim in writing to the Engineer- in- Charge within one month of the case of such claim occurring

28. Action and compensation payable in case of bad work

If any time before the security deposit or any part thereof is refunded to the contractor, it shall appear to the Engineer-in- Charge or his subordinate in charge of work, that any work has been executed with unsound, imperfect or unskillful workmanship or with the materials of inferior quality, or that any materials or articles provided by him for the execution of the work are unsound, or of a quality inferior to that contracted for or are otherwise not in accordance with the contract it shall be lawful for the Engineer-in-Charge to intimate this fact in writing to the contractor and then notwithstanding the fact that the work, materials or articles complained of any have been inadvertently passed, certified and paid for the contractor shall be bound forthwith, to rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require, or if so required, shall remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost, and in the event of his failing to do so, within a period to be specified by the Engineer- in- Charge in the written intimation aforesaid, the contractor shall be liable to pay compensation at the rate of 1 % on the amount of the estimate for every day not exceeding 10 days during which the failure so continues and in the case of any such failure the Engineer- in-Charge may rectify and remove, and re-execute the work or remove and replace the material or articles complained of as the case may be at the risk and expense in all respects of the contractor. Should the Engineer- in- Charge consider that no such inferior work or materials as described above maybe accepted or made use of it shall be within his discretion to accept the same at such reduced rates as he may fix therefore

29. Work to be open for Contractor or responsible agent to be present

All work under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspection and supervision of the Engineer- in-Charge and his subordinates, and the contractor shall at all times during the usual working hours, and at all other times at which his subordinates to visit the work shall have been given to the contractor, either himself be present to receive orders and instructions or have responsible agent duly authorized in writing present for that purpose. Orders given to the contractors duly authorized agent shall be considered to have the same force and affect as if they had been given to the contractor himself.

30. Notice to be given before work is covered up

The Contractor shall give not less than 5 days' notice in writing to the Engineer- in-Charge or his subordinate in charge of the work before measurement any work in order that the same may be measured and correct dimensions thereof taken before the same is so covered up or place beyond the reach of measurement and shall not cover up or place beyond the reach of measurement any work without the consent in writing of Engineer-in-Charge or his subordinate in charge of the work and if any work shall be covered up or placed beyond the reach of measurement, without such notice having been given or consent obtained the same shall be uncovered at the contractors expense and in default thereof no payment or allowance shall be made for such work or for the materials with which the same was executed

31. Contractor liable for damage done

If during the period of 12 months from the date of completion as certified by the Engineer- in-Charge pursuant to Clause 7 of the contract for 12 months after commissioning the work, whichever is earlier in the opinion of the Project Engineer, said work is defective in any manner whatsoever, the contractor shall forthwith on receipt of notice in that behalf from the Project Engineer, duly commence execution and completely carry out at his cost in every respect or the work that may be necessary for rectifying and setting right the defects specified therein including dismantling and reconstruction of unsafe portion strictly in accordance with and in the manner prescribed and under the supervision of the Project Engineer. In the event of the contractor failing or neglecting to commence execution of the said rectification work within the period prescribed thereof in the said notice and/or to complete the same as aforesaid as required by the said notice, the Project Engineer shall get the same executed and carried out departmentally or by any other agency at the risk on account and at the cost of the contractor. The contractor shall forthwith on demand pay to the ASCL the amount of such cost, charges and expenses sustained or incurred by the ASCL of which the certificate of the Project Engineer shall be final and binding on the contractor. Such cost, charges and expenses shall be deemed to be arrears of land revenue and in the event of the contractor failing or neglecting to pay the same on demand as aforesaid without prejudice to any other rights and aforesaid remedies of the corporation the same maybe recovered from the contractor as arrears of land revenue. The ASCL shall also be entitled to deduct the same from any amount, which may then be payable or which may thereafter become payable by the ASCL to the contractor either in respect of the said work or any other work whatsoever or from the amount of security deposit retained by Corporation

32. **Contractor to supply, Plant, Ladder etc**.

The contractor shall supply at his own cost all materials (except such special material, if any as many in accordance with the contract, be supplied from the Engineering Departmental Stores), plant tools appliances implements, ladders, cordage, tackle scaffolding and temporary works requisite or proper for the proper execution of the work, whether, in the original, altered or substituted from and whether including in the specification or other documents forming part of the contract or referred to in these conditions or not and which may be necessary for the purpose of satisfying or complying with the requirement of the Engineer-in -Charge as to any matter as to which these conditions, he is entitled to be satisfied, or which he is entitled to require together with the carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or the material, failing which the same may be provided by the Engineer-in-Charge at the expenses of the contractor and the expenses may be deducted from any money due to the contractor under the contract or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof. The contractor shall provide all necessary fencing and lights required to protect the public from accidents, and shall also be bound to bare the expenses of defense of every suit, action or other legal proceedings, that may be brought by any person for injuries sustained obeying to neglect of the above precautions, and to pay any damages and costs which may be avoided in any such suit actions or proceedings to any such person, or which may with consent of the contractor to be paid for compromising any claim by any such person.

33. **List of machinery in contractor's possession and which they propose to use on the work should be submitted along with the tender**

The contractor shall provide suitable scaffolds and working platforms gangways and stairways and shall comply with the following regulations in connection therewith

a) Suitable scaffolds shall be provided for workmen for all works that cannot be safely done from a ladder or by other means

b) A scaffold shall not be constructed, taken down or substantially altered except-
   i) Under the supervision of a competent and responsible person: and
   ii) As far as possible by competent workers possessing adequate experience in this kind of work
c) All scaffolds and appliances connected therewith and ladders shall
   i) Be sound of material,
   ii) Be of adequate strength having regards to the loads and strains to which they will be subjects, and
   iii) Be maintained in proper condition
d) Scaffolds shall be so constructed that no part thereof can be displaced in consequence of normal use
e) Scaffolds shall not be overloaded and so far as practicable the load shall be evenly distributed
f) Before installing lifting gear on scaffolds special precautions shall be taken to ensure the strength and stability of the Scaffolds
g) Scaffolds shall be periodically inspected by a competent person
h) Before allowing a scaffold to be used by his workmen the contractor shall, whether the scaffold has been erected by his workmen or not, take steps to ensure that it complies fully with the regulation herein in specified.

   i) Working platform, gangways, stairways shall
   ii) Be so constructed that no part of thereof can sag unduly or unequally.
   iii) Be so constructed and maintained having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripping or slipping, and

i) Be kept free from any unnecessary obstruction
j) In case of working platform, gangway, working places and stairways at a height exceeding three Members. Every working platform and every gangway shall be closely boarded unless other adequate measures are taken to ensure safety.

   i) Every working platform and gangway shall have adequate width and
   ii) Every working platform, gangway, working place and Stairway shall be suitable fenced.
k) Every opening in the floor of a building or in a working platform shall accept for the time and to the extent required to allow the excess of persons for the transport for shifting of materials to be provided with suitable means to prevent the fall of persons or materials
l) When persons are employed on roof where there is a danger of falling from a height exceeding 3 meters. Suitable precautions shall be taken to prevent the fall of persons or material
m) Suitable precautions shall be taken to prevent persons being struck by articles, which might fall from scaffolds or other working places
n) Safe means of access shall be provided to all working platforms and other working places

The contractor(s) will have to make payments to the laborers as per minimum wages Act.

The contractor shall comply with the following regulations as regards the hoisting appliances to be used by him.

(a) Hoisting machine and tackle, including the attachments anchorages and supports shall,

(i) Be of good mechanical construction, sound material and adequate strength and free from patent defect and

(ii) Be kept in good repair and in working order.

(b) Every rope used in hoisting or lowering materials or as a mean of suspension shall be of suitable quality and adequate strength and free from patent defect.

(c) Hoisting machines and tackle shall be examined and adequately tested after erection on the site and before used and be re examined in position at intervals to be prescribed by the Corporation.

(d) Every chain, ring, hook, shackle swivel and pulley block used in hoisting and lowering materials or as a mean of suspension shall be periodically examined.

(e) Every crane driver or hoisting appliance operator shall be properly qualified.

(f) No person who is below the age of 18 years shall be control of any hoisting machine, including any scaffold which, or give signals to the operator.

(g) In case of every hoisting machine and of every chain, ring, hook, shackle, swivel pulley block used in hoisting or lowering or as a mean of suspension, the safe working load shall be as ascertained by adequate means.

(h) Every hoisting machine and all gear referred to in preceding regulation shall be plainly marked with the safe working load.

(i) In the case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated.

(j) No part of any hoisting machine or of any geared referred to in regulation (g) above shall be loaded beyond the safe working load except for the purpose of testing.

(k) Motors, gearing transmissions, electric wiring and other dangerous part of hoisting appliances shall be provided with efficient safeguards.

(l) Hoisting appliances shall be provided with such means as will reduce to minimum, and the risk of the accidental descent of a load

Adequate precautions shall be taken to reduce to a minimum the risk of any part of a suspended load becoming accidentally displaced

34. Measure for prevention of fire

The contractor shall not set fire to any standing jungle, trees, bush woods or grass without a written permit from the Project Engineer.

When such permit is given, and also in all cases when destroying cut or dug up trees bush wood, grass etc. by fire; the contractor shall take necessary measure to prevent such fire spreading to or otherwise damaging surrounding property.

The contractor shall make his own arrangements for drinking water for the labors employed by him.

35. Liability of contractor for any damage done in or outside work

Compensation for all damages done intentionally or unintentionally by the contractor's labor whether in or beyond the limits of Corporation property including any damage caused by the spreading of fire mentioned in Clause22 shall be estimated by the Engineer- in- Charge or such other officer as he may appoint and the estimate of the Engineer in charge subject to the decision of the Chief Executive Officer on appeal shall be final and the contractor shall be bound to pay the amount of the assessed compensation on demand, failing which, the same will be recovered from the contractor as damages in the manner prescribed in Clause 1 or deducted by the Engineer- in -Charge from any sums that may be due or become due from Corporation to the contractor under this contract or otherwise. The contractor shall bear the expenses of defending any section or other legal proceedings that may be brought by any persons for injury sustained by him owing to neglect of precautions to prevent the speed of fire and he shall bay any damages and cause that may be awarded by the court in consequences

36. Employment of female labor

The employment of female labors on works in neighborhood of soldier's barracks should be avoided as far as possible. The contractor shall employ the labor with the nearest employment exchange

37. Work of Sunday

No work shall be done on a Sunday without the sanction in written of the Engineer - in-Charge

38. Work not to sublet

The contract shall not be assigned or sublet without the written approval of the Engineer- in- Charge and if the contractor shall assign or sublet his contract, or attempt to do so, or become insolvent or commence any proceeding to get himself adjudicated and insolvent or make any composition with his creditors, or attempt to do so or if bribe, gratuity, gift, loan, perquisites, reward or advantage pecuniary or otherwise, shall either directly or indirectly be given, promise or offered by the contractor or any of his servants or agents to any public officer or person in the employ of corporation in any way relating to his office or employment, or if in any such officer or person shall become in anyway directly or indirectly interested in the contract the Engineer-in - Charge may there upon by notice in written rescind the contract and the security deposit of the contractor shall thereupon stand forfeited and be absolutely at the disposal of Corporation and the same consequences shall ensure as if the contract had been rescinded under Clause 3 hereof and in addition the contractor shall not be entitled to recover or be paid for any work therefore actually performed under the contract

39. Sum payable by way of compensation to be considered reasonable compensation without reference to actual loss

All sums payable by contractor by way of compensation under any of these conditions shall be considered as a reasonable compensation to be applied to the use of Corporation without reference to the actual loss or damage sustained, and whether any damage has or has not been sustained

40. Changes in constitution of firm to

In case of tender by partners, any changes in the constitution of a firm shall be forthwith notified by the contractor to the Engineer- in- Charge for his information

41. Direction and control of Chief Executive Officer ASCL

All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects of the Project Engineer for the time being, who shall be entitled to direct at what points and in what manner they are to be commenced and from time to time carried on

(1) Except where otherwise specified in the contract and subject to the powers delegated to him by Corporation the decision of the Project Engineer for the time being shall be final, conclusive, and binding all parties to the contract upon all questions relating to the meaning of all specifications, designs, drawings and instructions hereinbefore mentioned and as to the quality of workmanship or materials used on the work, or as to any other question, claim, right matter, or thing whatsoever, if any way arising out of, or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions, or otherwise concerning the works or the execution, or failure to execute the same, whether arising during the progress of the work, or after the completion or abandonment thereof.

(2) The contractor may within thirty days of receipt by him of any order passed by the Project Engineer as aforesaid appeal against it to the ASCL concerned with the contract,

work or Project provided that-

The accepted value of that contract exceeds Rs. 10.00 lakhs (Rs. Ten lakhs Amount of claim is not less than Rs. 1.00 lakh (Rs. One lakh)

If the contractor is not satisfied with the order passed by the Chief Executive Officer, ASCL as aforesaid, the contractor may within thirty days of receipt by him of any such order Appeal against it to the Commissioner, and the Decision given by the Commissioner will be final.

42. Lump sums in estimates

When the estimate on which a tender is made includes lump sums in respect of parts of the work the contractor shall be entitled to payment in respect of the items of work involved or the part of work in question at the same rates as are payable under this contract of each item, or if the part of work in question is not in the option of the engineer in charge capable of measurement, the Engineer- in-Charge may as his discretion pay the lump sum amount entered in the estimate and the certificate in writing of the Engineer- in-Charge shall be final and conclusive against the contractor with regard to any sum or sums payable to him under the provision of this clause

43. Actions where no specifications

In the case of any class of work for which there is no such specification as is mentioned in rule 1 such work shall be carried out in accordance with the standard specifications of Public Works Department, and in the event of there being no specification, then in case the work shall be carried out in all respects in accordance with all instructions and requirements of the Engineer- in-Charge

44. Definition of work

The expression "works" or "work" where used in these conditions, shall unless there by something in the subject or context repugnant to such construction be construct to mean the work or works contracted to be executed under or in virtue of the contract, whether temporary or permanent and whether original, altered substituted or additional

The percentage referred to in the tender shall be deducted from/ added to the gross of the bill before deducting the value of any stock issued

All quarry fees, royalties and ground rent for stacking materials if any should be paid by the contractor

The contractor shall be responsible for and shall pay any compensation to his workmen payable under the Workmen's Compensation Act 1923 (VIIII of 1923) (hereinafter called the said Act) for injuries caused to the workmen. If such compensation is payable paid by corporation as principal under sub section (1) of section 12 of the said Act on behalf of the contractor under subsection (2) of the said section. Such compensation shall be recovered in the manner laid down in the Clause 1 above the contractor shall be responsible for and shall at the expenses of providing medical aid to any workmen who may suffer a bodily injury as a result of an accident. If Corporation the same shall be recoverable from the contractor forthwith and be incurs such expenses deducted without prejudice to any other remedy of Corporation from any amount due or that may be due to the contractor.The contractor shall provide all necessary personal safety equipment's and first aid apparatus available for use of persons employed on site and shall maintain the same condition suitable for immediate use at any time and shall comply with the following regulations in connection therewith.

a) The workers shall be required to use the equipment so provide by the contractor shall take adequate steps to ensure proper use of the equipment by those concerned.
b) When the work is carried in the proximity to any place where there is a risk or drawing all necessary equipment shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger.
c) Adequate provisions shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

The contractor shall duly comply with the provision of "the Apprentices Act" (III of 1961) the rules made there under and the orders that may be issued from time to time under the Act the said Rules

45. Claim for quantities entered in the tender

(1) Quantities in respect of the several items shown in the tender rare approximate and no revision in the tendered rate shall be permitted in respect of any of the items so long as subject to any special provision contained in the specifications prescribing a different percentage of permissible variation the quantity of the item does not exceed the contract quantity by more than50% and so long as the value of the excess quantity beyond this limit as the rate of the item specified in the tender is not more than Rs 5,00,000/-(Rs Five Lakh only).

(2) The contractor shall if ordered in writing by the Engineer to do so, also carry out any quantities in excess of the limit mentioned in sub-clause (1) hereof one the same conditions as in accordance with the specifications in the tender and at the rates as mentioned below:

a) if tender rate is above, rate will be at par as per Current PWD SOR

b) If tender rate is below, rate will be as per tender quoted rate on Current PWD SOR. For the purpose of operation of this clause, the total cost shall be taken as derived from the PWD SOR.

(3) Claims arising out of reduction in the tendered quantity of any item beyond 50 % will be governed by the provision of clause 15 only when the amount of such reduction beyond 50 % at the rate of the item specified in the tender is more than Rs.5,00,000/- (Rs Five Lakh only). This reduction is exclusively of the reduction mentioned in clause No 2, 1, 4 of the work and site condition.

There is no change in the rate if excess is less than or equal to 50%. Also, there is no change in the rate if quantity of work done is more than 50 % of the tendered quantity or the value of the excess work at tendered rates does not exceed Rs. 5,00,000/- (Rs Five Lacks only)

46. Employment of famine labor etc

The contractor shall employ any famine, convict or other labor of a particular kind or class if ordered in writing to do so by the Engineer- in-Charge.

47. Claim for compensation for delay in starting the

No compensation shall be allowed for any delay caused in the starting of the work on account of acquisition of land or in the case of clearance works on account of any delay in according to sanction of estimates

48. Claim for compensation for delay in execution

No compensation shall be allowed for any delay in the execution of the work on account of water standing in borrow pits or compartments the rates are inclusive for hard or cracked soil Excavation in mud, sub soil, water standing in borrow pits and no claim for an extra rate shall be entertained, unless otherwise expressly specified

49. Entering upon or commencing any portion of work

: The contractor shall not enter upon or commence any portion of work except with the written authority and instructions of the Engineer- in-Charge or of his subordinate in charge of the work. Failing such authority, the contractor shall have no claim to ask for measurements of or payment for work

50. Minimum age of persons employed, the employment of donkeys and for other animals and payment of fair wages

(i) No contractor shall employ any person who is under age of 18 Years.

(ii) No contractor shall employ donkeys or other animals with breeching of string or thin rope the breeching must be at least three inches wide and should be of tape (Nawar).

(iii) No animals suffering from sores lameness or emaciation or which is immature shall be employed on the work.

(iv) The Engineer-in-Charge or his agent is authorized to remove from the work any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by ASCL for any delay caused in the completion of work by such removal.

(v) The contractor shall pay fair and reasonable wages to the workmen employed by him in the contract under taken by him. In the event of any dispute arising between the contractor and his workmen on the grounds that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Project Engineer who shall decide the same. The decision of the Project Engineer shall be conclusive and binding on the contractor but such decisions shall not in any way affect the conditions of contract regarding the payment to be made by corporation at the sanctioned tender rates.

(vi) The contractor shall provide drinking water facilities to the workers similar amenities shall be provided to the workers engaged on large work in urban areas.

(vii) Contractor to take precaution against accidents which take place on account of labor using loose garments while working near machinery

51. Method of payment

Payments to contractors shall be made by cheque drawn on any bank within the ASCL limits convenient not exceeding Rs 10 /- will be paid in cash.

52. Employment of scarcity labor

If ASCL declares a state of scarcity or famine to exit in any village situated within 10 miles of the work, the contractor shall employ upon such parts of work, as are suitable for unskilled labor, any person certified to him by the Project Engineer, or be any person to whom the Project Engineer may have delegated this duty in writing to be in need of relief and shall be bound to pay to such person wages not below the minimum which government may have fixed in this behalf. Any disputes which may arise in connection with the implementation of this clause shall be decided by the Project Engineer whose decision shall be final and binding on the contractor.

The contractor shall employ at least 80 percent of the total number of unskilled labor to be employed by him on the said work from out of the persons ordinarily residing in the district in which site of the said work is located.Provided, however; that if the required number of unskilled labor from that district is not available, the contractor shall in the first instance employ such number of persons as in available and thereafter may with previous permission in writing of the Project Engineer-in-charge of the said work, obtain the rest of the requirement of unskilled labor from outside district Wages to be paid to the skilled and unskilled laborers engaged by the Contractor. The contractor shall pay the laborer's skilled and unskilled according to the wages prescribed by the Minimum Wages Act of 1948 applicable to the area in which the work of the contract is located.

The contractor shall comply with the provisions of the Apprentices Act 1961 and the rules and Orders issued there under from time to time, if he fails to do so, his failure will be a breach of the contract and the Project Engineer, may in his discretion, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provision of Act. The contractor shall pay the laborer's skilled and unskilled according to wages prescribed by Minimum Wages Act applicable to the area in which the work lies

The contractor shall duly comply with all the provisions of the Contract Labor (Regulation and Abolition) Act, 1970 (37 of 1970) as amended from to time to time

and all other relevant status and statutory provision concerning payment of wages particularly to workmen employed by the contractor and working on the site of the work. In particular, the contractor shall pay wages to each worker employed by him on the site of the work. If the contractor fails or neglect to pay wages at the said rates or makes short payment and the ASCL makes such payment of wages in full or part thereof less paid by the contractor, as the case may be ,the amount so paid by the contractor to such workers shall be deemed to be arrears of land revenue and the corporation shall be entitled to recover the same as such from the contractor or deduct same from the amount payable by the corporation to the contractor hereunder or from any other amount payable by the ASCL to the contractor hereunder or from any other amounts Payable to him by the Corporation.

If the project is shelved by the Corporation before commencement, the contractor will have no right to claim any loses or compensation due to the same and for whatsoever reasons.

All disputes and differences of any kind whatever arising out of or in connection with the contract or the carrying out of the work (whether during progress of the works or after their completion and whether before or after the determination , abandonment or breach of the contract) shall be referred to and settled by Project Engineer .But if the contractor be dissatisfied with the decision of the Chief Executive Officer ASCL or as to withholding by the Project Engineer of any certificate of the Project Engineer or as to withholding by the Project Engineer of any certificate to which the contractor may within 60 days after receiving notice of such decision give a return notice to the other party requiring that / may claim to entitled them and in any such case the contractor such matters in disputes be referred to in an appeal before a Committee as mentioned below. Such return notice shall specify the manner which are in disputes and such disputes or difference of which such notice has been given and no other shall be and is hereby referred to Committee consisting of the Chief Executive Officer ASCL, the decision taken by the committee will be final and binding on both the parties Such reference except as to the withholding of any certificate to which the contractor to be entitled shall not be opened or entered upon until after the completion or alleged completion of the works or until after the practical cessation of the works arising from any cause unless with the written consent of the Project Engineer. Provided always that the Corporation shall not withhold the payment of an interim certificate nor the contractor in any way delay the carrying out of the works by reason of any such matters, question or dispute being referred to the Committee but shall, proceed with the work with all the diligence and shall, until the decision of the Committee abide by the decision of the Project Engineer and no award of the Committee shall reliever the contractor of his obligations to adhere strictly to Project Engineer's instructions with regard to the actual carrying out of the works. The Owner and the contractor hereby also agree that the said reference to the Committee under this clause shall be a condition precedent to any right of action under the Contract.

Contractor shall take out necessary Insurance Policy / policies for all workmen, labor employed on site so as to provide adequate Insurance cover for execution of the awarded contract work from National Insurance Co Ltd. Insurance Policy/policies taken out from any other company will not be accepted. He shall submit the receipt of premium to ASCL before work commencement

ADDITIONAL GENERAL CONDITIONS AND SPECIFICATIONS

NOTE: These are to apply as additional specifications and conditions, unless otherwise already provided for contradictorily else-where in this contract.

CONTRACTOR TO INFORM HIM SELFFULLY:

The Contractor shall be deemed to have carefully examined the work and site conditions including labor, the general and the special conditions, specifications, schedules and drawings and shall be deemed to have visited the site of the work and to have fully informed himself regarding the local conditions and carried out his own investigations to arrive at rates quoted in the tender. In this regard, he will be given necessary information to the best of knowledge of Department but without any guarantee about it.

ERRORS, OMISSION AND DISCREPANCIES:

a) In case of errors, omissions and /or disagreements between written and scaled dimensions on the drawing or between drawing and specifications etc. the following order of preference shall apply.

(i) Between actual scaled and written dimensions or descriptions on a drawing the latter shall be adopted.

(ii) Between the written or shown description of dimensions in the drawing and corresponding one in the specifications, the latter shall apply.

(iii) Between the quantities shown in schedule of quantities and those arrived at from the drawings, the latter shall apply.

(iv) Between the written description of the item in the schedule of quantities and the detailed description in the specifications of the same items, the latter shall apply.

b) In case of difference between the rates written in figures and words, the rate adopted by the contractor for working out the total amount of the item will be taken as correct. In order cases correct rates would be that, which is lower.

In all cases of omissions and / or doubts or discrepancies in the dimensions or descriptions of any item or specifications, a reference shall be made to the Project Engineer, ASCL whose elucidation, elaboration or decision shall be considered as authentic. The contractor shall be held responsible for any errors that may occur in the work through lack of such reference and precaution.

WORKING METHODS AND PROGRESS SCHEDULES:

(a) Contractor shall submit within times stipulated by the Engineer, in writing the details of actual methods that would be adopted by the contractor for the execution of any items as required by Engineer , at each of the location, supported by necessary detailed drawings and sketches including those of the Plant and Machinery that would be used ,their locations, arrangement for conveying and handling materials etc. and obtain prior approval of the Engineer-in-charge well in advance of starting of such item of work. The Engineer-in-charge reserves the right to suggest modifications or make complete changes in the method proposed

by the contractor, whether accepted previously or not, at any stage of work, to obtain the desired accuracy, quantity and progress of the work which shall be binding on the contractor, and no claim on account of such change in method of execution will be entertained by corporation so long as specifications of the item remain unaltered.

PROGRESS SCHEDULE

(b) The Contractor shall furnish within the period stipulated in writing by the Engineer-in-charge, of the order to start the work, a progress schedule in quadruplicate indicating the date of actual start, the monthly progress expected to be achieved and the anticipated completion date of each major item of work to be done by him, also indicating dates of procurement and setting up the materials, plant and machinery. The Schedule is to be such as is practicable of achievement towards the completion of the whole work in the time limit, the particular items, if any on the due dates specified in the contract and shall have the approval of the Engineer-in-Charge. No revised schedule shall be operative without such acceptance in writing. The Engineer is further empowered to ask for more detailed schedule or schedules say; week by week for any item or items, in case of urgency of work as will be directed by him and the contractor shall supply the same as and when asked for.

(c) The contractor shall furnish sufficient plant, equipment and labor as may be necessary to maintain the progress of schedule. The working and shift hours restricted to one shift a day for operations to be done under the corporation supervision shall be such as may be approved by the Engineer-in-charge. They shall not be varied without the prior approval of the Engineer. Night work which requires supervision shall not be permitted except when specifically allowed by Engineer each time, if requested by the contractor. The contractor shall provide necessary lighting arrangements etc. for night work as directed by Engineers without extra cost.

(d) Further, the contractor shall submit the progress report of work in prescribed forms charts etc. at periodical intervals, as may be specified by the Engineer-in-charge. Schedule shall be in forms of progress charts, forms, progress statement and /or reports as may be approved by the Engineer.

(e) The contractor shall maintain Performa, charts, details regarding machinery equipment, labor, materials, personnel etc. as may be specified by the Engineer and submit periodical returns thereof as may be specified by the Engineer-in-charge.

AGENT AND WORK ORDER BOOK

The Contractor shall himself manage the work or engage an authorized all-time agent on the work capable of managing and guiding the work and understanding the specifications and contract condition. A qualified and experienced, Engineer shall be provided by the contractor as his agent for technical matters in case the Engineer-in-charge considers this as essential for the work and so directs contracts. He will take orders as will be given by the Project Engineer or his representatives and shall be responsible for carrying them out. This agent shall not be changed without prior intimation to the Project Engineer and his representatives on the work site. The contractor shall supply to the Engineer the details of all supervisory and other staff employed by the contractor and notify changes when made, and satisfy the unquestionable right to ask for change in the quality and numbers of contractor's supervisory staff and to order removal from work of any of such staff. The contractor shall comply with such orders and effect replacements to the satisfaction of the Engineer.

A work order book shall be maintained on site and it shall be the property of corporation and the Contractor shall promptly sign orders given therein by Project Engineer or his representative and his superior offices, and comply with them. The compliance shall be reported by the contractor to the Engineer in good time so that it can be checked. The blank work order book with machine numbered pages will be provided by the corporation free of charge for this purpose. The contractor will be allowed to copy out instructions therein from time to time.

INITIAL MEASUREMENTS FOR RECORD:

Where, for proper measurement of the work, it is necessary to have an initial set of levels or other measurement taken, the same as recorded in the authorized field book or measurement book of corporation by the Engineer or his authorized representative will be signed by the contractor who will be entitled to have a true copy of the same made at his cost. Any failure on the part of the contractor to get such levels etc. recorded before starting the work will render him liable to accept the decision of the Engineer as to the basis of taking measurement. Like-wise the contractor will not cover any work which will render its subsequent measurements difficult or impossible without first getting the same jointly measured by himself and the authorized representative of the Project Engineer. The record of such measurements on the corporation side will be signed by the contractor and he will be entitled to have a true copy of the same made at his cost.

HANDLING OVER THE WORK

All the work and materials before finally taken over by Corporation will be entire liability of the Contractor for guarding, maintaining and making good any damages of any magnitude. Interim payments made for such work will not alter this position. The handling over by the contractor and taking over by the Project Engineer or his authorized representative will be always in writing, copies of which will go to the Project Engineer or his authorized representative and the contractor. It is, however understood that before taking over such work, Corporation will not put it into regular use as distinct from causal or incidental one, except as specifically mentioned elsewhere in this contract, or as mutually agreed to.

ASSISTANCE IN PROCURING PRIORITIES, PERMITSETC

The Engineer, on a written request by the contractor, will if in his opinion, the request is reasonable and in the interest of work and its progress, assist the contractor in securing, the priorities for deliveries, transport permits for controlled materials etc. where such are needed. The Corporation, will not, however be responsible for the non-availability of such facilities or delay in this behalf and no claims on account of such failures or delays shall be allowed by the Corporation.

The Contractor shall have to make his own arrangement for machinery required for the work. However, such machinery conveniently available with the Corporation may be spared as the ruled in force on recovery of necessary Security Deposit and rent agreement in the prescribed form. Such an agreement shall be independent of this contract and the supply of machinery shall not form a ground for any claim or extension of time limit for this work.

SAMPLES AND TESTING OF MATERIALS

(i) All materials to be used on work shall be got approved in advance from the Engineer-in-charge and shall pass the test and or analysis required by him, which will be (a) as specified in the specification for the item concerned and or as specified by the Indian Road Congress Standard Specification(b) Code of Practice for Road and Bridges or (c) I.S.I. Specifications (Whichever and wherever applicable) or (d) such recognized Specifications accepted to Engineer-in-Charge as equivalent thereto or in absence of such recognized Specifications (e) such requirement test and or analysis as may be specified by the Engineer-in-Charge in order of precedence given above.

(ii) The contractor shall at his risk and cost make all arrangements and /or shall provide for all such facilities as the Engineer-in-charge may require for collecting preparing required number of samples for tests or for analysis at such item and to such places may be directed by the Engineer and bear all charges and cost of testing. Such samples shall also be deposited with the Engineer-in-Charge.

(iii) The contractor shall if and when required submit at his cost the samples of materials to be tested or analysis and if, so directed, shall not make use of or incorporate in the work any materials represented by the samples until the required tests or analysis have been made and the materials, finally accepted by the Engineer-in-charge.

(iv) The contractor shall not be eligible for any claim or compensation either arising out of any delay in the work or due to any corrective measures required to be taken on account of and as a result of testing of the materials.

(v) The contractor or his authorized representative will be allowed to remain present in the departmental authorised laboratory while testing samples furnished by him. However, the results of all tests carried out in the such laboratory in the presence or absence of the contractor or his authorized representative will be binding on the contractor.

(vi) Cost of routine day to day quality control testing charges for tests required as per specifications will be borne by contractor by sending the same to the concerned laboratories or by establishing laboratory at site.

CO-ORDINATION:

When several agencies for different sub work of the Project are to work simultaneously on the timely completion of the whole Project smoothly, the scheduled dated for completion specified in each contract shall therefore be strictly adhered to. Each contractor may make his independent arrangement for water, power, housing etc. if they so desired. On the other hand, the contractor is at liberty to mutual agreement in this behalf and makes joint arrangements with the approval of the Engineer. No single contractor shall take or cause to be taken any steps or action that may cause disruption discontent, or disturbance of work labor or arrangement etc. of other contractor in the Project localities. Any action by any contractor which the Engineer in his unquestioned discretion may consider as infringement of the above code would be considered as a breach of the contract conditions and shall be dealt with as such.

In case of any dispute, disagreement between the contractor, the Engineer's decision regarding the co-ordination, co-operation and facilities to be provided by any of the contractors shall be final and binding on the contractors concerned and such a decision or decisions shall not vitiate any contract nor absolve the contractor(s) of his/their obligations under the contract nor consider for the grant for any claim or compensation.

PAYMENT:

The Contractor must understand that the rates quoted are for completed work and include all costs due to labor, scaffolding, machinery, power, royalties, taxes etc. and should also include all expenses to cover the of night work if and when required and no claim for additional payment beyond the prices or rates quoted will be entertained. The mode of measurements has been indicated in the specifications, if there is any ambiguity or doubt in this respect the decision of Project Engineer will be final.

PATENTED DEVICE

Whenever the contractor desires to use any designed devices, materials or process covered by the letter of patent or copy right, the right for such use shall be secured by suitable legal arrangement and agreement with patent owner and the copy of their agreement shall be filled with the Engineer-in-charge if so desired by the letter.

TEMPORARY QUARTERS:

(i) The contractor shall at his own expense maintain sufficient experienced supervisory staff etc. required for the work and shall make his own arrangement, provide housing for them with all necessary arrangements, including fire preventive measures etc. as directed by the Engineer-in-charge.

SAFETY MEASURES AND AMENITIES:

SAFETY MEASURES:

The contractor shall take all necessary precautions for the safety of the workers and preserving their health while working in such job as require special protection and precautions. The following are some of the requirements listed, though not exhaustive. The contractor shall also comply with the directions issued by the Engineer in this behalf from time to time and at all times.

(1) Providing protective foot wear to workers, in situations like mixing and placing of mortar of concrete in quarries and places where the work is under too much of wet conditions as also for movements over surfaces infected with oyster growth etc.

(2) Providing protective head gear to workers, working in quarries etc. to protect them against accidental fall of materials from above. To provide Reflective Jackets, Helmets to site staff.

(3) Taking necessary steps towards training the workers concerned in the use of machinery before, they are allowed to handle it independently and taking all necessary precautions in and around the areas where machines, hoists, and similar units are working.

(4) Avoiding bare lives-wires etc. as would electrocute workers.

(5) Making all platforms, staging and temporary structures sufficiently strong so as not to cause inconvenience and risk to the workmen and supervisory staff.

(6) Providing sufficient first aid trained staff and equipment to be available quickly at the work site to render immediate first aid treatment in case of accidents due to suffocation, drowning and other injuries.

(7) Where the workers are required to work near machine and are liable to accident they should not be allowed to wear loose cloths like dhoti, zabba, etc.

DAMAGE BY FLOODS OR ACCIDENTS:

The contractor shall take all precautions against damage by floods or like or from accident etc. no compensation will be allowed to the contractor on this account or for correcting and repairing ant such damage to the work during construction. The contractor shall be liable to make good at his cost any plant or material belonging to the Corporation, lost or damaged by floods or from any other cause which is in his charge.

RELATION WITH PUBLIC AUTHORITIES:

The Contractor shall comply with all rules, regulations, bye-laws and direction given from time to time also by any local public authority in connection with this work and shall himself pay fees or charges which are leviable on him without any extra cost to the Department.

POLICE PROTECTION:

For the Special Protection of camp, the contractor's works, the Department will help the contractor as far as possible to arrange for such protections with the concerned authorities if so required by the Contractor in writing. The full cost of such protection shall be borne by the Contractor.

INDEMNITY:

The Contractor shall indemnify the ASCL against all actions, suits, claims and demands brought or made against him in respect of anything done or committed to be done by the Contractor on execution of or in connection with this contract and against any loss or damage to the corporation in consequence of any action or suit being brought against the Contractor for anything done or committed to be done in the execution of this contract.

MEDICAL AND SANITARY ARRANGEMENTS TO BE PROVIDED FOR LABOUR EMPLOYED IN THE CONSTRUCTION BY THE CONTRACTOR

a) The Contractor shall provide an adequate supply of potable water for use of laborers on work and in Camps.

b) The contractor shall construct trench or semi-permanent latrines for the use of the laborers. Separate latrines shall be provided for men and women.

c) The Contractor shall build sufficient number of huts on a suitable plot of land for use of the laborers according to the following specifications.

   i. Huts of bamboo and tin sheets may be constructed.
   ii. A good site not liable to submergence shall be selected on high ground remote from jungle but well provided with trees, shall be chosen wherever it is available. The neighborhood of tank, jungle, grass or woods

should be particularly avoided. Camps should not be established close to large cuttings of earthwork.

iii. The lines of huts shall have open spaces of at least ten meters between rows. When a good natural site cannot be procured, particular attention should be given to the drainage.
iv. There should be no overcrowding. Floor space at the rate of 30 sq.ft.per head shall be provided. Care should be taken to see that the huts are kept clean and in good order.
v. The contractor must find his own land and if he wants Corporation Land, he should apply for it and pay assessment for it, if made available by Corporation.
vi. The Contractor shall construct a sufficient number of bathing places. Washing places should also be provided for the purpose of washing clothes.

2. The Contractor shall make sufficient arrangements for draining away the surface and salvage water as well as water from the bathing and washing places and shall dispose off the wastewater in such a way as not to cause any nuisance.

d) The Contractor shall engage a medical officer with a traveling dispensary for a camp containing 500 or more persons if there is no government or other private dispensary situated within 8kms from the camp. In case of emergency the contractor shall arrange at his cost for transport for quick medical help to his sick worker.

e) The Contractor shall provide the necessary staff for effecting a satisfactory drainage system and cleanliness of the camp to the satisfaction of the Engineer. At least one sweeper per 200 persons should be engaged.

f) The Assistant Director of Public Health shall be consulted before opening a labor camp and his instruction on matters such as water supply, sanitary conveniences, the camp site accommodation and food supply shall be followed the Contractor.

g) The Contractor shall make arrangements for all anti-malaria measures to be provided for the labor employed on the work. The anti-malaria measure shall be provided as directed by the Assistant Director of Public Health.

3. QUARRIES:

The quarrying operations if required and permitted by the Engineer-in-charge shall be carried out by the contractor with proper equipment such as Compressors, jack hammers, Drill bits, Explosives etc. and sufficient number of workmen shall be employed so as to get the required out-turn.

The Contractor shall carry out the works in quarries conformity with all the rules and regulations already laid down or may be laid down from time to time by Corporation due to non-compliance of any rules or regulations or due to damages by the contractor shall be the responsibility of the contractor. The Engineer-in-charge or his representative shall be given full facilities by the contractor for inspection at all times of the working of the quarry, records maintained, the stocks of the explosives and detonators etc., so as to enable him to check that the working records and storage are all in accordance with the relevant rule. The Engineer-in-charge or his representative shall at any time be allowed to inspect the works, buildings and equipment at the quarters.

The Contractor shall maintain at his own cost, the books, registers etc., required to be maintained under the relevant rules and regulations and as directed by the Engineer-in-charge. These books shall be open for inspection at times by the Engineer-in-charge or his

representative and the contractor shall furnish the copies or extracts of books or register as and when required.

All quarrying operations shall be carried out by the contractor in organized and expeditious manner, systematically and with proper planning. The contractor shall engage licensed blaster and adopt electric blasting and/or any other approved method which would ensure complete safety to all men engaged in the quarry and its surroundings. The contractor shall himself provide suitable magazines and arrange to procure and store explosives, etc. as required under the rules at his own cost the designs and the locations of the magazine shall be got approved in advance from the Chief Inspector of Explosives and the rules and regulations in this connection as laid down by the Chief Inspector of Explosives from time to time shall be strictly adhered to by the Contractor. It is generally experienced that it takes time to obtain the necessary license for blasting storage of material from the concerned authorities. The contractor must therefore take timely advance action for procuring all such licenses so that the work progress may not be hampered.

The approaches to the quarrying place from the existing public roads shall have to be arranged by the contractor at his own cost, and the approaches shall be maintained by the contractor at his own cost till the work is over.

The quarrying operations shall be carried out by the contractor to the entire satisfaction of the Engineer-in-charge and the development of the quarry shall be made efficiently so as to avoid wastage of stones. Only such stones as are of the required quality shall be used on the work. Any store which is in the opinion of the Engineer-in-Charge, not in accordance with the specifications or of required quality will be rejected at any time, at the quarry or at the site of work. The rejected stones shall not be used on the work and such rejected materials shall be removed to the place shown at the contractor's cost.

Since all stones quarried from Government quarry (if made available) by the contractor including the excavated overburden are the property of the government, no stones or earth shall be supplied by the contractor to any other agencies or works , and are not allowed to be taken away for any other works all such surplus quarried materials not required for work under this contract shall be the property of the Government and shall be handed over by the contractor to Government free of cost at quarry site duly heaped at the spots indicated by the engineer-in-charge. The contractor will be entitled to the refund of the royalty if any paid by him for such quantity handed over to Government for which necessary certificate will be issued by Project Engineer as per usual procedure. If, however, the Government does not require such surplus material, the contractor may be allowed to dispose of or use material elsewhere with prior written permission of Engineer- un-Charge. Leaving off a quarry face or opening of a new quarry face shall be done only on the approval of the Engineer-in-charge. Quarrying permission will have to directly obtained by the contractor, from the Collector of the district concerned for which purpose the Corporation will render necessary assistance. All quarry fees, Royalty charges, ground rent for staking material, etc. if any two be paid, shall be paid directly by the contractor as per rules in force. The contractor will be permitted to erect at his own risk and cost at the quarry site if suitable vacant space in government area is available for the purpose, his own structures for stores, offices, etc. at place approved by the Engineer-in-charge. On completion of the work, the contractor shall remove all the structures erected by him and restore the site top its original condition.

The contractor shall not use any land in the quarry either for cultivation or for any other purpose except that required for breaking or stacking or transporting stones.

TRAFFIC REGULATION

Unless separately provided for in the contract, the contractor shall have to make all necessary arrangement for regulating traffic, day to night during the period of construction to the entire satisfaction of the Engineer. This includes the construction and maintenance of diversions if necessary. The contractor shall have to provide necessary caution boards, barricades, flags, lights and watchmen etc. so as to comply with the latest Motor Vehicles rules and regulations and for traffic safety and he shall be responsible for all claims from accidents which may arise due to his negligence whether in regulating the traffic or in stacking material on the roads or due to any other reasons.

MISCELLANEOUS

Rate shall be exclusive of G.S.T. as applicable.

For providing electric wiring or water lines etc. shall be provided if necessary through walls, slabs, beams etc. and later on refilled up with bricks or stone chippings, cement mortar without any extra cost.

In case it becomes necessary for the due fulfilment of Contract for the Contractor to occupy land outside the Department limits, the Contractor will have to make his own arrangement with the land owners and to pay such rents if any are payable as mutually agreed between them. The Department will afford the Contractor all the reasonable assistance to enable him to obtain ASCL land for such purpose on usual terms and conditions as per the rules of the ASCL

Special provision in detailed specifications or wording of any item shall gain precedence over corresponding contradictory provision (if any) in the Standard Specifications or PWD Hand Book, where reference to such specifications is given without reproducing the details in Contract.

Suitable separating barricades and enclosures shall be provided to separate material brought by the Contractor and material issued by ASCL to the Contractor. Same applies for the material obtained from different sources of supply.

It is presumed that the Contractor has gone carefully through the Standard Specifications of PWD Hand Books and the Schedule of Rate of the Division and studied the site conditions before arriving at rates quoted by him. Decision of the Engineer-in-charge shall be final as regards interpretation of specifications.

The stacking and storage of construction material at site shall be in such a manner as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality, properties and fitness for the work. Suitable precautions shall be taken by the Contractor to protect the material against atmospheric action, fire and other hazards. The materials likely to be carried away by wind shall be stored in suitable stores or with suitable barricades and where there is likelihood of subsidence of soil, such heavy material shall be stored on approved platforms.

The Contractor shall be responsible for making good the damages done to the existing Property during construction by his men.

If it is found necessary from safety point of view to test any part of the structure, the test shall be carried out by the Contractor with the help of the Department at this worn cost.

The Contractor shall provide, maintain, furnish and remove on completion temporary shed for office on work site for the use of Project Engineer’s representative.

Defective work is liable to be rejected at any stage. The Contractor, on no account can refuse to rectify the defects merely on reasons that further work has been carried out. No extra payment shall be made for rectification.

General directions or detailed description of work, materials and items coverage of rates given in the specification are not necessarily repeated in the Bill of Quantities. Reference is, however, drawn to the appropriate section clause (s) of the General Specifications in accordance with which the work is to be carried out.

In the absence of specific directions to the contrary, the rates and prices inserted in the items are to be considered as the full inclusive rates and prices for the finished work described there under and are to cover all labor, materials, wastage, temporary work, plant overhead charges and profits, as well as the general liabilities, obligations and risk arising out of the General Conditions of the Contract.

The quantities set down against the items in the Schedule B are only estimated quantities of each kind of work included in the Contract and are not to be taken as a guarantee that the quantities scheduled will be carried out or required or that they will not be exceeded.

All measurements will be made in accordance with the methods indicated in the specifications and read in conjunction with the General Conditions of Contract.

The details shown on drawings and all other information pertaining to the work shall be treated as indicative and provisional only and are liable to variation as found necessary while preparing working drawing which will be supplied by the ASCL during execution. The Contractor shall not, on account of such variation be entitled to any increase over the ones mentioned in the contract which are on quantity basis**.**

Contract Data to General Conditions of Contract

Except where otherwise indicated, the Employer prior to issuance of the bidding documents should fill in all Contract Data. Schedules and reports to be provided by the Employer should be annexed

Clause Reference

Items marked "N/A" do not apply in this Contract.

1. The Employer is: [Cl.1.1]
   Designation: **Chief Executive officer, ASCL Agra**
   E-mail ID :gm@agrasmartcity.in
2. The Intended Completion Date for the whole of the Works is
   AS PER NIT after start of work. [Cl.1.1, 17&27]

3. The Site is located : Agra U.P.

4. The Start Date shall be Same days after the date of issue of the Notice to proceed with the work. [Cl.1.1]
5. The works shall, inter-alia, include the following, as specified or as directed.
6. (a)The law which applies to the Contract is the law of Union of India. [Cl.3.1]
   (b) The language of the Contract documents is English. [Cl.3.1]
7. The Schedule of Other Contractors is attached. [Cl. 8.1]
8. A. The Technical Personnel for construction work are: [Cl. 9.1]

Technical Personnel	**Number**	**Experience in water Supply Works**
A. Degree Holder in Civil / Mechanical/ Electrical Engineering	1	Minimum 20 years of Experience out of which five years of experience of having handled/executed independently large water supply work project.
B. Degree Holder in Civil Engineering	1	Minimum 5 years of Experience
C. Degree Holder in Mechanical Engineering	1	Minimum 5 years of Experience
D. Degree Holder in Electrical/ Electronic Engineering	1	Minimum 5 years of Experience
E. Diploma holder in Civil Engineering	2	Minimum 2 years of Experience
F. Diploma holder in Mechanical / Electrical Engineering	2	Minimum 2 years of Experience in Maintenance of plant & machinery
G. Surveyor	3	Minimum 2 years of Experience
I. ITI Certified Plumber/ Electrician/ Welder/ Fitter	10	Minimum 2 years of Experience
For Field Test Laboratory		
Technical Personnel	**Number**	**Experience in Water Supply Works**

A. Degree Holder in Civil/Mechanical/Electrical Engineering	2	Minimum 05 years of Experience in testing and quality control in water supply works
C. Lab Assistant/Technical Assistant (ITI/BSc)	2	Minimum 2 years of Experience in maintenance of plant & machinery
E. Surveyor	1	Minimum 2 years of Experience in testing
For Routine Maintenance		
Technical Personnel	**Number**	**Experience in water supply Works**
A. Diploma holder in Civil/Mechanical/Electrical Engineering (Supervisor)	1	At least 2 Years
Diploma holder in Mechanical & Electrical Engineering	1	At least 2 years
Lab assistant/Technical assistant (nITI/BSc)	1	At least 2 years

13(a) Amount and deductible for insurance are: [cl.13.1]

Item		**Amount to be insured**		**Deductibles**
A.	Loss of or damage to the works, Plants and materials	10 % of contract value		Deductibles for insurance shall be as per latest tariff of General Insurance Company of India plus 20% of premium amount for items A, B, C & D
B.	Loss of or damage to equipments	2.5 % of contract value		
C	Loss of or damage to property (except the works, plant, Materials, and Equipment) in Connection with the contract:	1 % of contract value		
D	Personal injury or death	Up to contract value Rs. 2 Crores	Rs. 2 lacs per occurrences for maximum three occurrences	
		For contract value more than Rs. 2 Crores	Rs. 2 lacs per occurrences for maximum three occurrences	

13(a) Amount and deductible for insurance are: [cl.13.3 (a)]

Item		Amount to be insured	Deductibles
A.	Personal injury or death	Rs. 2 Lacs for one occurrence per year	Deductibles shall be as per latest tariff of General Insurance Company of India plus 20% of the premium amount

14. Site investigation report [cl.14.1]

15. The key equipments/machinery for construction of works shall be:

Sl.	Name of the Equipments	Quantity /No Cost Of Work More Then 2 Crores
1	R.M.C. plant	1
2	Transport Miller	-
3	Tar Boiler	-
4	Mixture/Mixol	4
5	Concrete Mixture	4
6	Water Tanker	8
7	Diesel Road Roller (8-10 Ton Capacity)	-
8	Vibratory Roller	1
9	Tractor	2
10	Truck	4
11	Hot mix plant with sensor paver	-
12	Air compressor	-
13	Mechanical Broom	-
14	Bitumen Distributor/ mechanical sprayer	-
15	Tipper	4
16	J.C.B.	2
17	Pockland	1
18	Wet Mix Macadam Plant with paver	-
19	Pin vibrator	-
20	Generator 250 KVA	**3**
21	Grader	-
22	Soil Compactor	1
23	Concrete Vibrator with niddle	2
24	Field Laboratoy	2
25	Hydra (CAPACITY 8 TON)	As per requirement
26	Mastic Cooker	-
27	Trolly	As per requirement
28	Barrier	As per requirement
29	Cone	-
30	Reflective Tape	As per requirement
31	Dumpy Level	2
32	Total Station	1

[Cl 16.2]

16. Competent authorities are: [Cl. 24.1]

Chief Executive Officer

17. (a) The period for submission of the program for approval of Engineer shall be TEN days from the issue of Letter of Acceptance. [Cl.26.1]

(b) The updated program shall be submitted at interval of 60 days. [Cl. 26.3]

(c) The amount to be withheld for late submission of an updated program shall be Rs. 20,000.00 per day for contract value [Cl. 26.3]

18. The key equipment for field laboratory shall be: As mentioned in specifications of relevant items

19. *No increase in rates of any items specified in Bill Of Quantity is allowed due to variation in quantities* [Cl 36.1]

20. The authorized person to make payments is **CEO, Agra Smart City Limited, Agra**. [Cl 39.2]

21. (a) Milestone to be achieved during the contract period.

(1) 1/8th of the value of entire contract work up to 1/4th of the period allowed for completion of construction.
(2) 3/8th of the value of entire contract work up to 1/2nd of the period allowed for completion of construction.
(3) 3/4th of the value of entire contract work up to 3/4th of the period allowed for completion of construction.

(b)

Amount of liquidated damages for delay in completion of works	For whole of work 1 percent of the initial contract price, rounded off to the nearest thousand, per week

(c)

Maximum limit of liquidated damages for delay in completion of work.	10 percent of the initial contract price rounded off to the nearest thousand

[Cl 44.10]

22 The standard form of performance security acceptable to the employer shall be an unconditional Bank Guarantee of the type as presented in the Bidding Documents. [Cl 46.1]

23. (a) The Schedule of operating and maintenance manuals N.A [Cl 51.1]

(b) The date by which "as-built" drawings (in scale as directed) in 2 sets are required is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be (including L Section & Cross sections of the road) [Cl 51.1]

24. The amount to be withheld for failing to supply "as-built" drawings by the date required is Rs. One Lac. [Cl 51.2]

25. (a) The Period for setting up a field laboratory with the prescribe equipment is 7 (Seven) days from the days from the date of notice to start work [Cl 51.2.(i)]

(b) The following events shall be fundamental breach of contract: "The Contractor has contravened Clause 7.1 and Clause 9 Of Part I General Condition Of Contract" [Cl 51.2.(j)]

26. The Percentage to apply to the value of the work not completed representing the Employer's additional cost for the completing the works shall be 20% [Cl 53.1]

Section 5
Specifications

All the works shall be carried out as per specification for Water supply which is separately given in the tender documents (Volume –II) and detailed PWD/Jal Nigam Specifications & latest E in C circulars.

Section 5 (Cont'd)
Drawings

List of Drawings: -

S.no	List of Drawings	S.no	List of Drawings
1	Agra Index Map	2	Satellite Image
3	Topogarphy Map	4	Ward boundary & project area Boundary
5	Proposed water supply Zone map	6	Schematic diagram of proposal water supply system
7	Transmission main alignment	8	Feeder main drawing from Tanjganj ZPS to OHT's
9	Layout drawing of Proposed OHT's and CWR's	10	Proposed pumping station arrangement at Geonimandi WTP
11	SLD for pumping station arrangement for Geonimandi WTP	12	Proposed pumping station arrangement at Tajganj ZPS
13	SLD for pumping station arrangement for Tajganj ZPS	14	Typical arrangement for OHT's
15	Typical standard details of scour valve installation	16	Typical standard details of Kinetic double valve installation
17	Typical Thrust block installation	18	Standard details of water connection
19	Standard details of wash out chamber	20	Standard details of bulk flow meter
21	Typical Sluice valve chamber	22	Typical air valve chamber
23	Distribution Network for Zone-1	24	Distribution Network for Zone-2A
25	Distribution Network for Zone-2B	26	Distribution Network for Zone-2C
27	Distribution Network for Zone-3	28	Distribution Network for Zone-4
29	Distribution Network for Zone-5	30	Distribution Network for Zone-6
31	Distribution Network for Zone-7	32	Valve Location Drawing for Zone-1
33	Valve Location Drawing for Zone-2A	34	Valve Location Drawing for Zone-2B
35	Valve Location Drawing for Zone-2C	36	Valve Location Drawing for Zone-3
37	Valve Location Drawing for Zone-4	38	Valve Location Drawing for Zone-5
39	Valve Location Drawing for Zone-6	40	Valve Location Drawing for Zone-7

Drawings to be followed for actual execution of work should bear the stamp "Good for construction".

1. Any revision of working drawings should be indicated by pre-fixing R1, R2….. etc. after original reference number. Reasons for each revision should be clearly noted in the drawing.
2. Complete set of drawings should be issued along with other tender documents so as to form part of the agreement.
3. Drawings are not available with the bidding documents downloaded from the website and may be obtained from the office of ASCL, Agra as indicated in the NIT

Section– 6.

Form of Bid

Notes on Form of Bid

The Bidder shall fill in and submit this Bid form with the Bid.

---------- -- (Date)

To
The **CEO,**
Agra Smart City Limited,
Agra.

Description of the work: Providing 24x7 water supply to ABD area with water meter and SCADA system under Smart city Mission

1. I/We offer to execute the works described above and remedy any defects there in conformity with the conditions of contract, specifications, drawings, bill of quantities and addenda for

   (a.) For Item rate in the Bill of quantity, as referred to in clause 13 of ITB.

2. We undertake to commence the works on receiving the notice to proceed with work in accordance with the contract documents.

3. This Bid your written acceptance of if shall constitute a binding contract between us. Weunderstand that you are bound to accept the lowest or any Bid you receive.

   We hereby confirm that this bid complies with the Bid validity and earnest money required by the bidding documents and specified in the Appendix to ITB.

Authorized Signature :- _____
Name and title of Signatory:-_____
Name of bidder :- _____
Authorized Address of Communication:- _____
_____
_____
Telephone No(s): (Office) :- _____
Mobile No :- _____
Facsimile (FAX) No :- _____
Electronic Mail Identification (E-mail ID) :- _____

Section 7

Bill of Quantities Preamble

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, Conditions of Contract Specifications and Drawings.

2. For the construction of works, the quantities given in the Bill of Quantities are estimated, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the Bill of Quantities in the case of item rate tenders.

3. The rates and prices tendered in the priced Bill of Quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out in the Contract.

4. Arithmetic errors will be corrected by the Employer pursuant to Clause 27 of the instructions to Bidders.

Section 8
Letter of Acceptance and Other Forms
OFFICE OF THE CEO, AGRA SMART CITY LIMITED, AGRA

NO.....

DATED.....

LETTER OF ACCEPTANCE

To,

M/s.....

.....

….....

This is to notify you that on behalf of the Employer, **CEO, Agra Smart City Limited, Agra** has accepted your Bid dated ..... for execution of the …….. for the Contract Price of Rs..... Rs..…….....only) is hereby accepted by our Agency.

You are hereby requested to furnish Performance Security, in the form detailed in Cl.32 of ITB for an amount of Rs..... (Rs.....) Within 10 days of the receipt of this letter of acceptance valid up to 45 days from the date of expiry of Defects Liability Period (i.e. up to .....) and sign the contract, failing which action as stated in Cl. 32.3 of ITB will be taken.

Yours faithfully,

CEO, Agra Smart City Limited, Agra

OFFICE OF THE CEO, AGRA SMART CITY LIMITED, AGRA

Issue of Notice to proceed with the work

LETTER NO.....
DATED.....

To,
.....
.....
.....
Dear Sirs:

Pursuant to your furnishing the requisite performance security as stipulated in ITB Clause 32.1 and signing of the contract for the construction of ……..……for Dist. Agra you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents & complete it by …….

Yours faithfully,
CEO, Agra Smart City Limited, Agra

(c) Standard Form of Agreement

Notes on Standard Form of Agreement The Agreement should incorporate any corrections or modifications to the Bid resulting from corrections of errors (Instructions to Bidders, Clause 26).

Standard Form: Agreement
Agreement

This agreement, made the ..... day of ..... of …….. . Between **CEO, Agra Smart City Limited, Agra** (Hereinafter called "the Employer") of the one part, and
.....
.....
.....
[Name and address of Contractor] (Hereinafter called "the Contractor" of the other part).
Whereas the Employer is desirous that the Contractor execute the Work of
……..
District- Agra (Hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the Execution and completion of such Works and the remedying of any defects therein at a cost of Rupees.....
(Rs.....only)

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:
   i) Letter of Acceptance:
   ii) Notice to proceed with the works:
   iii) Contractor's Bid:
   iv) Contract Data:
   v) Special Conditions of contract and General Conditions of Contract:
   vi) Specifications:
   vii) Drawings:
   viii) Bill of Quantities: and
   ix) Any other document listed in the Contract Data as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written. was hereunto affixed in the presence of: Signed, Sealed and Delivered by the said To

Binding Signature of Contractor

Binding Signature of Employer
authorized representative

(d) Form of unconditional Bank guarantee for advance payment

BANK GUARANTEE FOR ADVANCE PAYMENT

To,
CEO, Agra Smart City Limited,
Agra Nagar Nigam,
Agra

Gentlemen:
In accordance with the provisions of the General Conditions of contract, clause 45 ("Advance Payment") of the above-mentioned

Contract, ……. *[name and address of Contractor]* (Hereinafter called "the Contractor") shall deposit with …….. *[Name of Employer]* a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of …….. *[Amount of guarantee]1* ……*[in words]*.We, the ……..[bank or financial institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to……. *[name of Employer]* on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding ……..……[amount of guarantee] …….We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed there under or of any of the Contractor documents which may be release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.
This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ *[name of Employer]* receives full repayment of the same amount from the Contractor.

Yours truly,
Signature and seal: _____
Name of Bank/Financial Institution: _____
Address:_____
Date: _____

1. An amount shall be inserted by the bank or financial institution representing the amount of the Advance Payment, and Denominated in Indian Rupees.

(e) Form of unconditional Bank guarantee "Performance Bank Guarantee").

PERFORMANCE BANK GUARANTEE

To,

CEO, Agra Smart City Ltd.
Agra Nagar Nigam,
Agra

WREREAS ……. [*Name and Address of Contractor*] (Hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. …….. Dated …….to execute …….[*Name of Contract and brief description of Works*] herein after called "The Contract"

AND WHEREAS it has been stipulated by you in the said contract that the contractor shall furnish you with a bank guarantee by a Nationalized Bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract,

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of ……[*amount of guarantee*] ……...[*in words*], such sum being payable in the types and proportions of currencies in which the Contract price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of …….. [*Amount of guarantee*] as aforesaid without your needing to prove or to show grounds or reasons for a demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contactor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in anyway release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This Guarantee shall be valid until a date 45 days after the expiry of defect liability period of 5 years after intended completion date.

Signature and seal of the guarantor
……

Name of Bank
…….....

Address
…….....

Date ……

(f) Form of unconditional Bank guarantee "Bid security/ EMD").

BID SECURITY (BANK GUARANTEE)

To,
CEO, Agra Smart City Ltd

WHEREAS,_____[name of Bidder] (hereinafter called "the Bidder") has submitted his Bid dated_____[date] for the construction of _____[name of Contract hereinafter called "the Bid"].

KNOW ALL PEOPLE by these presents that We _ [name of Bank] of _____[name of country] having our registered office at_____(hereinafter called "the Bank") are bound unto Chief Executive Officer ,Agra Smart City Limited] (hereinafter called "the Employer") in the sum of_____* for which payment well and truly to be made to the said Employer the Bank itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this_____day of, 20_____

THE CONDITIONS of this obligation are :

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;

OR

(2) If the Bidder having been notified to the acceptance of his bid by the Employer during the period of Bid validity:

a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or
b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders; or
c) does not accept the correction of the Bid Price pursuant to Clause 26.

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date …….

180 days after the deadline for submission of Bids as such dead-line is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE_____ SIGNATURE

_____

WITNESS _____ SEAL_____

[Signature, name and address]

* The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions to Bidders.

Employer Bank Details-

Benificiary Bank name-Panjab national Bank

RTGS/NEFT IFSC CODE----PUNB0003000

QUALIFICATION INFORMATION

The information to be filled in by the Bidder in the following pages will be used for Purposes of post qualification as provided for In Clause 4 of the Instructions to Bidders. This information will not be incorporated in the Contract.

1. For Individual bidders

1.1 Constitution or legal status of bidder
[Attach Copy]

Place of registration:
……
Principal place of business:
……
Power of attorney of signatory of Bid
[Attach]

1.2

Total value of civil engineering construction and construction work executed and payment received in last 5 years (in Rs. Lakhs)		

1.3.1. Work performed as prime contractor (in the same name) on works of a similar nature over the last five years **

Project Name	Name Of The Employer*	Description Of Work	Contact No.	Value Of Contract (Rs. Million)	Date Of Issue Of Work Order	Stipulated Period Of Completion	Actual Date Of Completion*	Remarks Explaining Reasons For Delay And Work Completed

1.3.2 Quantities of work executed as prime contractor (in the same name and style) in the last five years:

Year	**Name Of The Work**	**Name Of The Employer**	**Quantity Of Work performed @**					**Remarks* (Indicated contract ref.)**
			Earthworks in both excavation and embankment (combined quantity)(cum)	Granular Sub Base and base (cum)	Plant Mix paver laid Bituminous Work (cum)	Pipe drain NP3/NP4	Sewer Line 300mm DWC Pipe	

** Attach certificate (s) from the Engineer - In - Charge*
@ The item of work for which data is requested should tally with specified in ITB clause 4.5A(c)
*** Immediately preceding the financial year in which bids are received*
Attach certificate from chartered Accountant

1.4 Information on bid capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid

(a) Existing Commitments and on-going works:

Description Of Work	Place & State	Contract No. & Date	Name And Address Of Employer	Value Of Contract (Rs. In Million)	Stipulated Period Of Completion	Value Of Works* Remaining To Be Completed (Rs. In Million)	Anticipated Date Of Completion

(b) Works for which bids already submitted

Description Of Work	Place & State	Name And Address Of Employer	Estimated Value Of Works (Rs. In Million)	Stipulated Period Of Completion	Date When decision is expected	Remarks, If Any

** Attach certificate (s) from the Engineer - In – Charge*

1.5 The following items of Contractor's equipment are essential for carrying out the works. The bidder should list all the information requested below. Refer also to sub clause 4.3 (d) of the instructions to bidders.

Item Of Equipment	Requirement Nos.	**Availability Proposal**			Remarks (From Whom to be purchased
		Owned/Released/ To be procured	Nos/Capacity	Year (Model)/Condition	

@ As Per Annex 1 of section 1 - Instruction to bidders

1.6 Qualification and experience of key personnel proposed for administration and execution of the contract attach biographical data. Refer also to sub clause 4.3 (e) and 4.5 (B) (b) of instructions to bidders and sub clause 9.1 of the conditions of contract

Position	Name	Qualification	Experience (years) in general	Experience In The Proposed Position
Project Manager				
Construction Engineer				
Material and Quality control Engineer				

1.7 Proposed subcontracts and firms involved. [Refer ITB Clause 4.3 (j)]

Sections Of The Works	Value of Sub Contract	Sub-Contractor (Name And Address)	Experience In Similar Work

1.8 Financial reports for the last five years: balance sheets, profit and loss statements, auditors' reports (in case of companies/corporation), etc. List them below and attach copies.

1.9 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit. etc. List them below and attach copies of support documents {sample format attached}.

1.10 Name, address, and telephone, telex, and fax numbers of the Bidders' bankers who may provide references if contacted by the Employer.

1.11 Information on litigation history in which the bidder is involved.

Other Party (ies)	Employer	Cause of Dispute	Amount Involved	Remarks/Present Status

1.12 Statement of compliance under the requirement of Sub Clause 3.2 of the instruction to bidders.

……
……
……
……

1.13 Proposed work method and schedule. The bidder should attach description, drawings and charts as necessary to company with the requirement of the bidding documents. [Refer ITB Clause 4.1 and 4.3 (k)].

2. Joint Ventures -

3. Additional Requirements

3.1 Bidders should provide any additional information required to fulfill the requirements of clause 4 of the instruction to bidders, if Applicable

Check List of Bidder.

Sl. No.	Document/Certificate	References	
		Chapter	**Clause**
1	**2**	**3**	**4**
1	T – 6	I T B A	3.2, 3.3, 3.5
2	T – 4	- do -	3.4
3	T – 5	- do -	3.4
4	Following information shall be furnished by the contractor on Non- Judicial Stamp paper with Bid.		
a.	Construction or legal status Bidder, Place of registration Principal place of business, Power of attorney.	Section - 3	1.1
b.	Total annual volume of civil Engineering constructions work executed and payments received in the last five years preceding the year in which bids are invited. (Attach certificate from chartered Accountant)	Section – 3	1.2
c.	Work performed as prime contractor (in the same name and style) on construction works of a similar nature and volume over the last five year. Attach certificate from the Engineer-In-Charge.	Section - 3	1.3.1
d.	Existing commitments and on-going constructions works.	Section – 3	1.3.2. A
e.	Works for which bids already submitted.	Section – 3	1.3.2. B.
f.	Availability of major items of contractor‟s Equipment proposed for carrying out the works. List all information requested below, Refer also to Clause 4.2 (d) and Clause 4.4 b (b) of the instructions to Bidders.	Section – 3 I T B	1.4, 4.4 (b) (i)
g.	Qualifications of technical personnel proposed for the contract. Refer also to clause 4.2 (e) of the instructions to bidders and clause 9.1 of part-1 General Conditions of Contract.	Section – 3 I T B	1.5, 4.4.3 (b) (ii)
h.	Financial reports for the last five years: balance sheets, profit and loss statement, auditor, reports, etc. List below and attach copies.	Section – 3 I T B	1.6., 1.7
i.	Evidence of access to financial resourees to meet the qualification: cash in hand, lines of credit, etc. list below and attach copies of support documents. (Sample format attached)	Section – 3	1.8
j.	Name, address and Telephone, telex, and facsimile numbers of banks that may provide reference if contacted by the Employer.	Section – 3	1.9
k.	Information on current litigation in which the bidders is involved.	Section – 3	1.9 A
5	Undertaking from bidder for minimum investment.	I T B	4.2 (g)
6	Authority to seek reference from the Bidders‟s bankers	I T B	4.2 (i)
7	Each bidders must produce the current income-tax clearance certificate. An affidavit that the information furnished with the bid documents is correct in all respects and, Such other certificates as defined in the Appendix to ITB. Failure to	I T B	4.4 B (a)

	produce the certificates shall make the bid non-responsive.		
8	Bid Security	I T B	16
9	The minimum amount of liquid assets and/or credit facilities net other contractual commitments of the successful bidder shall be 10% of the contract value.	Appendix to I T B	4.4.B (b) (iii)
10	The bidder must produce an affidavit stating the names of retired gazetted officer (if any) in his employment who retired within the last two years with the following ranks from the departments listed below.	- do -	4.4 B (c) (ii)
11	Calculation of Bid capacity of Bidder.	Appendix to I T B	4.6
12	The proposed methodology and programmed of construction, backed will equipment and material planning and deployment, duly supported with broad calculations and quality management PI an proposed to be adopted, justifying their capability of execution and completion of the work as per technical specific actions and within the stipulated period of completion.	I T B	4.2.L
13	Any documents which are not mentioned in any list shall be as per standard Bid of Document.	-	-

Volume – II

SECTION 5 : TECHNICAL SPECIFICATIONS

Contents

CHAPTER 1

SPECIAL SERVICE TO BE PROVIDED BY THE CONTRACTOR

1 Special Services to be provided by Contractor

The following services are to be provided by Contractor during the entire period of the Contract. Those items not included separately in the Bill of quantities but the cost of providing these services are deemed to be included in the pay items of the Bill of Quantities

1.1 Surveying Equipment

1.1.1 The Contractor shall provide at the site, at his own expense, two approved sets of surveying and measuring equipment. The sets shall be used by the Contractor for requirement at site and also shall be made available from the commencement of contract for the use of the Engineer's Representative. The set shall consist of the following instruments:

ITEMS QUANTITY

a) Total Station 2
b) Pogo with Reflector 4
c) Big Tripod 2
d) Small Tripod 2
e) Fiber glass tape (cased 30m) 4
f) Steel Pocket tape, 3 6
g) Surveying Umbrellas 2
h) Ranging Poles, 2.5m long 10
i) Level books – as required
j) Field books – as required

1.1.2 All equipment shall be supplied with their tripods, staff and such other equipment/item as t h e Engineer's Representative may require for the measuring, or setting -out of the work.

1.1.3 The Contractor shall be solely responsible for the maintenance of all such instruments and equipment and shall ensure they are, at all times, in good repair and adjustment. All equipment other than expendable items shall revert to the Contractor upon completion of the works.

1.1.4 The Contractor shall provide the Engineer, throughout the Contract period, with all necessary surveyors and survey assistants to assist with surveying work. The assistant shall keep the survey equipment in good order.

1.1.5 There is no pay item for provision of survey equipment or survey support. Payment for the provision of surveying instrument and support service is deemed to be included in the rates for other pay items of the bill of quantities.

1.1.6 The Telemetry system and their components should be verified by the third party qualified concerned before making payment by the ULB.

1.2. Laboratory Testing and Laboratory

1.2.1. Description

Testing of materials for items such as embankment and concrete structures shall be carried out by a site laboratory established and allocated exclusively for that purpose; all testing shall be carried out under the direction and supervision of the Engineer's staff.

All tests shall be performed in strict accordance with the appropriate I n d i an Standards or other standards as approved by the Engineer.

1.2.2. The Laboratory shall be adequately staffed by the contractor with materials technicians and assistants in the numbers deemed necessary by the Engineer so that no interruption of unnecessary delay shall occur to construction activities due to delays in sampling or testing, in-site or in the laboratory, as required by the Contract. The testing equipment provided in the

Laboratory shall be sufficient to carry out the following tests:

a) Crushing strength of 150mm size concrete cubes.

b) Sieve analysis

123. Alternatively the contractor can get the testing done in an approved laboratory as agreed to by the Engineer. If in case the tests are to be done in an approved laboratory, such an approval shall be obtained from the Engineer within 15 days of commencement of Contract.

Any testing relating to the Works as required by the Engineer which cannot be carried out in the site laboratory or in the approved external laboratory shall be carried out at the Contractor's expense, at an independent laboratory approved by the Engineer.

The provision of laboratory facilities on site, as specified, shall in no way relieve Contractor of the responsibility for providing additional laboratory space and testing equipment as necessary in order to control materials at mixing plants and elsewhere and enable him to fulfill his obligations under the Contract.

Laboratory Building

The Contractor shall provide, furnish, equip, keep clean and maintain to the satisfaction of the Engineer, a laboratory building of a floor area sufficient to accommodate a l l the testing requirements. The building shall be provided with electrical power, potable water, drainage, and shall have adequate daylight and artificial lighting.

The Contractor shall, at the Commencement of the Contract, submit a detailed list of the equipment he is proposing to provide showing for each item its type and model, s e r i a l number, manufacturer's name and year of manufacture for the Engineer's approval.

The testing of the works by the Engineer, in no way, absolves the Contractor from his responsibilities to carry out his own testing of the quality of his works and the materials used.

The laboratory building and equipment shall be used exclusively for the purposes for which they are intended and shall, together with all equipment, all samples and records, be open to inspection by the Engineer during all working hours.

The contractor has to make his own arrangements for locating the laboratory in an appropriate site near the work area.

1.3. Contractor's Senior Materials Technician

131. The Contractor shall provide a full-time senior materials technician to be responsible for the day-to-day activities of the laboratory and for site testing. He shall be directly and solely responsible to the Engineer or designated members of his staff.

The senior materials technician shall have not less than ten years experience of the testing of earthworks and of concrete for structures and shall be fully conversant with the testing of materials as per latest Indian Standards. The experience and qualifications of the senior materials technician shall be to the approval of the Engineer.

Sample

132. The Contractor shall submit samples of all materials and goods for inclusion in the works to the Engineer and only those approved by the Engineer and to the standards specified elsewhere in the Contract may be ordered for supply. Samples shall be submitted promptly in order not to delay the works.

All work executed shall be of equal standard in all respects to the approved samples and the Engineer may reject any work which, in his opinion, does not comply with the approved samples.

133. Payment

There is no pay item for provision of establishment of testing laboratory or testing of materials. Payment for the provision of surveying instrument and support service is deemed to be included in the rates for other pay items of the bill of quantities

134. Site surveys, Setting out and detailing

Description

The Contractor shall be responsible for the true and proper setting-out of the works in relation to the lines and levels of reference given by the Engineer in Charge or shown on the Drawings and for the correctness of the position, levels, dimensions and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour used in connection therewith.

He shall carry out a detailed route alignment survey of the site in advance of his commencement of Construction work, and shall supply full details to the Engineer as specified in the following sub clauses of Technical Specifications.

All setting out and leveling shall be based on permanent Benchmarks provided by the Employer.

1.3.5. Existing levels and Layouts

1.3.5.1. Before commencing operations of any section of the works, the Contractor shall survey all existing detail in that section, in plan and in level and shall plot the results in such detail and to such scales as shall be to the satisfaction of the Engineer. These survey plots shall be supplied to the Engineer at least four weeks before the intended commencement of construction on the section. Unless otherwise instructed by the Engineer the detailed survey plots will be supplied in 1:200 scale both as soft and hard copy.

1.3.5.2. In addition to the above mentioned requirements above, horizontal control lines shall be marked out by pegs at intervals of not more than 20m and the lines traversed with total station, by steel band or by any other method acceptable to the Engineer. The alignments established shall be referenced by pegs offset at suitable distance on each side of the horizontal control lines. These offset pegs shall be painted in a conspicuous colour.

1.3.5.3. Cross sections of the existing ground and of the ground after completion of earthworks shall be taken at intervals not exceeding 20m along the horizontal control lines in an approved and acceptable manner.

1.3.6. Bench Marks, Survey Points and Deliverables

1.3.6.1. As the work proceeds, the Contractor shall establish, at suitable location, substantial permanent benchmarks, clear of the works, from which, all subsequent setting out and leveling shall be carried out. The location of the benchmarks shall be agreed with the Engineer before they are established.

Benchmarks shall be constructed in class 20/20 concrete, with minimum

dimensions of 0.3x0.3m, the upper surface being approximately 50mm above ground level. 20mm diameter mild steel rod, not less than 300mm in length, shall be cast into the concrete so that it projects about 10mm above the centre of the surface of the concrete. The concrete surface shall be clearly engraved with the reference number of the benchmark. The co-ordinates and level of each benchmark shall be determined in meters to 3 decimal places.

Plan of the road shall show the location of the proposed water main alignment, the width of right of way of roads on both sides of the carriageway, the existing services and obstructions to proposed pipelines and edges of existing asphalt carriageway. The drawing shall clearly indicate the location of the plot boundary walls wherever available. The existing services, as determined by site excavation, should also be marked up on these plans. The Contractor shall check co-ordinates and levels of benchmarks at monthly intervals and immediately notify the Engineer of any discrepancies.

1.3.6.2. The cost of alignment survey as explained above shall be included in the quoted items.

Technical Specifications

1.3.7. Working and Shop Drawing

1.3.7.1. General

The Contractor is advised to note that the following requirements are part of the Contract and he will not have any right to claim at any time for delays or for expenditure incurred by him in fulfilling the same.

1.3.7.2. Tender Drawings

The drawings are prepared in such detail as are necessary to give a comprehensive idea of the works. These drawings may be, to suit the site requirements clarified subsequent to the tender, modified, expanded or replaced subsequent to opening of tender. The Drawings if stands finalized at the time of executing the agreement, together with additional drawings and / or modified drawings, signed and made part of the contract will be called Construction drawings for the Contract. Any questions or alterations affecting the requirements

or information on the Contract Drawings shall be submitted in writing to the Engineer and shall be reviewed by the Engineer. The lines indicated on the Construction Drawings denoting locations of the existing utilities or services are approximate locations. The Contractor is not to assume that they are exact. He has to confirm the exact location of the utilities in consultation with the relevant authorities.

The locations, layout and scope of works may be altered and in such cases the Contractor shall not be entitled to any claim whatsoever for such alterations over and above the measured works or measured variations at the tendered rates except in accordance with the provisions of relevant Clauses of the Conditions of Contract.

1.3.7.3. Working drawings

The Construction Drawings shall be supplemented by working drawings or shop drawings prepared by the Contractor which are required for the execution of the works. These working drawings shall include, pipe laying details, electrical single line drawings to suit the contractor's submission, mechanical drawings, piping drawings, reinforcement details such as bar bending schedules, manhole schedules, setting out details, layouts, utility relocation and protection if any required, and any other detail the Engineer may ask during construction. Schedules shall be drawn up for each pipeline with the details of depth, levels of pipes, and benching details. The working drawings/shop drawings and documents, including diagrams and schedules shall show the details of proposals for the execution of the works at specific chainages and shall include every information necessary for the following purposes:

- To illustrate in detail the arrangement of the various section of the works and to identify the various components.
- To integrate the various sections of the works
- All drawings shall be computerized and shall be submitted both in hard copy as well as digital data.

The costs of furnishing working drawings shall be included in the rates for various paying items given in the Bill of Quantities. Working drawings and documents shall be made available in sufficient time in order to maintain the Programme of Work on site. The Contractor shall also provide as part of the mobilization to site, latest model Pentium Computers and software together with new colour printer, for the preparation of his working Drawings by his staff. The Engineer shall have access to this Computer. In case the Contractor fails to mobilize such staff and equipment as described above to site, the Employer reserves the right to mobilize the necessary staff and deduct the cost of such mobilization from any money due to the Contractor.

1.3.7.4. Approvals of working drawings and Materials

The Contractor shall liaise with the Engineer for the period required for any approval, which shall be a maximum of two weeks. The Contractor shall ensure that all items to be ordered by him can be accommodated in the positions shown on the drawings and for taking all necessary dimensions on site together with any supporting information which may be necessary for preparing working drawings.

No materials or equipment shall be ordered nor construction of the associated works be commenced until such approval has been obtained from the Engineer. The Contractor shall be deemed to have obtained a full and proper understanding of the Engineer's design and design intents and to have satisfied himself with their accuracy and suitability. In this respect, the Engineer will meet all reasonable requests made by the Contractor in furnishing design information to the Contractor. No claim in respect of lack of knowledge will be admissible.

1.4 Soil Investigation and Report

1.4.1 A soil investigation has been undertaken during the Design phase. However in case additional investigations are required during the course of construction the Contractor shall be advised of such requirement and the

Contractor shall promptly carry out such investigations as advised by the Engineer.

1.5 Site Safety

1.5.1 Safety of General Public/Utilities

In order to improve the general vehicular traffic condition and to guarantee public safety from and around the work the Contractor shall provide all labour, and materials, and construct and maintain temporary traffic diversions throughout the construction activities, to the directive and approval of the Engineer. It is therefore recognized that there is a particular responsibility placed upon the Contractor to take special precautions for public safety and to minimize the scale and extent of disruption to public and commercial life. Plans for traffic diversion shall always be submitted to the Engineer and to the traffic police for their prior approval.

1.5.2 Safety on Site

The Contractor shall ensure that the works are carried out in a safe manner according to internationally accepted guidelines on safe working procedures and to the satisfaction of the Engineer. The following requirements shall be complied with by the Contractor:

a) **Excavation -** All excavations shall be adequately supported to avoid collapses and effective safety barriers shall be erected with warning signs and devises around all open excavations to the satisfaction of the Engineer. Struts and walling shall not be used as ladders and for the purpose of access to the base of excavation the Contractor shall provide proper ladders which shall be suitably secured. Reflective overalls shall be worn by all workmen on or close to a road and, here necessary, temporary road signs and cones shall be provided to ensure a safe working area. While excavating along the road reserve, sufficiently strong and wide timber bridges s h a l l be provided for pedestrian crossings. As far as possible the excavations in front of entrances shall be backfilled the same day. Sufficient written notice shall be given to the residents who may be affected by the excavation.

b) **Protective Clothing** - The Contractor shall ensure that all personnel on site are supplied with the necessary protective clothing such as safety helmets, goggles, face masks, ear muffs, gloves, boots, depending on the operations being performed.

c) **Scaffolding** - Suitable and sufficient scaffolds shall be provided and properly maintained for all work that cannot safely be carried out from the ground or from part of the structure or from a ladder. Every scaffold shall be of good construction, of suitable and sound material and of adequate strength for the purpose for which it is used. Unless designed as an independent structure, every scaffold shall be rigidly connected to a part of the structure which is of sufficient strength to afford safe support. Protective headgear shall always be worn.

d) **Lifting Device** - Every rope, chain, pulley, bloc, hook, winch, crane or other lifting gear used for raising or lowering pipes of as a means of suspending them shall be of good construction, sound material, adequate strength and free from defects. They shall be properly maintained and tested at regular intervals by a competent person, who shall be to the approval of the Engineer.

e) **Working in existing pipelines etc**.: Checks shall be carried out before entry to ensure that the atmosphere is fit for respiration and no smoking naked lights or flames are to be permitted in any pipeline or chambers or in their vicinity when these are open.

The equipment which shall be made available shall include but not limited to:

a) Gas detector lamps with lead acetate papers.
b) Lifting harness with ropes
c) Hand lamps with spare batteries
d) First aid kit.
e) Protective head gear.
f) Rubber Gloves.

g) Breathing apparatus.

Throughout the period of the Contract, the Contractor shall provide safety helmets and high reflectivity jackets to all employer's staff and visitors. Barriers must be provided to all excavations for the safety of the public and flagmen must be used for all items of plant for the safety of the operatives, supervision staff and members of the public.

1.6 Traffic Management

Before commencing the works, the Contractor shall consult with and obtain from he Traffic Police, Employer and the Engineer their requirements for temporary traffic signs, road markings, lighting and other measures necessary to ensure the safety of the public, and shall comply with these requirements, though such compliance alone will not relieve the Contractor of his obligations under the Contract. The Contractor shall also take a No Objection Certificate from Consultants supervising other Contracts in the area, get details of newly installed and temporary services and obtain access requirements for other contractors.

The Contractor shall deploy a safety officer, as a full time member of his site staff for the duration of the contract, whose duties shall include the production and implementation of traffic management schemes and the safety of vehicular and pedestrian traffic. Qualification and experience of the safety officer (traffic management staff) shall be subject to the approval of the Engineer.

Throughout the Contract, the Contractor shall maintain vehicular and pedestrian access to all properties adjacent to and within the site at all time. The contractor is solely responsible for obtaining the necessary permissions and approvals from the Traffic Police, service authorities and all other concerned authorities for the diversions and closure of sections of the existing roads and footpaths. Details of all proposed traffic management schemes shall be prepared well in advance of their intended implementation and shall be submitted to the Engineer and to other interested parties for approval.

Approval by the Engineer of a scheme will not relieve the Contractor of his

responsibility to gain approval from the Traffic Police or other concerned authorities. Ignorance of any restrictions as to the timing and /or placing of diversions imposed by the Traffic Police or other authorities will not be accepted as a basis for claims for additional c o s t s or delays arising from such restrictions.

Adequate warning and direction signs are to be erected wherever necessary and as advised by Traffic Police and diversions are to be maintained in good condition to the satisfaction of the Engineer.

Temporary diversions shall be constructed and maintained to the standards approved by b o t h the Traffic Police and the Engineer. Upon completion of the Permanent works, the temporary diversions shall be removed and the site restored to the satisfaction of the Engineer.

The Contractor shall arrange with the appropriate authorities for any additional land required for temporary diversions. All traffic diversions must be constructed and maintained to the highest standards with regular washing of cones and daily maintenance of flashing lights. The signs and cones should be self-stabilizing, and if extra stability is required, only small sandbags with reflective painting should be used.

All stockpiles of material to be used in the works must be fenced off and all unsuitable material must be removed from site on a daily basis and not stockpiled on site. Payment for Traffic management shall be considered as included in the various pay items of BOQ. The Employer shall reserve the right to deduct penalties from any monies due to the contractor for failure to follow these conditions

1.7 Utility Services

1.7.1 Contractor to establish location of Utilities

Before the Contractor may proceed with the Works in any given area he is required to establish the precise location of all services in that area. Existing service plans are only approximate and may not be taken as an accurate indication of the positions of all services. The contractor will therefore be

required, acting in strict co-operation with the Engineer, Agra smart city limited and other concerned authorities, to open up hand excavations, at points to be agreed, in order to establish the precise location of the existing services. The contractor is to locate all existing services by cutting trenches across the road's right of way at least at an interval of 100m.The trench shall be excavated manually without the use of machinery, so as not to damage any service. The width of the trench shall be decided at site. Once the service is located, its position, location and depth together with any other significant details, shall be marked up on a road layout drawing, provided by the Engineer, and got approved by the Engineer. After collecting the details the trench shall be backfilled w i t h t he permission of the Engineer. The backfilling shall follow the specification for earthwork excavation.

The Contractor is required to make adequate allowance in his programming for this process and may be required to adapt his programme to accommodate the service protection and /or relocation works ordered as a result of these investigations. The Contractor shall provide for in his rate for quoted items for minor shifting of utilities.

If any major shifting or realignment of water supply, gas pipelines, electric and telephone lines is necessary then the same may be done by the contractor. The cost of such shifting shall be borne by the Employer.

1.7.2 Protection of Utilities

The Contractor is wholly responsible for the protection and /or facilitating relocation of such utilities as may be required. If any utility is damaged during the execution of works by contractor, the Contractor shall reinstate the utility at no cost to the Employer.

1.8 Protection of the Works during Contract period

It is clearly understood that any damage occurring to the works (completed or under execution) is the responsibility and no claims will be entertained by the Employer since the matter shall be covered by the relevant Insurances.

1.9 Discrepancies in Alignment

Discrepancies in alignment and levels etc., noticed during construction and/or on completion shall be rectified by the Contractor at his own cost, Engineer's approval does not relieve the Contractor of his responsibilities.

1.10 Temporary Water and Power Supply

All costs, both for temporary installations and water required f o r testing of pipelines a n d tanks, shall be borne by the Contractor. All costs for power supply in connection with testing of equipment shall be borne by the contractor.

1.11 Progress Photographs

1.11.1 The Contractor shall submit to the Engineer each month, throughout the period of the Contract, one set of progress photographs comprising 2 copies of 12 A4 size photographs selected by the Engineer from not less than 24 exposures of views of the works taken at the direction of the Engineer. The camera used for this purpose shall be such that the date is printed out on the negative.

1.11.2 In addition three copies of each of the 30 previously selected progress photographs and mounted in three separate and suitable albums shall also be delivered to the Engineer on the Preliminary Handing-over of the works. The arrangements for the progress photographs are subject to the approval of the Engineer and shall be discussed at as early a date as possible so that complete coverage can be assured.

1.12 As Built Records

On or before the completion of the works, at the direction of the Engineer, the Contractor shall prepare detailed drawings and other records, as required, of the works executed. The Contractor is required to submit the soft copy as well as two hard copies of the as built records to the scale advised by the Engineer.

1.13 Programme of works

1.13.1 In respect of the programme of works required under Clause 25 of the General Conditions of Contract the following specific requirements shall apply:

- The works shall be programmed in such a way as to minimize disruption to public traffic.
- Works shall not be carried out simultaneously over large areas of the site but shall be sequenced so that all operations likely to cause disruption to public traffic shall be undertaken and completed in discrete area before commencement of operations in other areas.
- Works which, by their nature, will create disruption and / or obstructions to vehicular or pedestrian traffic, such as pavement rehabilitation or trench – work shall be programmed to be undertaken in a continuous sequence of events from the initial disruption until the restoration of access without and significant delay between operations.

  The programme submission shall be accompanied by outline traffic management plans in sufficient detail to indicate to the Engineer that the Contractor has considered this aspect the work in his programme. Notwithstanding, acceptance of the Contractor's programme will not in any way relieve of his responsibilities for traffic management under Clause 1.6 of this Specification.
- The Contractor's Programme shall, insofar as it is practicable to do so , take into consideration the commercial interest of individual shopkeepers e.g. operations should not be sequenced so as to disrupt access to individual shops having only one access from the road.

1.13.2 The Contractor's Programme of Works, submitted shall be subject to the approval of the Engineer and of Employer. If the Contractor's programme, in the opinion of the Engineer/Employer has not properly achieved the objectives of the programme, then the Contractor shall be instructed to revise his Programme and the Contractor shall do so forth; for this reason the Contractor is advised to liaise closely with the Engineer during the production of his Programme.

1.13.3 In addition to the Works Programme required the Contractor shall produce individual programmes for each element of the works likely to cause significant disruption to public and vehicular traffic, for the approval of the

Engineer and prior to commencement of the element of the works, clearly showing the sequencing of construction operations is such a manner as to minimize the duration of the disruption.

1.13.4 The Contractor shall note that different work in various parts of site by other contractors may be in progress or may commence during the Contract Period. It will be the Contractor's responsibility to liaise with contractors on adjacent sites in order to ensure the detail progress. The Contractor's Programme may be phased and the Contractor shall make full allowance for the need for a co-operative timing with adjacent contractors.

1.14 Notice Boards

The Contractor shall provide, erect and maintain for the duration of the contract, two steel framed timber notice boards for the works, in location approved by the ASCL and the Engineer's Representative. Notice Boards s h al l have a block board panel size of around 3m as detailed on the Drawings or equally approved. Prior to sign writing, the board shall be painted with two coats of white oil based paint back and front. The board shall be supported above the ground on steel struts painted matt black and fixed into concrete foundations, all to the approval of the Engineer. The sign shall be painted by a skilled sign writer to show the details described in the Contract. The Contractor is responsible for obtaining all necessary approvals for the erection of these notice boards.

The Contractor shall include the following details in the notice board:

- the name of the project and the financing agency
- the name and address of the Employer, the Contractor and the Engineer
- the name and address of the Design and quality control Consultant
- A short description of the project
- The amount of the Contract Price and
- and the Commencement and completion Dates

Under no circumstances, shall sub-contractor's or supplier's name boards be

fixed on hoarding or elsewhere on site.

1.15 Advertising

1.15.1 Neither the Contractor nor any of those in his employment shall give information concerning the works for publication in any form without the written approval of the Engineer.

1.15.2 Neither the Contractor nor any of his sub-contractors shall erect placards or advertisements within the site other than the notice boards permitted under Clause 1.14

1.16 Contractor's offices, yard, stores and plant area

1.16.1 The contractor shall find on his own site for setting up his offices, yard, stores and plant area.

The Contractor's main office shall be used for the purposes of administering the Project but may not be used for the storage of construction materials nor for storage or maintenance of plant and shall not be allowed to become unsightly.

1.16.2 The Contractor's other offices, yard, stores and plant area shall be provided, by the Contractor, at location(s) to the approval of the Employer. The Contractor shall be responsible for all associated expenses including rents, assessments or temporary occupation license fees, establishment, running and maintenance costs, the supply of all services, as well as the obtaining of any appropriate No Objection Certificates.

1.16.3 Within 7 days of the Commencement date of the Contract, the Contractor shall submit, for the approval of the Employer, a drawing showing detailed plans for his offices, yard, stores and plant area, together with all sanitary arrangements, and for the supply of water a n d electricity. Until the Employer has given his approval in writing, no construction of any of the Contractor's buildings, fences, services or roads shall commence. The area shall be fenced in accordance with ASCL regulations.

1.16.4 The Contractor shall not be permitted to erect temporary building or structures elsewhere without the specific permission in writing of the Employer,

including approval of the dimensions and specifications of such buildings or structures and their location.

1.16.5 The Contractor shall take all steps necessary as directed by the Employer to minimize or eliminate dust, noise or any other nuisance, which may occur. Plant emitting dust, smoke, excessive noise or other nuisance shall not be permitted to be sited at any location which shall cause nuisance to any building or other installation, whether complete or under construction, site offices, camps, or other similar buildings.

1.16.6 Under no circumstances shall overnight accommodation be permitted on site except for Site watchman in carrying out their duties.

1.16.7 Throughout the period of the Contract, the Contractor shall maintain the area of his operation within the limits of the site in a clean, tidy and safe condition by arranging materials and the like in an orderly manner. All rubbish, debris, waste materials and the like shall be systematically cleared from the site as it accumulates.

1.16.8 The Contractor shall satisfy himself as to the means of access to the site and other relative items affecting him, his sub-contractors and suppliers.

1.16.9 Upon completion of the Contract, or, in the case of facilities required by the Contractor during the Period of Maintenance, on completion of the period of maintenance the Contractor shall remove all buildings and other facilities from the site including all foundations and services, clean and level the site and restore the ground to its original condition.

1.2 SITE PREPARATION

1.2.1 General

The Contractor shall maintain close liaison with all Service Authorities and the Municipal Council Authorities and shall obtain their approval prior to removal of any service installation. Where Service Authority installations are to be removed, they shall be removed after the existing facilities have been relocated and commissioned or after they have been redundant and after any electrical supply has been made safe by the Authority or the

Contractor whichever is appropriate. It is deemed that except for the items mentioned in this bill, costs of all other works in connection with site clearance are included in various pay items of other bills. If up stand kerb and/or flush kerbs to be removed are part of an asphaltic pavement to be removed, then, no separate payment will be considered for removal of kerbs.

1.2.2 Removal of Trees

a) General

1. This item consists of the removal of trees of any girth, their disposal as instructed by the Employer and Engineer and the backfilling of the hole left after uprooting the tree.
2. If any tree is conflicting with the road works then Contractor shall inform the Consultant.

The Contractor shall remove the trees only after obtaining the necessary approval from competent authority through the Employer.

b) Measurement and Payment

Payment under this item shall be made per unit of trees removed. The unit price shall constitute full compensation for the removal, hauling, disposing off of the tree of any girth as described herein and as directed by the Engineer and for all material, labour equipment, supplies and incidentals necessary to complete the Work. No payment shall be made for the removal of bushes, stumps, roots etc., whose cost is considered as included in other pay items of the bill.

1.2.3 Removal and Reinstallation of Traffic Signs

The Contractor shall carefully remove the traffic signs and posts and or any similar directional signs located along the alignment by breaking out foundations/base/backing, disposal of all debris to Contractor's tip, backfilling of voids with suitable material in an approved manner, taking item to a store until required for re-erection, or delivery to the Municipal Stores or elsewhere as directed. The Contractor shall reinstate the traffic sign with foundation after completing the pipe laying and backfilling. Payment for the removal and

reinstatement of traffic signs is deemed to be included in the quotable items.

a) Measurement and Payment

Payment under this Item shall be made per linear metre of fence removed. The unit price shall constitute full compensation for the works described herein and as directed by the Engineer and for all material, labour equipment, supplies and incidentals necessary to complete the Works.

1.2.4 Removal of Concrete Structures

a) General

The Contractor shall remove wholly or in part and satisfactorily dispose of all structures (manhole, slabs, walls, small building or any other concrete structure) as indicated on the Drawings / obstructing the pipeline alignment or as directed by the Engineer, and which are not specifically described under a separate Clause of this Specification. All material removed and all structures demolished shall be removed from the Work Site, hauled away and disposed off in approved disposal area and as approved by the Engineer. The voids or depression which are the result of the demolition of structures shall be backfilled with borrow material as approved by the Engineer. Backfilling material shall be placed in horizontal layers of over 15cm in depth and compacted to not less than 98%.

b) Measurement and Payment

Payment for the removal and disposal of all structures and related obstructions as described above will be at the cubic metre rate included in the Bill of Quantities which shall include all labour and equipment to demolish, remove the obstructions as building materials, concrete, debris etc., loading, hauling irrespective of haulage distance, disposing off all materials removed, and backfilling with borrow material and depression of voids, as indicated on the Drawing, specified herein and as directed by the Engineer.

TECHNICAL SPECIFICATIONS

CHAPTER 2: MATERIALS

All materials required for the works shall be procured and supplied by the contractor himself. The materials shall be of good quality and conforming to relevant BIS .The materials that are classified for ISI marking should be supplied with ISI marking only.

2.1 Cement

The entire quantity of cement and steel required for the work will be procured by the contractor. The Contractor is responsible for all transport and storage of the materials and shall bear all related cost. The Employer shall be entitled at any reasonable time to examine the cement and steel supplied by the contractor.

The cement procured by the contractor shall comply with the requirements of IS:269/1976 with the latest revision thereof for ordinary port land cement and IS:8112/1989 with the latest revision thereof for 43 grade ordinary Portland cement. It shall be of the best normal setting quality unless specially rapid hardening or quick setting quality if expressly instructed by the Engineer to be supplied. Each bag shall bear ISI Certification mark and as per specification All cement shall be procured in bags and shall be stored in a dry place for which the contractor shall be responsible. Consignment of bagged cement shall be property stacked in a manner, which will permit easy access for inspection and definite identification. Cement shall be used in approximately in the chronological order in which it is received, but cement that has been stored for a period longer than 4 months from the date of initial sampling shall not be used unless it has been retested at the expenses of the contractor and passed by the Engineer in charge as good quality on the retest. Cement aged more than 180 days from the date of initial sampling shall be rejected.

Cement, which has become caked or perished, shall on no account be used on the works and shall be rejected. Although the Engineer may have passed any consignment if he finds that any deterioration in the quality thereon has

taken place.

2.2 Steel

The steel bars shall comply with the requirements set forth in the IS:432 Part 1, IS:1139, IS:1786 as the case may be with the latest revision thereof and the test as described for ultimate tensile strength, bond test and elongation tests.

All reinforcing steel shall be clean and free from oil, grease, loose scales or rust or other coatings of any character which would reduce or destroy the band. Each band containing the bars shall bear the ISI Certification marks.

The Cement/steel shall be tested in nearby laboratories of Polytechnic or Engineering College by the Employer. Two samples should be taken by the Engineer in charge in the presence of the contractor or his authorized representatives or the technical personnel employed by the Contractor as in the Agreement. The contractor shall without extra cost, provide samples and cooperate in the testing of the cement/steel. One sample shall be got tested and the other sample shall be retained by making clear identification in the sample by the Engineer in charge so as to identify at a later date. The cost of such test shall be borne by the contractor.

A record of the quantity of cement/steel procured with the name of dealer, bill number and date shall be maintained by the contractor. This should be produced for examination by the Engineer in charge at any time. The age of the cement shall be reckoned from the date of manufacture and it shall be verified by the Engineer in charge.

The rejected consignment of cement and steel should be removed from the site within two days.

2.3 Aggregates

2.3.1 Sand

The course and fine aggregates for concrete shall conform to IS:383/1970 and as specified in the relevant clauses of IS:456/2000. Other aggregates free from deleterious materials shall be used at the concurrence and approval of the Engineer

after sufficient tests have been carried out at the contractors cost.

The maximum quantities of deleterious materials in the aggregates, as determined in accordance with IS: 2386/ (Part II/1963 shall not exceed the limits given in table 1 of IS:383. Unless otherwise specified all course aggregate in RCC shall be graded aggregate of 20mm nominal size.

2.4 Water required for Construction

The water used in the construction shall be of potable quality and shall be tested at the contractor's cost. The contractor has to make his own arrangements at his cost for water required for construction, testing, filling, etc., either from local bodies or from elsewhere by paying the charges directly and arranging tanker etc., as per necessity. No claim for extra payment on account of non-availability of water nearb y extra lead for bringing water shall be entertained. All required the contractor at his cost should make piping arrangements and pumping if required for water. Water for mortar mixing and curing of concrete shall be free from harmful mater or other substances that may be deleterious to concrete or steel and taken from a source approved by the Engineer. Ground water for mixing and curing shall conform to the provisions in the class 4.3 of IS: 456/2000.

2.5 Form work and Centering

Steel /wooden form centering shall be used. If wooden formwork is used, it shall consist of planks not less than 40mm thick and strong props. This shall be provided complying with clause 10 of IS: 456/1978 . The timber for form works shall be best hard wood and got approved by the Engineer in charge. This shall be deemed to be included in the items of contract even otherwise specified.

2.6 Separator (Cover Block)

For bottom cover of beams, slabs etc., separators of pre-cast cement m or t ar blocks of suitable size with wire embedment as directed shall be used and tied to the reinforcement. Between layers of reinforcements, separators consisting of pieces of bars of suitable diameter shall be used. The required cover shall be provided as per clause 24-4 of IS: 456/1978

2.7 Pipes, Specials and Valves.

2.7.1 General

All types of pipes required for the works should be of good quality conforming to relevant BIS and should be procured from reputed manufacturer or his authorized dealer. Each pipe should bear the trade mark of the manufacturer, the nominal diameter, class, weight, batch number and the last two digits of the year of manufacture suitably and legibly marked on it. The Engineer shall have the right to conduct any test to ascertain the quality of the pipes supplied by the contractor. The contractor should make all necessary arrangements for testing the pipes. All the charges and expenses towards the testing shall be borne by the contractor. The materials, which are classified for ISI marking, should be supplied with ISI marking only.

If on examination of any sample from any portion of the supply, the material is found to be substandard and not fully in accordance with the relevant specification, the entire consignment shall be rejected. In case of doubt whether the materials confirm to the specification or not, the decision of the Executive Engineer shall be final.

2.7.2 PVC Pipes

- The unplasticised PVC rigid pipes shall strictly conform to IS: 4985/1988 and as amended from time to time and shall carry ISI marking in every pipe.
- The contractor should procure the PVC rigid pipes from a reputed manufacturer.
- The contractor should furnish the test certificate issued by the manufacturer.
- The manufacturer's test certificate and third party inspection certificate should be produced by the contractor for the pipes used in the works.
- In addition to third party inspection, wherever felt necessary, the Engineer shall have the power to test the PVC pipes for its quality such as specific gravity, impact strength, internal hydraulic pressure test, diameter, thickness etc, in authorized laboratory.
- The PVC pipes joints shall be with solvent cement of good quality,

conforming to IS: 14182/1994.

- The Engineer in charge, shall verify, in addition to the test certificate, whether the pipes are as per BIS, by visual examination, diameter, weight, wall thickness, flexibility, Colour etc.
- All the PVC specials required for use in conjunction with PVC pipes, should be got approved by the Engineer-in-charge.

2.7.3 PVC Specials & Fittings

The Specials and fittings should be in conformity to the relevant BIS specification.

2.7.4 MS pipes

The MS pipes shall be of spirally welded, manufactured conforming to IS 5504 -1997 with mild steel HR coils conforming to IS 10748 grade 3

Following tolerances are applicable even if found stringent than theapplicable codes

Wall thickness	: As per IS 3589
Ovality	: As per IS 3589
Straightness	: 2 mm per mtr of pipe

Pressure rating:

Pipes shall be suitable for an internal maximum working pressure as per IS 3589.

Length of pipe:

Pipes shall be supplied in 12 to 12.5 m length.

Pipe Ends:

Pipe ends shall be beveled and end faces shall be at right angle to pipe axis. Beveling shall be done as per standards suitable for but-welding joints.

Internal lining:

Pipes shall be lined internally with cement mortar coat as per IS 3589 -2001 Hazen William coefficient of friction “C” should not be less than 150. Thickness of lining

shall be 12.5 mm. The outer coating shall be 25 mm thick cement mortar guniting for the underground pipes and enamel coating for above ground level piping conforming to relevant BIS/BSS.

Pipe fittings:

Pipe fittings shall be manufactured in accordance with IS 3589, and lined internally.

Welding Procedure:

The welding procedure shall be as follows:

- Submerged arc welding in accordance with IS 4353 (SAW)
- For submerged arc welding, alloying is not permitted via the flux.

Welding Electrodes and Consumables

All welding electrodes/consumables shall comply with IS 814, IS 3613, IS 6419 and IS 7280.The electrode/consumable chemistry shall meet the requirements of the base material and shall be selected such that the deposited weld metal exhibits mechanical properties equal to or in excess of the base material. All welding electrodes/consumables shall, as a minimum, be stored and used in accordance with the manufacturer's recommendations.

Non-destructive Examination (NDE)

All NDE shall be performed by a qualified personnel to recognized National or International Standard (E.g. PCN, ASNI Level 11, etc.).A document listing the relevant NDE procedures, methods and technique for the item, shall be submitted to us for review. Any subsequent revision to the document shall be approved by the Purchaser. Purchaser have right to review certification of NDE personnel at you works.

Pipe Marking

All pipes shall be marked with unique serial number. The number shall be hard stamped in letters or numbers not less than 15 mm high on the external face 200 mm from the pipe end and clearly stenciled in Red or White paint in letters or numbers not less than 200 mm high on the internal and external face of the pipe

close to the pipe end, Diameter and length of pipe, Date of Manufacture, Manufacture's name, Identification mark/number as certified by our representative stationed at suppliers premises.

The pipe thickness shall be designed to withstand Maximum working pressure plus the surge pressure. Field test pressure i.e. 1.5 times the working pressures Collapse pressure, Min. thickness for handling.

***Qu*ality Assurance**

During the whole process of manufacturing, department's representative shall be present to supervise the Quality Assurance process and witness the test performed.

Testing At Work Site

Ten percent of the field joints shall be tested radio graphically (Samples at random) as per IS: 4853, in case of failure 20% field joints shall be selected. In case of second failure, 100% field joints shall be radio graphed. Five percent of the field joints shall be tested ultrasonic test as per IS: 4260. The welding of pipes in the field should comply with IS 816-1965 and electrode used should comply with IS 814-1967. Welded joints shall be tested in accordance with procedures laid down in IS 3600-1966 and one test specimen shall be taken from at least one field joint out of 10.

***F*ield Hydraulic Test**

After erection at site and after the concrete anchor/ thrust blocks have been constructed, the pipe section shall be put to sectional testing. The pipe line shall be tested for site test pressure of 1.5 times the maximum working pressure. Before start of the testing the pipe shall be kept filled at low pressures for minimum 24 hours to allow absorption of water by lining in case testing is allowed after lining by EIC. In any case the field welded joints shall be lined only after successful testing of the section. Pressure building shall be gradual at a rate of 0.1 N/mm2 per minute The duration of the test shall be 24 hours after attaining full pressure. If a drop in pressure occurs, the quantity of water added in order to re-establish the test pressure should be carefully measured. This should not exceed 0.1 liter/ mm of pipe diameter per km of pipeline per day for each 30 m head of pressure applied.

Additional water will be pumped in the pipeline whenever drop in pressure is 10% of test pressure or 0.5 kg/cm2, whichever is less or continuously maintaining the test pressure with required system.

The test will be declared successful only if the quantity of water thus added is within permissible limit, as prescribed above. Length of a section for testing shall not be more than 1.0 km. Field Joints shall be kept open during testing. Adequate anchorages shall be provided to avoid any movement of pipes. If any joint leaks during testing, the section shall be put to retest after repair of the joint by contractor. The contractor shall provide and maintain all requisite facilities, instruments, for the field testing of the material. All pipes, specials, valves and civil works shall be replaced by the contractor free of cost if damaged during testing. All pipes, specials, valves and Civil Works shall be replaced by the contractor free of cost if damaged during testing.

Failure to pass the test

All pipes or joints which are proved to be in any way defective shall be replaced or remade and re-tested as often as may be necessary until a satisfactory test shall have been obtained. Any work which fails or is proved by test to be unsatisfactory in any way shall be redone by the Contractor.

Disinfection of mains

Upon completion of a newly laid main or when repairs to existing pipes are made, the main shall be disinfected by heavily chlorinated water. After final flushing and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriological quality and shall show the absence of coliform organisms.

Fill, Backfilling and Site Grading

Trenches shall be backfilled with approved selected excavated material only after the successful testing of the pipeline. The tamping around the pipe shall be done by hand or other hand operated mechanical means. The water content of the soil shall be as near the optimum moisture content as possible. Filling of the trench shall be carried out simultaneously on both sides of the pipe in such a manner that unequal

pressure does not occur. Each layer shall be consolidated by watering, ramming, care being taken to avoid damage to the pipeline.

Material

To the extent available, selected surplus soil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps 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 the voids and the mixture used for filling.

If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Employer. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Top soil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Employer. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

Sand Filling

Where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the Employer has inspected and approved the fill.

***R*efilling of trenches**

On completion of the pipe laying operations in any section, for a length of about 100m and while further work is still in progress, refilling of trenches shall be started by the Contractor with a view of restricting the length of open trenches. Pipe laying shall closely follow the progress of Trench Excavation and the Contractor shall not permit unreasonably excessive lengths of trench excavation to remain open while awaiting testing of the pipeline. If the Employer considers that the

Contractor is not complying with any of the foregoing requirements, he may prohibit further trench excavation until he is satisfied with the progress of laying and testing of pipes and refilling of trenches. Only soft earth and murrum of good quality free from stones boulders, roots, vegetation etc., shall be utilized after the lumps are broken for filling in around the pipes for at least 30cm all around for pipes.

Filling shall be done in layers not exceeding 150mm and compacted to 70 to 80% of max. dry density percent of the maximum dry density as per part VII of IS:2720. The excavated material nearest to the trench shall be used first. Care shall be taken during backfilling, not to injure or disturb the pipes, joints or coating. Filling shall be carried out simultaneously on both sides of the pipes so that unequal pressure does not occur. Walking or working on the completed pipeline unless the trench has been filled to height of at least 30cm over the top of the pipe except as may be necessary for tamping etc., during backfilling work.

The remaining portion of the trench may be filled in with a mixture of hard and soft material free from boulders and clods of earth larger than 150mm in size if sufficient quantity of good earth and murrum are not available. Filling in shall be done in layers not exceeding 225mm in thickness accompanied by adequate, ramming etc., so as to be compacted to 70 to 80% of the maximum dry density as per part VII of IS:2720. Water contents of the soil shall be as near the optimum moisture content as possible. The trench shall be refilled so as to build up to the original ground level, keeping due allowance for subsequent settlement likely to take place.

To prevent buckling of pipe shell of diameters 1200mm and above, pipes shall be strutted from inside while the work of refilling is in progress, for which no separate payment shall be made separately.

Strutting shall be done by means of strong spiders having at least 6 arms which shall be sufficiently stiff to resist all deformation. Spiders shall be provided at a maximum interval of 2m.

The Employer shall, at all times, have powers to decide which portion of the excavated materials shall be for filling and in which portion of the site and in what manner it shall be so used.

If any material remains as surplus it shall be disposed of as directed by the Employer, which includes loading, unloading, transporting and spreading as directed within a distance of 15 km. If the Contractor fails to remove the earth from site within 7 days after the period specified in a written notice, the Employer may arrange to carry out such work at the Contractor's risk and cost or may impose such fine for such omission as he may deem fit. Particular care shall be taken to keep the trench dry during the entire refilling operation.

If suitable material for refilling is not available for excavation the Contractor shall bring earth, murum of approved quality as directed by the Employer.

No mechanical plant other than approved compacting equipment shall run over or operate within the trench until backfilling has reached its final level or the approval of the Employer has been obtained.

In case of excavation of trenches in rock, the filling up to a level 30 cm above the top of the pipe shall be done with fine materials such as earth, murum, etc. The filling up to the level of the centre line of the pipe shall be done by hand compaction in layers not exceeding 8 cm whereas the filling above the centre line of the pipe shall be done by hand compaction or approved means in layers not exceeding 15 cm. The filling from a level 30 cm above the top of the pipe to the top of the trench shall be done by hand or other approved mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.

Filling of the trenches shall be carried out simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.

Subsidence in filling: Should any subsidence take place either in the filling of the trenches or near about it during the maintenance period of 12 months from the completion of the Contract Works, the Contractor shall make good the same at his own cost or the Employer may without notice to the Contractor, make good the

same in any way and with any material that he may think proper, at the expense of the Contractor. The Employer may also, if he anticipates occurrence of any subsidence, employ persons to give him timely notice of the necessity of making good the same, and the expenses on this account shall be charged to the Contractor.

2.7.5 GI Specials and Fittings - Deleted

2.7.6 AC pipes - Deleted

2.7.7 AC Specials and Fittings - Deleted

2.7.8 CI pipes

- The Cast Iron pipes shall strictly conform to IS: 1536/2001 and as amended from time to time and shall carry ISI marking in every pipe.
- The contractor should procure the CI Pipes from a reputed manufacturer.
- The contractor should furnish the test certificate issued by the manufacturer.
- The manufacturer's test certificate and third party inspection certificate should be produced by the contractor for the pipes used in the works.
- In addition to third party inspection, wherever felt necessary, the Engineer shall have the power to test the CI pipes for its quality such as specific gravity, impact strength internal hydraulic pressure test, diameter, thickness etc, in authorized laboratory.
- The CI pipe joints shall be push-on joint for Spigot & Socket pipes conforming to IS:1538 & IS:13382.
- The Engineer in charge, shall verify, in addition to the test certificate, whether the pipes are as per BIS, by visual examination, diameter, weight, wall thickness, flexibility, Colour etc.
- All the CI specials required for use in conjunction with CI pipes, should be got approved by the Engineer-in-charge.

2.7.9 CI Specials and Fittings

The Specials and fittings should be in conformity to the relevant BIS specification.

2.7.10 DI pipes

- The Ductile Iron pipes shall strictly conform to IS: 8329/1994 and as amended from time to time and shall carry ISI marking in every pipe.
- The contractor should procure the DI Pipes from a reputed manufacturer.
- The contractor should furnish the test certificate issued by the manufacturer.
- The manufacturer's test certificate and third party inspection certificate should be produced by the contractor for the pipes used in the works.
- In addition to third party inspection, wherever felt necessary, the Engineer shall have the power to test the DI pipes for its quality such as specific gravity, impact strength internal hydraulic pressure test, diameter, thickness etc, in authorized laboratory.
- The DI pipe joints shall be push-on joint for Spigot & Socket pipes conforming to IS: 9523.
- The Engineer in charge, shall verify, in addition to the test certificate, whether the pipes are as per BIS, by visual examination, diameter, weight, wall thickness, flexibility, Colour etc.,
- All the DI specials required for use in conjunction with DI pipes, should be got approved by the Engineer-in-charge.

2.7.11 DI Specials and Fittings

The Specials and fittings should be in conformity to the relevant BIS specification.

2.7.12 HDPE pipes

- The HDPE pipes shall strictly conform to IS:4984/1995 and as amended from time to time and shall carry ISI marking in every pipe.
- The contractor should procure the HDPE Pipes from a reputed manufacturer.

- The contractor should furnish the test certificate issued by the manufacturer.
- The manufacturer's test certificate and third party inspection certificate should be produced by the contractor for the pipes used in the works.
- In addition to third party inspection, wherever felt necessary, the Engineer shall have the power to test the HDPE pipes for its quality such as specific gravity, impact strength internal hydraulic pressure test, diameter, thickness etc, in authorized laboratory.
- The Engineer in charge, shall verify, in addition to the test certificate, whether the pipes are as per BIS, by visual examination, diameter, weight, wall thickness, flexibility, Colour etc.,
- All the HDPE specials required for use in the conjunction with HDPE pipes, should be got approved by the Engineer-in-charge.
- All HDPE joints and specials shall be of electro fusion coupler joints

2.7.13 HDPE Specials and Fittings

The Specials and fittings should be of coupler joints in conformity to the relevant BIS specification.

Testing of Pipes

The manufacturer test certificate third party inspection certificate should be produced by the contractor for the pipes used in the work. The Engineer shall have the right to test the pipes, wherever felt necessary for its quality. All testing charges should be borne by the contractor.

Testing of materials to be used in works, for the quality of finished items shall generally be done by the contractor at his own cost in the laboratory approved by the Employer by providing requisite materials transport of test specimen and other assistance required thereof.

CHAPTER 3
TECHNICAL SPECIFICATIONS

General

3.1 Well Steining-Deleted

3.2 Chambers and Manholes

Valve chambers, air valve chambers, flow meter chambers, manholes and similar structures shall be built into the pipeline where shown in the Drawings and shall be constructed in accordance with the Drawing. Valve chambers in which pipes are anchored shall be treated as specified for anchor and thrust blocks. If undisturbed ground has not been maintained next to a thrust-bearing surface, the gap shall be backfilled with mass concrete

Brick works

Bricks used for construction of valve chambers shall conform to the relevant Indian Standards. They shall be sound, hard, homogeneous in texture, well burnt in kiln without being vitrified, table moulded, deep rod, cherry or copper coloured, of regular shape and size and shall have sharp and square and parallel faces. The bricks shall be free from pores, chips, flaws or humps of any kind. Bricks containing unground particles and/or which absorb water more than 1/6th of their weight when soaked in water for twenty-four hours shall be rejected. Over burnt or under burnt bricks shall be liable to rejection. The bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 35 Kg/sq.cm. The class and quality requirements of bricks shall be as laid down in IS : 1077.

The size of the brick shall be 23.0 x 11.5 x 7.5 or unless otherwise specified; but tolerance upto (+) 3 mm. in each direction shall be permitted. Only full size brick shall be used for masonry work. Brick bats shall be used only with the permission of the Engineer-in-charge to make up required wall length or for bonding. Sample bricks shall be submitted to the Engineer-in-charge for approval and bricks supplied shall conform to approved samples. If demanded by the Engineer-in-charge, brick sample shall be got tested as per IS: 3495 by Contractor at no extra cost to the client. The bricks rejected by the Engineer shall be removed from the site of works within 24 hours.

Pipe entering or leaving manhole

Whenever a pipe enters or leaves a manhole, bricks on edge must be cut to a proper form

and laid around the upper end of the pipe so as to form an arch. All around the pipes, there shall be a joint of cement mortar (1:2) 13 mm thick between it and the bricks.

Manhole steps. Except where otherwise specified or shown on the Drawings, manhole step shall be of malleable cast iron in accordance with IS 5455. The shape and dimensions shall be to the figure of that BS.

Cast iron frame and cover

The cast iron frame and cover shall be of grey cast iron as per IS : 1728. The general requirements for casting and coating of CI frame and cover shall be as specified for CI steps in Clause. The locking device for cover shall be not less than 4 mm. The locking device for cover shall be provided. The CI covers for load test shall be selected at one for every lot of fifty or part thereof for each type and size manufactured and as directed by the Engineer-in-charge. The frame shall be fixed in cement concrete of M15 grade all round and finished with neat cement. The manhole frame shall have clear opening and shall weigh including cover shall be as per the bill of quantity.

3.3 Earth work

3.3.1 Conveyance

The excavated earth, blasted rubble etc., shall be conveyed and deposited in the departmental lands within 150m of work site and as directed by the Engineer in charge.

3.3.2 Stacking

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

3.3.3 Disposal of surplus Earth

The excavated soil, which is surplus to that, required for filling and after allowing for settlement will have to be removed, spread and sectioned at places shown on the site during excavation for purpose of widening or leveling. It is to be understood that no

extra payment, will be made for this and the unit rate for trench work of excavation and refilling shall include the cost removal of surplus earth to disposal site approved by the Engineer in charge, its spreading and sectioning at the bidder's expense.

3.3.4 Shoring, Strutting and Bailing out water

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

3.4 Concrete

3.4.1 Specification

The concrete mix shall be in specified proportions satisfying the maximum aggregate size, water cement ratio and required cube strength and workability as per IS 456-2000. Such concrete must be adequately vibrated to form solid mass without voids. The entire concreting works should be done only with the prior approval and in the presence of Engineer-in-charge.

3.4.2 Fabrication Steel Reinforcement

Supplying, fabricating and placing in position MS/RTS Steel reinforcements for all RCC Works as per design/drawing etc. as per standard specifications.

3.4.3 Mixing Concrete

The concrete shall be proportioned as far as cement and aggregates are considered by volume. The amount of water required being measured either by weight or volume the adjustments must be made to frequent intervals at the discretion of the Engineer or his assistant to account for the moisture content of the aggregates. The mixing operation shall be performed only in a mechanical concrete mixer and shall continue until the whole batch of uniform consistency and colour. The mixing of concrete shall be done in accordance with clause 8 and 9 of IS:456-2000.

3.4.4 Transporting, Placing and Compacting Concrete.

3.4.4.1 Transportation, placing and compaction of concrete mix by mechanical vibrators shall be done in accordance with clause 12 of IS: 456-2000. It is imperative that all concreting operations be done rapidly and efficiently with minimum rehandling and adequate manpower shall therefore be employed to ensure this.

3.4.4.2 The forms shall be first cleaned and moistened before placing concrete.

3.4.4.3 The mix should not be dropped from such a height as it may cause segregation and air entrainment. When the mix is placed in position, no further water shall be added to provided easier workability.

3.4.4.4 No concrete mix shall be used for the work if it has been left for a period exceeding its initial setting time before being deposited and vibrated into its final position in the member.

3.4.4.5 While one concrete is being placed in position it shall be immediately spread and ramped sufficiently and suitable to attain dense and complete filling of all spaces between and around the reinforcement and in to the corners of form work for ensuring a solid mass entirely free from voids.

3.4.4.6 Construction joints required in any of the structural members shall be provided generally complying with clause 12.4 of IS: 456-2000 and as directed by the Engineer-in-charge. The efficiency of tempering and consolidation will be judged by complete absence of air pockets, voids and honey combing after removal of form works.

3.3 Curing

3.3.1 Curing shall be done to avoid excess shrinkage or harmful effort to the members generally complying with clause 12.5 of IS:456-2000.

3.3.2 The method adopted shall be effective and any special method used must be approved by the Engineer and be subject to complete supervision.

3.3.3 Any deficiency in concreting such as cracking, excessive honey combing exposure of reinforcement or other fault which entail replacement of the defective part by fresh concrete without hampering the structural safety and

architectural concept, all at the cost of contractor.

3.4 Removal of Form Work

3.4.1 Removal of form work shall be done as per directed by the Engineer in such a manner that no damage is caused to the structures. The striping time shall not be less than that indicated in clause 10.3 of IS:456-2000.

3.5 Testing of Concrete

3.5.1 During the course of construction works, preparation of test specimens, curing and casting of concrete shall be done in accordance with IS:1199 and IS:516 to ascertain the strength requirements and acceptance criteria indicated in IS:456-2000. The contractor shall provide all apparatus, labour and arrange to test the cubes at his own cost at the test laboratory decided by the Engineer.

3.5.2 In addition to the above tests, any other test which may if desired by the Engineer-in-charge be carried out from time to time as per relevant specifications at the cost of contractor. In case the concrete does not meet the strength required, all corrective measures shall be taken at once at the contractor's cost.

3.5.3 The inspection and testing of structures shall be done in accordance with clause 16 of IS 456/2000.

3.6 Masonry

3.6.1 All masonry works such as Random Rubble/Brick work / Partition wall in Brick Work must be done as per Specification and Bid schedule specification.

3.6.2 Dismantling:

a) Dismantling brick work in Cement Mortar and clearing away the debris and carefully stacking materials useful for reuse for any thickness of wall etc. complete as directed.

b) Dismantling brick work in Cement Mortar and depositing the debris in low lying areas and leveling the debris as directed.

c) Brick on edge are confirming to standard specification

3.7 Plastering

3.7.1 Plastering would be 10mm, 12mm & 20mm thick cement plaster either plain or waterproof as may be specified.

3.7.2 The plastering items shall be executed in thickness and cement mortar of proportion as detailed in respective items in the BOQ. Similarly the plastering shall be either ordinary or waterproof as specified in respective item in the BOQ.

3.7.3 In case of water proof plaster standard approved water proofing compound shall be mixed in cement mortar in required percentage as directed and then the plaster is applied.

3.7.4 The finishing shall be either smooth or rough as may be directed by the Engineer unless otherwise specifically mentioned in the BOQ.

3.7.5 Neat finish wherever directed by the Engineer shall be done at no extra cost.

3.7.6 Curing and watering shall be one as directed and plaster shall be in alignment and level. Any substandard work is liable to be rejected and shall have to be re-done at contractors cost. Sand to be used shall be of approved quality only. Cost of all scaffolding shall be included in the rates quoted in the BOQ.

3.8 Flooring & Base Concrete

3.8.1 100mm thick cement concrete 1:4:8 / 1:5:10 shall be provided for flooring as base concrete.

The size of metal shall not be more than 40mm and it shall be properly graded. A thin coat of very fine plaster shall be provided on top to give a smooth finish.

The marking of false grooves to surfaces as directed includes the cost of labour. Floor finish shall be of:

1. Granolithic Flooring
2. Ceramic tiles
3. Cuddappah Slab

4. Granite Stone

5. Polished Granite

3.9 Doors and Windows.

3.9.1 Sizes shown on drawings are clear openings in masonry and not the shutter's size. These sizes shown on drawings are, therefore, inclusive of required frame sizes and doors windows, etc., and shall be manufactured, accordingly. If sizes bigger than shown in drawings are manufactured, as instructed specifically in writing they shall be measured and paid for accordingly.

3.9.2 The work shall be executed as per the size of frame thickness of shutter type viz. Plain planked paneled, glazed etc., and fixture, etc., as described in tender item. Iron bars for windows and ventilators are to be provided if specifically mentioned in the tender item at Contractor's cost. .

3.9.3 The design of shutters and quality of wood shall be got approved form the Engineer-in-charge before manufacture. The CW/TW to be used for wood work shall be uniform in substance straight, free from large deed knots, flows flanks. The joints shall be perfect.

3.9.4 Part of wood embedded in masonry shall be painted with the tar. The frames of doors, windows, ventilators, etc., shall have proper hold -fasts embedded in masonry.

3.9.5. Whenever iron bar is to be provided as per tender item the rate thereof is included in tender item. The painting shall be done as prescribed in tender item. No painting, however, shall be permitted till the wood work is approved by the Engineer-in-charge.

3.9.6 Any substandard work not conforming to the specifications are liable to be out rightly rejected and Executive Engineer's decision in such case shall be final and binding on the Contractor.

3.9.7 The mode of measurement shall be on units as mentioned in BOQ.

3.10 White Washing, Colour Washing & Painting.

3.10.1 The work shall be carried out as per the description of the tender item and as directed by Engineer-in-charge. It shall be white washing, distempering and/or

cement painting. Shade and make shall be as directed by the Engineer and for decorative purpose. Engineer may ask for different shades to be provided for different components or different parts of the same component which the Contractor shall have to do within his tendered rate only at no extra cost to the Employer. Cost of priming coat as directed, scaffolding etc. shall be included in the tender rate. In general, all items of works must be done as per UP PWD SOR specifications and bid schedule specifications.

Painting two coats with approved cement paint over one coat of cement primer on the new plastered wall surface, ceiling and other new surface and including cleaning, preparing the surface and curing etc. complete complying with standard specifications.

TECHNICAL SPECIFICATIONS
CHAPTER 4

WATER SUPPLY WORKS

4.0 General

4.1 The earthwork for the pipe laying work shall generally conform to the details given below.

Sl. No.	Size of pipe in mm	Depth of Excavation (cm)	Width of trench at bottom (cm)
1	For other pipes up to	1	0.60
2	For other pipes 150	1	0.75
3	For other pipes 200	1	0.80
4	For other pipes 250	1	0.80
5	For other pipes 300	1	0.80
6	For other pipes 350	1	0.90

4.2.1 Wherever necessary, sand cushioning for the bed shall be given as per IS Standards and as directed by the Engineer in charge. The pipe should be laid true to the alignment line and grade wherever necessary, appropriate bends should be used. The pipes laid must be jointed properly and carefully by using approved type of jointing materials.

4.2.2 After the pipes are laid and jointed, the pipelines are to be subjected to hydraulic pressure test as detailed in the relevant BIS Specification for various types as indicated below.

a)	Cast iron Pressure Pipes	:	Clause 6 of lS 3114/1985
b)	PVC Pressure Pipes	:	Clause of IS 7634/1975
c)	DI Pressure Pipes	:	Clause of IS 7634/1975

In portion of pipeline, where the pipes have developed cracks or sweating, such pipes with jointing materials shall be removed and re laid with new pipes at the contractor's cost and the pipe line shall be re tested to the

entire satisfaction of the Engineer in charge. No extra payment will be made on this account. The bidder has to make his own arrangements for the procurement of the required equipment for testing of pipes which shall be subjected to such test as the Engineer-in-charge deems fit to ensure the accuracy of the gauge.

Refilling shall be done with proper compaction with excavated earth. In no case the contractor shall be allowed to refill the trenches in hard excavated portion to be refilled by the boulders or excavated stuffs. This portion of trench shall be refilled by the soft strata from excavated stuff from distance place at no extra cost. The refilling shall be done in 15cm thick layers duly watering and compacting each layer. The refilling may be done up to a height of 20 to 30cm than the natural ground level to allow that sinking afterwards. If the refilling gets sunk below the natural ground level at any time till the completion of the work, the contractor at his cost should make good the refilling to the required level as may be directed by the Engineer in charge

4.2.3 Case of pipe trenches, the Engineer may reduce the width of trench wherever a hard strata is met with, if he feels adequate and just sufficient to lay the pipe line in order to reduce the hard rock quantity. In such case the contractor will be paid as per the actual measurement.

4.2.4 If the work is in a residential area, the contractor should carry out the excavation carefully to avoid collapse of any structure.

4.2.5 Valves shall be provided with valve pits with proper cover to bear the loads coming on it as per bid documents and departmental drawings and specification Public fountains, Fire hydrants shall be provided as per type design and specification.

4.2.6 Adequate protective measures should be taken against surge pressure. Zero velocity valves and air cushion valves should be provided at the appropriate places Thrust blocks and anchor blocks should be provided at all bends and appropriate places.

4.2.7 Water required for testing the pipeline shall be arranged by the contractor at his

cost.

4.3 PVC PIPES - Deleted.

4.3.1 Laying and Jointing Pipes – Deleted.

4.4 ASBESTOS CEMENT PIPES - Deleted

4.5 LAYING OF CAST IRON PIPES - Deleted.

4.6 LAYING AND JOINTING OF DI PIPES

4.6.1 TRANSPORTATION

The transportation of materials to work site and stacking shall be done in such a manner as to cause minimum inconvenience to the traffic and other construction works. Pipes shall be protected during handling against impact, shocks and free fall to avoid cracks and damage. Pipes shall be loaded for transportation is in such a way that they are secured and no movement can take place on the vehicle during transit. The same care shall be taken if pipes are transferred from one vehicle to another, however short the journey may be. The cement mortar lining of pipes that are damaged during transportation is to be repaired by hand application if possible; otherwise it has to be rejected. The decision for rejection shall be taken by the Engineer in charge.

4.6.2 UNLOADING OF PIPES:

Each pipe consignment shall be inventoried and inspected with care upon arrival even though the pipes have been inspected and loaded with care at the factory. Overall examination shall be made during unloading to ensure that the pipes have reached destination in good condition. If there is any sign of rough treatment on the coating, each pipe shall be inspected for damage.

While unloading, pipes shall not be thrown down from the truck to the hard roads. Cranes or Mechanical equipment shall be used for unloading the pipes from the truck. If mechanical equipment is not available, care should be taken to unload the pipes on timber skids. Unloading them on timber skids without a steadying rope and thus allowing the pipe to bump hard against one another

should not be allowed. In order to avoid damage to the pipes specially to the spigot end, pipe should not be dragged along concrete and similar pavements with hard surfaces.

The pipes shall be laid on timber battens and secured with wooden wedges. The pipes shall be stacked with each tier at right angles to the preceding tier.

4.6.3 LOWERING OF PIPES AND FITTINGS:

The pipes shall be lowered cautiously to prevent disturbances of the bed and sides of the trench. Proper implements, tools and facilities satisfactory to the Authority shall be provided and used for the safe and convenient execution of the work. All pipes, fittings, valves and hydrants shall be carefully lowered into the trench, piece by piece, by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to pipes materials and protective coatings and linings. Under no circumstances shall pipes materials be dropped or dumped into the trench. Pipes over 300mm diameter shall be handled and lowered into trenches with the help of chain pulley blocks or preferably by cranes. Tripod supports used for this purpose shall be regularly checked to prevent all risks of accidents.

4.6.4 CLEANING OF PIPES AND FITTINGS:

All lumps, blisters and excess coating material shall be removed from the socket and spigot end of each pipe. The outside of the spigot and the inside of the socket shall be wire-brushed and wiped clean and dry and free from oil and grease before the pipe is laid.

4.6.4 LAYING:

Before lowering the pipe, the trench section shall be got approved f r o m the Engineer in charge. Trenches are to be dug to the specified level / grade. Sufficient cushion shall be provided for protection from surface traffic, future changes in the ground elevation. The width of the trench shall be to the required specifications providing room for pipe laying operation, backfilling,

compaction etc., Trenches should be shored and braced when conditions so warrant.

The bottom of the trench shall form a continuous bed for the pipe. Where rock is encountered, trenches shall be dug deeper and then filled and compacted to grade with suitable bedding material. The Contractor shall have to provide and maintain sight rails and boning rods wherever required till the completion of work. The pipe shall be laid in reasonably dry condition and under no circumstances they shall rest on slushy bedding.

The pipes shall be lowered slowly into the trench by means of chain pulley block and tripod stand or with the help of ropes and suitable size of wooden bullies or with the help of cranes. They shall be brought to the required level by giving packing with wooden sleeper pieces and ultimately with well-consolidated hard murum if required. The chain pulley block and tripod stand must be approved from the Engineer in charge. Under no circumstances pipe shall be allowed to be thrown in the trenches. At the end of each day, the end of the pipe should be plugged to prevent entry of rodents, foreign substances, water etc.

4.6.5 SUPPORT OF PIPE FOR NALLAH / RIVER CROSSING:

Venteak piles are proposed for portion of pipeline which crosses the nalla / river or slushy soils. Each pipe shall be supported on a pair of Venteak piles driven upto 3.50m or firm ground whichever is met earlier.

One pair of timber piles shall be driven 150mm behind the shoulder of toe socket and another pair about 750mm in front of the spigot end of the pipe.

The size of timber section to be used for Venteak piles shall be: 100mm x 100mm for pipe sizes upto 300mm,150mm x 150mm for pipe sizes above 300mm.

A cross piece of section same as that of pile shall be bolted to a pair of piles which have been driven to the required depth.

The level of the cross piece should be such that when the pipe rests on its top, its Invert level coincides with the proposed invert of the pipe.

The pipe shall be aligned for straightness and secured in position by wooden wedges nailed down to the wooden cross piece. The spigot end of each pipe shall be thoroughly homes in to socket of preceding pipe and jointing made. The pipe shall be further secured from moving upwards by timber cross pieces bolted to the supporting piles. The section of the cross piece shall be same as that of pile.

The socket ends of all pipes shall face up hill irrespective of the direction of water flow. Any deviation either in plan or elevation of less than 11 ¼ deg. angle shall usually be effected by laying straight pipes round a flat curve; of such radius that rubber gasket shall not be disturbed in its place. Wherever new pipes laid are to be jointed with existing pipe line, first pipe laying work of new pipes are to be completed. Jointing of new pipe line with existing pipe line has to be completed within a stipulated time as per the instructions of Engineer in charge to keep the distribution system ready to supply water to the city. No extra payment will be made for this time bound urgent work.

4.6.6 TESTING:

After laying and jointing, the pipe line must be pressure tested to ensure that the pipes and joints are sound enough to withstand the maximum pressure likely to be developed under working conditions. The Contractor shall submit for the Engineers approval, details of his proposed methods and programme for testing including details of test equipment and shall provide for all tests to be carrying out testing and cleaning including water pumps, gauges, piped connections, stop ends, and all other temporary works.

Pipe lines shall be properly completed and supported before being put under test. No testing will be permitted until ten days after thrust blocks and other holding down works have been completed. In addition to any tests of individual joints or other interim tests which may be specified elsewhere, the Contractor shall submit, all parts of the pipe lines to a final test. Notwithstanding the foregoing, the Contractor may at any stage of construction, carry out such other tests as he considers desirable to check materials and workmanship on the pipe lines but this shall not relieve the Contractor of his obligations to achieve successful test under the contract.

All water required for testing and cleaning the pipelines shall be potable water and shall be provided by the Contractor at his cost. The test can be carried out by means of a hand pump or a pressure pump.

Pipelines shall be tested in lengths between valve pits or such lengths as the Engineer may direct or permit.

Fittings required for temporarily closing the openings in pipelines to be tested shall be properly designed for this purpose and shall be adequately strutted to withstand the pressure specified. T he completed pipe line may be tested in sections; the length of section should be decided by considering:

a) the availability of suitable water;

b) the number of joints to be inspected; and

c) the difference in elevation between one part of the pipe line and another.

The maximum length that can be tested in one operation shall be restricted to 500m and minimum length shall be 50m.

Where joints are left uncovered until after testing, sufficient materials should be back filled over the centre of each pipe to prevent movement under the test pressure. The Contractor shall make his own arrangements to procure necessary equipment, apparatus etc., required for testing and shall provide necessary labour for filling with water the length of pipes to be tested, fixing all apparatus and for carrying on the testing operations until the length of pipe, specials and connections are firmly passed by the Engineer. If the testing apparatus and equipment are available with the TW AD Board, they can be hired by the Contractor at usual conditions and charges.

The length to be tested shall be provided with two blank flanges fastened on the usual manner by collar bands and bolts to the end pipes or if the length to be tested shall have a sluice valve at each end, such blank flanges may be dispensed with.

The length of pipes to be tested shall first be filled in with from a higher section of pipes already laid or with clean water obtained from a service

connection, as the Contractor may arrange with the approval of the Engineer. Before the actual testing pressure is applied, any air which has logged in the length of pipe to be tested shall be got rid of, by screwing on at the highest part of the length of pipes or temporary air valve, or by opening a temporary stop – cock or by means as the Engineer may direct.

The test pressure shall not be less than 10 kg / cm^2.

Each pipe line or section thereof shall be filled with water and all air removed. The pressure in the pipe lines shall be raised steadily until the site test pressure is reached in the lowest part of the section. This pressure should be disconnected and no further water permitted to enter the pipe line for a period of 1 hour. At the end of this period, the reduced pressure in the pipe line should be measured, the original test pressure restored by pumping and the loss measured by drawing off water from the pipe line until the pressure has fallen to match the reduced pressure previously noted.

The loss shall not exceed 0.02 litre per mm diameter per Kilometer per 24 hours for each bar of head applied. If the pipeline fails to pass the test, the faults shall be located and repaired and the pipeline retested until it passes the pressure test. All exposed pipe, fittings, valves and joints shall be visually inspected during the tests.

If the length of pipeline under test is found to be satisfactory and no leaks or sweating are found at the pipe joints or at the joints of specials and connections, then this length of pipeline will be passed by the Engineer.

But should any pipe, joint, special or connection be found to sweat or leak, Contractor shall make good at his cost such defective joints and the length of pipe line shall be retested until all pipes, joints specials and connections are found to be satisfactory.

After satisfactory test, the Contractor shall remove water from the pipeline and clean it after testing at his own cost, without flooding adjoining areas.

Duration of Hydraulic Test:

The test is for 1 hour only. The rate of allowable leakage is given on per day basis. The leakage observed within one hour shall be converted to per day basis and compared with criteria given.

Maximum field test pressure for pipes with flexible joints:

Table – 1 on page 11 of IS: 12288 is not applicable in this case as our test pressures are well below the maximum field hydraulic test pressures given in the table.

Allowance of test pressure for lower elevations:

As regards allowance for lower points, there is marginal level difference in levels, between 2 points in the section to be chosen for testing and hence the difference in pressure developed will be insignificant.

Saturation of pipe material:

As regards saturation of material, it is significant in case of RCC, PSC pipes for DI pipes it is insignificant. We are not clear whether the remark is aimed at saturation of inner CM lining. The adequate curing of the lining will take care of this. Also the duration of the test is long enough to discount such possibility.

4.6.7 INTERCONNECTION WORK:

The interconnection work between the existing main and the proposed main to be laid under this contract shall proceed from the new main to the existing main. Before actually proceeding with the interconnection work, the Contractor shall make ready necessary tools and plants required for the work at site, such as pump sets, shoring materials etc. He shall also keep ready at site necessary pipes, jointing materials, specials and valves required for the work.

The Contractor shall keep necessary skilled workmen of sufficient strength at

site and once the work commenced, the entire interconnection work shall proceed without interruption by engaging labour for carrying out the work on a continuous basis both day and night till the work is completed. The work shall be executed as per programme drawn up by the Engineer and shall be completed within the time ordered by the Engineer, for each individual interconnection. The work shall be carried out under the direction of the Engineer from the beginning to end.

Laying of specials, valves (except straight pipes from the branch of the new main to the connecting point in the existing main) including conveying specials etc., from the stores or site of stacking, excavating, timbering, pumping out water from the trenches, lowering, aligning, jointing specials and valves, cutting the existing mains, dealing with water, inserting the necessary branches, jointing, testing, refilling etc., is included in the item of providing, laying and jointing DI pipes. Any ancillary work either of Temporary or Permanent nature required for interconnection and not covered by schedules shall be executed by the Contractor at no extra cost.

4.6.8 FLANGED JOINTS:

Flanged joint should be made by painting the facing of the flange with white lead freely and bolting up evenly on all sides. A thin fiber of lead wool may be very useful in making the joints water tight where facing of the pipes is not true. When packing must be used, it should be of rubber insertion three ply and of approved thickness. The packing should be of the full diameter of the flange with proper pipe hold and bolt holes cut out evenly on both the inner and outer edges. Where the flange is not full faced, the packing may be of diameter of the packing strip only, proper placing of the packing should be checked before another pipe is jointed on.

4.6.9 DISINFECTION OF MAINS:

Upon completion of a newly laid main or when repairs to existing pipes are made, the main shall be disinfected as directed by the Engineer. The main shall

be flushed prior to disinfection except when the tablet method is used. After initial flushing, the hypochlorite solution shall be applied to the water main with mechanically or electrically powered chemical feed pump designed for feeding chlorine solutions. For small applications, the solution may be fed with a hand pump. In the case of mains of large diameter, water from the existing distribution system or other approved source shall be made to flow at a constant measured rate into the newly laid pipeline. The water shall receive a dose of chlorine also fed at a constant measured rate.

The two rates shall be proportioned so that the concentration in the water entering the pipeline is maintained at not less than 300 mg/l. The chlorine shall be applied continuously and for a sufficient period to develop a solid column of 'Slug' of chlorinated water that will, as it passes along the line, expose all interior surfaces to a concentration of at least 300 mg/l for atleast 3 hours. As the chlorinated water flows through tees and crosses, related valves and hydrants shall be operated so as to disinfect the appurtenances.

In the case of newly laid mains in which scrupulous cleanliness has been exercised, the tablet method can be adopted and in this method. The initial flushing is dispensed with the calcium hypo chlorate tablets are placed in each section of pipe and also in hydrants, hydrants branches and other appurtenances. The tablets shall be attached by an adhesive and must be at the top of the main. The main shall then be filled with water and the water shall remain in the pipe for at least 24 hours. After the applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the mains is no higher than that generally prevailing in the system or less than 1 mg/l. After final flushing and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriological quality and shall show the absence of coliform organisms. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. When the samples are satisfactory, the main may be placed in service.

The Contractor is expected to carry out the disinfection work as a part of laying the pipes and his rates for laying the pipes should include the disinfection and other connected works till the main is placed in service unless otherwise specified in the schedule.

4.7 Fixing Sluice Valve

The sluice valves to be fixed on the pipelines shall be examined, cleaned and placed in the positions as shown in the drawings. The valves shall be placed on the pipeline and valve chambers constructed according to drawings. The depth at which the valve is to be laid and the dimensions of concrete and masonry shall be varied when necessary under the orders of the Engineer.

As the pipes in some instances may be required to be fixed at a less depth than will permit the top of the valve spindle being below the level of the road (but this may only be in cases where the position of the valve is to one side of the metalloid road) the walls of the valve chamber shall in such cases be carried upto such height at may be ordered, and the chamber shall have such covering as the Engineer may direct. The valve shall be supported in the valve chamber so that no stress or strain occurs in the flange or other joints of the valve. The valve shall be carefully protected from slime or dust by a suitable mat or gunny covering and the pit itself shall be cleared of all unwanted material.

4.8 Fixing Scour Valve

Scour valves shall be fixed at places shown in the drawings or as directed by the Engineer, and the scour connections from the main shall be carried out completely as per drawings.

4.9 Fixing Air Valve

Air valves shall be fixed at the summits of pipe lines or at places as may be

directed by the Engineer. The air valve connections etc. shall be carried out as per drawing.

4.10 Interconnection Work

The Interconnection W ork between the existing main and proposed main to be laid under this contract shall proceed from the new main to the existing main. Before actually proceeding with the interconnection work, the Contractor shall make ready necessary tools and plants required for the work at site, such as pump sets, shoring materials etc., He shall also keep ready at site necessary pipes, specials, valves if any required for the work. The Contractor shall keep necessary skilled workmen of sufficient strength at site and once the work is commenced, the entire interconnection works shall proceed without interruption by engaging labour for carrying out the work on a continuous basis both day and night till the work is completed. The work shall be executed as per Programme drawn up by the Engineer and shall be completed within the time ordered by the Engineer, for each individual interconnection. The work shall be carried out under the direction of the Engineer from the beginning to end.

Laying of Specials, valves (except straight pipes from the branch of the new main to the connecting point in the existing main) including conveying specials etc., from the stores or site of stacking, excavation, timbering, pumping out water from the trenches, lowering, aligning, jointing specials and valves cutting the existing mains, baling out water, inserting the necessary branches, jointing, testing, refilling etc ., shall comprise as one unit of work and will be paid at the lump sum rate quoted in the schedule for interconnections.

4.11 Works to be left Water tight

The Contractor shall construct the pipes chambers and all other Works so that they shall be water tight. Should any leakage appear, it shall be made good by him at his expense by removing and reconstructing the portions of the Work so affected or by other method which will render the W ork

thoroughly water tight to the satisfaction of the Engineer.

4.12 Cleaning of Mains

During the execution of the work the contractor shall keep the interior surface of the mains free from cement, brick, soil or other superfluous matter and shall hand over the mains perfectly clean and free from deposit on completion.

4.13 Masonry chambers

Chambers for sluice valves, inspection, scour valves, air valves shall be constructed on the pipes in the positions as shown in the drawings or in such positions as the Engineer may direct. The work shall be done strictly in accordance with the detailed drawings or as ordered by the Engineer.

The excavation shall not be made lower than necessary to admit of the earth being properly timbered. The bottom of the excavation shall be properly levelled, rammed and a bed of concrete laid thereon. W hen the concrete has sufficiently set the building of the brick walls shall then be proceeded with and all iron work fixed in as the building proceeds. The inside of all chambers shall be plastered with cement mortar 20 mm thick and the outside with cement mortar 12mm thick.

The chamber shall be topped with pre-cast RCC Slab 1:2:4 or cast iron surface box of valve cover as ordered by the Engineer. The surface box or valve cover shall be fixed on the top of the RCC slab by a layer of; cement mortar and sides of the surface box or valve cover covered over with cement concrete.

Where pipes pass through walls of chambers relieving arches shall be turned neatly over the upper half of the pipes or RCC lintels shall be provided to avoid load of the walls transmitted to the pipes.

Cast Iron steps shall be built in each chamber as the Work proceeds on being inserted to every 4 courses of brick work, horizontal distance center to center of each row being 30cm.

The Contractor shall include in his rate for brick work cost for fixing steps, frame, cover etc., for completing all chambers in accordance with the drawings and with the above specifications.

4.14 Restoring Road Surface

The surface of the road or ground shall be finished off to the proper level with the same kind of materials upto the surface consisted of before the excavation commenced, except in the case of superior roads and tarred roads in which case the surfaces should be finished off with water bound macadam surface. The road top surface/finishing restoration shall be carried out by road work. Should any settlement occur after refilling is completed, and upto the end of the period of maintenance, it shall be made good at once and the surface restored to the satisfaction of the authority under whose jurisdiction such road or ground may be, all at the cost of the contractor.

4.15 Collection of Rubbish

The Contractor shall, at his cost, on the completion of the Work remove all water and all materials or rubbish of every description which may have been collected in the works find a deposit thereof and anything which may have collected within the works, during the period of maintenance shall also be removed before the W orks are finally accepted by the Employer.

4.2 Earth work excavation

4.2.1 General

Before commencing the work, and also during the progress of the work the contractor shall give notice to the concerned authorities viz., the Panchayats, the Municipalities, the Railway, the Electricity Board, the Te1egi~ph

Department, the Traffic Department attached to the Police and other Departments or Companies, as may be required to the effect that the work is being taken tap in a particular locality and that necessary diversion of traffic may be arranged for. The contractor shall cooperate with the department concerned and provide for necessary barricading of roads, protection to existing underground cables, etc. met with during the excavation of trenches.

The contractor shall also provide at his own expense watch and light during the day and night and put required notice towards such as "Caution" "Road Closed for Traffic", etc. He should also provide and maintain at his own expense the necessary supports for underground cables, etc, to afford the best protection to them in consultation with the authorities in charge of the properties and to their best satisfaction.

4.2.2 Trench excavation

The width and depth of excavation of trench shall be as per relevant BIS. The rate for excavation shall include charges for shorting, strutting, bailing and pumping water whenever necessary and no extra payment shall be made for any of these contingent works.

Excavation and refilling for the socket hollows shall be paid for as excavation and refilling for trenches in soil of appropriate classification. The supply of river sand required for refilling should be paid for separately if provided in BOQ as separate item.

The Contractor shall deposit the surplus earth if any from trench work to proper place as may be directed by the Engineer and no extra rats shall be paid.

Whenever earthen road or gravel road is cut for the laying of pipes, the contractor shall restore the surface after the pipes and specials are laid and jointed with available materials to the satisfaction of the Engineer without extra cost either for cutting or relaying. The clause shall not apply to the cutting of concrete or macadam or brick surfacing or black top roads. The pipes shall be laid to correct levels and gradients, *as* may be directed by the Engineer, after fixing the sight rails without extra cost.

If the floor of the trench is other than rock, hard clay or boulders, the floor

shall be rounded to fit the curve of the pipe to form an even bedding for the pipe for a width equal to half the outer diameter of the pipe.

If the floor of the trench is in rock, hard or clay which will otherwise not provide uniform support for the pipe, the floor shall be excavated below the proposed bottom level of the pipe to a depth of 20cm and the trench shall be refilled with approved soil or river sand as may he directed by the Engineer and properly compacted to a level of 10cm above bottom of the pipe. If river sand is used for refilling, the sand shall be paid for separately if provided in BOQ as a separate item.

4.3 Hard Rock

"Rock requiring blasting" shall exclude all rock such as soft rock, disintegrated rock, small boulders, all of which can be removed either with pick axe or craw bards and shall apply to rocks of different kinds which cannot be removed by any of these means. In case of difference of opinion, the Engineer's decision as to which rock shall be considered as "rock requiring blasting" shall be final.

Refilling of the trench in reaches where the excavation is in rocky soil shall be with approved soil which is surplus from trench work operations elsewhere along the alignment or which shall be obtained from new borrow pits.

It is to be distinctly understood that if surplus soil from trench work elsewhere along the alignment is used no extra payment shall be paid for conveyance of the soil to the refilling site. No payment will be made for any excess earth brought to site and it shall be disposed off by the contractor at his own cost. Hard rock which is blasted and removed will be stacked at site as shown by the Departmental officers which are the property of City Municipal Corporation. The stacking shall be as directed by the Engineer.

4.4 Lowering of pipes and jointing of pipes and specials

4.4.1 All laying and jointing shall be in accordance with Clause 9.1 , IS: 783-1985 for laying of concrete pipes. All the pipes and fittings shall be carefully

handled and lowered into the trench by means of mobile cranes. Any other method of handling shall be got approved by the Executive Engineer concerned.

The pipes and specials should be handled by flat rubber bolts. Iron chain or iron craw bards should not be used under any circumstances for handling the pipes and specials at any stage.

The sockets shall face opposite to the direction of flow of water in the pipe. Pipes shall be normally laid so that the spigot end enters the socket of the last pipe that is, socket faces and direction of lying. The socket and spigot ends of pipe shall be cleaned of all extraneous matter especially clay or grease. Rubber ring shall be clean and dry.

4.4.2 Pipes shall be laid true to the lines and grades given on the plans. The rubber rings shall be kept evenly positioned on the spigot groove, and when satisfied that pipe and ring are correctly positioned, the pipe shall be forced right home to the full depth of the joint. Inside the joint, the two pipe ends shall be in close proximity.

4.4.3 Bailing or pumping out of water from trench including shoring, strutting and removing slush while laying, jointing and testing shall be done by the contractor at his expense.

4.5 Special Fittings

4.5.1 Special Fittings have to be located at the exact chainage as shown on plans. It might entail in the necessity of laying short pipes in specified length. The number of gaps should be got approved by the Executive Engineer concerned.

4.5.2 Jointing between the special and pipe shall be done with rubber rings.

4.5.3 The construction of all anchor blocs at beds 'Y's and Tees shall be done by the contractor. It shall be his responsibility to cheeky for the adequacy of the anchor block.

4.5.4 All HDPE pipes shall be jointed by electro fusion coupler joints only.

4.6 Testing pipes on position

4.6.1 The finished pipe line shall be tested in convenient sections between stop valves. The test gap and short reaches which could not be tested simultaneously as a continuous reach due to circumstances prevailing during execution may be subjected to the pipe line static pressure or maximum working pressure plus surge pressure which may be created daring testing the short reaches and lest gap whichever is higher as the case may be. The PMC Engineer's decision regarding the test pressure at field for the above test gap arid short reaches will be final. When testing the pipe line hydraulically, the line shall be filled completely with water and kept filled for a week. The pressure shall then be increased gradually to full test pressure and maintained at this pressure for one hour. In testing pipe lines, a seepage allowance of 2.5 liters per kilometer per hour per centimeter diameter of the pipe shall be permissible.

4.6.2 Joint Testing

When testing the finished pipe line hydraulically after filling the pipe line section under test with water it shall be left under operating pressure for a certain length of period which will depend upon initial permeability, absorption movement of the pipe line under pressure and the quantity *of* air trapped. More water shall be pumped from a calibrated container until the required test pressure is reached, the test pressure shall be maintained throughout the test by means of continued pumping using a pressure relief calibrated container. The rate of flow of water from the container shall be determined at regular intervals. The pipe line is satisfactory provided the successive measurements show a diminishing quantity. An allowance of 3 liters per millimeter diameter of pipe per kilometer of pipe line per day per each 30 meter head of pressure applied shall be allowed.

The field test pressure to be imposed should be not less than the greatest of the following:

a) 1½ times the maximum sustained operating pressure

b) 1½ times the maximum pipe line static head; and

c) Sum of the maximum sustained operating pressure or the maximum Pipeline static pressure and the maximum calculated surge pressure.

Subject to a maximum equal to the works test pressure for any pipes and fittings incorporated in the pipeline. However, the line test pressure, in no case, shall exceed the hydrostatic proof test pressure. Pressure gauges shall be inserted at both ends of the line and test so that leakage can be precisely calculated.

4.7 Back filling trenches

4.7.1 The initial back fill shall be of selected materials suitable for tamping under the pipes and down at the sides. Earth shall be placed by hand in 7.5 cm-layers and rammed we1l until the backfill materials reaches 15 cm above the crown him of the pipe. Mechanical rammers may also be used.

4.7.2 The remainder of the trench shall be filled carefully with ordinary excavated material without rock and rammer property.

4.7.3 Refilling can be done leaving the joints portion exposed, after laying.

4.8 River crossings.

All the supporting structure for pipeline to be taken above MFL (Maximum Flood Level) in river. The contractor shall furnish detailed drawings showing the type of bedding needed to support the pipe.

4.9 Railway Crossings

Required permission for laying, jointing and testing the pipe line across the railway lines will be obtained by the Employer. The contractor will carry out the work according to the specifications and stipulations made by the Railway authorities.

4.10 Road Crossings

Wherever pipeline has to cross roads or cart tracks, it shall be done through a culvert or bridge, wherever necessary.

4.11 Distance indicators

The Employer shall supply and *fix* indicators at all points of change of direction, at all valves and at every one kilometer intervals along the pipeline. Indicators shall consist of 10 x 10cm precast concrete posts 1.25m length set 0.75m into the ground arid painted white about ground level. The description shall be written in blue at one face of the precast post.

4.12 Drawings

The drawings are only indicative. The site conditions will only be the governing factor for manufacture, laying and payment.

4.13 Disinfections of Mains

Upon completion of a newly laid main or when repairs to an existing pipe are made, the main shall be disinfected as directed by the Engineer.

The mains shall be flushed prior to disinfections except when the tablet method is used. After initial flushing, the hypo chlorite solution shall be applied to the water main with mechanically or electrically powered chemical feed pump designed for feeding chlorine solutions. For small applications, the solution may be fed with a hand pump.

In the case of mains of a large diameter, water from the existing distribution system or other approved source of supply shall be made to flow at a constant measured rate into the newly laid pipe line. The water shall receive a dose of chlorine also fed at a constant measured rate. The two rates shall be proportioned so that the concentration in the water entering the pipeline is maintained at not less than 300 mg/I. The chlorine shall be applied continuously and for a sufficient period to develop a solid column of 'Slug' of chlorinated water that will as it passes along the line expose all interior surfaces to a concentration of at least 300 mg/I. for at least 3 hours. As the chlorinated water flows past tees and crosses, related valves and hydrants shall be

operated so as to disinfect the appurtenances.

After the applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the mains is not higher than the generally prevailing in the system or less than 1 mg/I. After final flushing and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriological quality and shall show the absence of coliform organisms. If the initial disinfect ion fails to produce satisfactory samples, disinfections shall be repeated until satisfactory samples have been obtained. When the samples are satisfactory, the main shall be placed in service.

4.14 General

1. The water for the works shall be as far as practicable free from earthing vegetable or organic matter and from salts or other substance likely to interface with the setting of mortar or otherwise prove harmful to the work.
2. The contractor shall be responsible for the safe custody of all the departmental materials once they are handed over to the contractor at the departmental stores. The cost of any materials in the custody of the contractor stolen, lost, destroyed or damaged or if rendered unfit for the work will be recovered from the contractor at the issue rate.
3. For testing the concrete and aggregate the contractor must procure the following equipment and make them available at site:-
4. Steel mould for making 45cm cube of concrete (The mould will be in two halves for easy removal)
5. Slump cone for testing consistency (slump test) the cone will be 30cm height truss casted cone with top and bottom diameters of 1cm and 20 cm respectively. In addition a steel rod 15cm diameter and 50cm in length and with tamping and rounded is to be procured.
6. For finding fineness modules and coarse aggregate hand operated over a apparatus may be procured along with weighing machine for weighing the aggregate and the sand.

7. In the case of any breach of the terms of the contract the contract will be closed at the risk and the costs of the contractor in addition to the forfeiture of the EMD & security deposit.
8. The testing is to be done at the contractor's cost for all building materials and also for concrete cubes.
9. The work shall be executed and measured as per metric dimension given in the schedule of quantities drawing etc. (F.P. units where indicated are for guidance only)
10. Unless otherwise specified the entire rate quoted by the contractor shall be for works at all levels of the buildings.
11. Rates for every item of work to be done under this contract shall be for all lifts and leads, heights, depths, lengths and widths.
12. Except when specifically mentioned in the item, otherwise nothing extra will be paid on this account.
13. The rate for all item in which use of cement is involved is inclusive of charges for curing.

TECHNICAL SPECIFICATIONS

CHAPTER 5

WATER RETAINING STRUCTURES

5.1 Elevated Service Reservoir/Ground Level Service Reservoir/Sump etc

1. Each service reservoir shall be executed as per the drawings and specifications and as directed by the Engineer in charge.
2. The service reservoirs shall be provided with suitable size CI D/F Pipes for inlet, delivery, overflow and scour connections and painted with two coats of anticorrosive paint as per BOQ/Drawing.
3. Suitable size sluice valves with gear arrangements wherever necessary shall be provided for all inlet and outlet connections with valve pits.
4. Water level indicators enamel painted with float and painted with graduations in metric units shall be provided to indicate water level inside the reservoir.
5. Suitable size and required number of ventilators, manhole covers shall be provided as directed by the Employer.
6. RCC spiral staircases shall be provided for outside and access ladder inside the service reservoirs as per Specifications.
7. The finishing colour of the service reservoirs shall be aesthetically selected after its approval by Employer and double coating shall be applied after water tightness certificates is given by the Engineer.
8. Letterings to indicate the capacity and other details as directed by the Employer shall be written on the side wall of the service reservoirs.
9. Valves shall be provided with valve pits and cover to bear the loads coming on it as per departmental type design and plans.

5.1 Testing for Water Tightness

5.1.1 For water retaining structures above ground level, the requirement of the test shall be deemed to be satisfied if the external face shows no sign of leakage and remain apparently dry over a period of observation of seven days after filling upto maximum water level and allowing seven days period for

absorption.

5.1.2 In case of underground structures with top covered the tanks shall be deemed to be water tight if the total drop in water level over a period of seven days does not exceed 40mm.

5.1.3 If the structure does not satisfy the condition of the test period, the test may be extended for a further period of seven days and if the specified conditions of the test are satisfied the structures shall be considered to be water tight.

5.1.4 In case of unsatisfactory test result, the contractor; shall ascertain the cause, make all necessary repairs and repeat the procedure in the preceding clauses until the test has been passed satisfactorily at no extra cost to the Employer.

5.1.5 The fact carrying out water tightness test should be recorded in M.Book. The last part bill should be passed only after above certificate is issued. However the contractor shall be permitted to execute an indemnity bond in lieu of the recovery of 40% in each bill in prescribed form in stamp paper for a value of Rs.22.50 towards water tightness and structural stability of the reservoir/water retaining structure. The period of guarantee required by the contract shall be two years from the date of completion and commissioning (with filling of water upto maximum water level in the case of service reservoir/overhead t a n k /water retaining structure). If defects are noticed within the stipulated period of 24 months of satisfactory performance, the defects should be rectified by the contractor at his own cost and the performance period again shall be reckoned from the date of completion of the rectification of defects by the contractor. In the case of service reservoir/overhead tanks and other water retaining structures during this period, structure under full working head of water should show no sign of leakage. The test for water tightness should be arranged to be carried out and completed within 30 days from the date of intimation, by the Engineer. The testing of the service reservoir/OHT/and other water retaining structures should be done by the contractor at his own cost inclusive of all necessary equipment,

water etc., complete. The test for water tightness of the structure as well as materials of construction used shall be conducted in conformity with the standard specification as per IS: 3370 (Part-1)-1965 as amended from time to time and the other specifications as mentioned in the bid document.

5.2 C.I. Pipe Connections

5.2.1 The vertical pipe connections shall be hoisted and fixed true to plumb without any deviation from the verticality as directed by the Engineer-in-charge.

5.2.2 The jointing of pipes shall conform to the requirement and all required jointing materials shall be arranged by the contractor at his cost.

5.3 Scour

5.3.1 Scour and overflow arrangements should be connected and let to a common pit from where it will lead to the nearest open drain.

5.4 Maintenance

During the maintenance period, the contractor should clean the elevated service Reservoir and sump at the intervals as directed by the Engineer.

TECHNICAL SPECIFICATION

CHAPTER – 6

MECHANICAL & ELECTRICAL WORKS

6.1.Mechanical equipment and Works

6.2.Centrifugal Pumps

6.2.1. General

The pumps shall be designed to operate satisfactorily without detrimental surges, vibration, noise, or dynamic imbalance over the required head range. The head-capacity curve of the pump shall have a continually rising head characteristic with decreasing capacity over the whole range of total head. The shut off head of the pump shall be at least 135 % of the total head. The Pump shall have the maximum efficiency at the specified duty point.

The Contractor shall guarantee that adequate required Net Positive Suction Head (NPSH) is available to ensure that pumps can operate without cavitation under the worst operating condition. The required NPSH at duty point and throughout the range shall be at least 1.0 M, and 0.5 M less than the available NPSH respectively at the lowest water in the sump.

Each pump must be capable of running satisfactorily in parallel with other sets in the system without throttling and by itself, without cavitation or overload under all operating conditions within the system resistances indicated.

The unit shall be designed to operate safely at the maximum speed attainable in the reverse direction of rotation due to water returning through the pump at times when the power supply to the motor is interrupted and the discharge valve fails to close. The first critical speed of the pump set shall be at least 30 % above the operating speed.

Pumps shall run smooth without undue noise and vibration. The velocity of vibration shall be within the 4.5 mm/sec. Noise level shall be limited to 85 dBA at a distance of 1.86m.

All rotating parts shall be statically and dynamically balanced as per relevant ISO standards

All pumps shall be provided with mechanical seals of working life not less than 20,000 hours of operation.

A stationery coupling guard shall be provided for the coupling conforming to all relevant safety codes and regulations. Guard shall be designed for easy installation and removal, complete with necessary support, accessories and fasteners.

The pumping unit shall be provided with a common base plate. The base plate shall be of sufficient size and rigidity to maintain the pump and motor in proper alignment and position.

Pump design shall be as per IS:6595 and pump performance shall be as per IS:5120.

The power rating of the pump motor shall be the larger of following:

(i) 115 % of the power required by the pump at the duty point.

(ii) 105 % of the maximum power required by the pump from zero discharge to run off point total head.

Materials of Construction

Casing	:	CI IS210 Gr FG 260
Impeller	:	SS ASTM A743 Gr CF8M
Shaft	:	ASTM A276 SS 431
Shaft Sleeve	:	ASTM A 743 CF8M
Casing ring	:	SS AISI 410
Gland	:	Bronze conforming to IS 318 Gr LTB 2
Gland Packing	:	Graphited Asbestos

Base Plate	:	CI/Epoxy Coated MS

Testing:

Material Test Certificate:		Casing, Impeller and shaft
Hydrostatic Test	:	1.5 times the shut-off head or twice the rated discharge head, whichever is greater
Performance Test	:	As per IS:5120 &: at full speed
NPSH Test	:	"Type" test certificate for the offered model
Mechanical Balancing	:	As per ISO:1940, Gr. 6.3 or better
Visual Inspection	:	Pumps shall be offered for visual inspection before shipment. The pump components shall not be painted before inspection
Field Tests	:	Field performance tests required for satisfactory operation

Inspection: Category A

6.3. CRANES

6.3.1. General

Electric driven, short headroom, wire rope hoists with motor driven, traveling trolley and I-beams for suspension shall be provided at chlorine room and chemical house. The construction of the hoists, its components, the design, testing and commissioning shall conform to IS 3938, Class II duty.

Mechanical details

The specifications of the hoists are as follows:

- Rope drums shall be of cast steel or fabricated from rolled steel plates, conforming to the relevant Indian Standards. Fabricated rope drums shall be stress relieved before any machining takes place. The drum grooves shall be smooth finished and the rope drum shall be flanged at both ends. The drum shall be designed for a single

layer of ropes. A precision machined rope guide to suit the drum grooves shall move over the drum like a nut, guiding the rope into the grooves and preventing an overlapping of the rope.

- Brakes shall be D.C. electromagnetic type/thrust type. Brakes shall be designed to hold the load at any position whenever there is a current interruption, either intentionally or by main power supply failure.
- The wires shall be hemp cored and galvanised. Ropes shall be of regular right hand lay as per IS 2266. The rope construction shall be 6 x 37 with a factor of safety specified as per IS.
- The sheaves shall be fully encased in close fitting guards fabricated from steel plate. Smooth opening shall be provided in the guards to allow for free movement of the rope. Holes shall be provided for oil drainage. The lifting hook shall be supported on a bearing for 360 ° swivel under load.
- Straight and helical spur gearing shall be used for all motions. All first reduction gears shall have helical teeth. All pinions shall be integral with the shaft. All gears shall be hardened and shall be of tempered alloy steel having metric module. Overhung gears shall not be used. All gearing shall be totally enclosed and grease lubricated.
- Single flanged wheels shall be mounted in anti-friction roller bearings housed in "L" shaped bearing brackets for ease of removal during routine maintenance. Solid wheels shall be of forged/rolled steel or cast steel.
- 415 V, 50 Hz, heavy duty motors suitable for hoist and trolley operation, suitable for reversible motion, frequent acceleration and mechanical breaking, totally enclosed, fan cooled, wound rotor motor shall be used. Class of insulation shall be "F", with temperature rise limited that for "B". The pullout torque shall not be less than 225% of full load torque, corresponding to 40% CDF (Cycle Duration Factor of the motor). 200 switching per hour shall be considered for the selection of motors. The hoist shall have the following speed ranges:

  a) trolley travel : 10 m/min; micro travel: 2 m/min

  b) hoisting : 2 m/min

  Roller operated, resetting limit switches shall be provided for all motions. Limit switches shall be fitted to prevent over travelling and over hoisting.

- A flexible travelling cable system mounted on a retracting support system shall be used. The conductor shall consist of insulated multi-conductor cable with permanent termination on the connection box and on the trolley. The flexible trailing cable shall have ample length and shall be supported by means of properly designed movable clamps. These clamps shall be fitted with rollers and shall run freely on a guide rail along the beam. The flexible copper cable shall be butyl rubber or EPR insulated CSP sheathed type 650/1100 V Grade.
- From fixed control panel from where the entire operation area can be overlooked or from a pendant push button control block hanging on a cable from the hoist. Control voltage is 110 V from a single phase step-down transformer. The following control is possible:
    a) Key operated ON push button - standard green button.
    b) ON signal lamp - green lens.
    c) Emergency OFF push button - standard red button.
    d) Hoisting push button - standard black button.
    e) Lowering push button - standard yellow button.
    f) Micro hoisting push button - standard black button.
    g) Micro lowering push button - standard black button.
    h) Cross traverse forward push button - standard black button.
    i) Cross traverse reverse push button - standard black button.
    j) Micro cross traverse forward push button - standard black button.
    k) Micro cross traverse reverse push button - standard black button.
    l) Long traverse forward push button - standard black button.
- The beam shall be suitable for the trolley, complete with end stops, holding down bolts and taper washers and shall be suitable for connection to the station earth. It shall be designed according to the capacity of the hoist, the beam fixation/support points, length and alignment. It shall be of galvanised mild steel. All fixation elements shall be of galvanised steel.

The following documents are to be furnished after award of work.

- General arrangement drawing of crane with details
- Note on erection and testing
- Test certificate for hook, chain and chain pulley block assembly.

6.4. Full Bore Electromagnetic Flow Measuring System

a. For flow measurement full bore electromagnetic flow measuring system shall be provided.

b. The full bore electromagnetic flow measuring system shall comprise of flow tube, flow transmitter cum computing unit, panel mounted digital flow indicator cum integrator and any other item required to complete the flow measurement system.

c. To avoid the effects of disturbances in the velocity profile, a straight and uninterrupted run, upstream as well as downstream from the location of the flow tube shall be provided, as required by the flow meter manufacturer.

d. Flow Tube

i.	Type	:	In line full bore electromagnetic
ii.	Size of the flow tube	:	Same as pipe size
iii.	Material of internal lining of flow tube	:	Rubber / Neoprene / Polyurethane
iv.	Minimum flow	:	As per process requirement
v.	Maximum flow	:	As per process requirement
vi.	Maximum pressure	:	As per process requirement
vii.	Weather protection class	:	IP 68
viii.	Electrode material	:	SS 316
ix.	Coil housing	:	SS 304 / CS / Die cast aluminium
x.	Prefabricated integral cables for connecting flow tube to flow transmitter cum computing unit	:	Required
xi.	Process connection	:	Flanged

e. Flow Transmitter cum Computing Unit

i.	Type	:	Microprocessor based with facility to configure the flow meter
ii.	Type of display	:	Digital seven segment back-lit LCD/LCD display
iii.	Unit of display	:	Flow rate - m^3 / hr Totalised flow – ML
iv.	Input	:	From flow tube
v.	Output	:	4-20 mA DC (isolated) proportional to flow rate
vi.	Zero and span adjustment	:	Required
vii.	Enclosure material	:	Die cast aluminium / non-corrosive
viii.	Enclosure protection class	:	IP 65
ix.	Battery backup for totalised flow	:	Required
x.	Facility for on line diagnosis	:	Required
xi.	Mounting	:	Separate from flow tube

f. Digital Flow Indicator cum Integrator

Refer specifications of digital flow indicator cum integrator elsewhere.

6.5. Pressure Gauges

a. Pressure gauges shall comply with IS 3624. Where the gauge is subject to pressure pulsations and/or vibration, it shall be provided with either rubber or glycerin filled dial.

b. The minimum diameter for round pressure gauges shall be 150 mm unless specified otherwise or as per the equipment manufacturer's standard practice when the gauge forms part of the equipment.

c. Technical Requirements

i.	Service	:	• Raw water (diaphragm seal assembly with SS 316 diaphragm shall be provided) • Waste wash water (diaphragm seal assembly with SS 316 diaphragm shall be provided) • Alum dosing tanks (diaphragm seal assembly with SS 316 diaphragm shall be provided) • Chlorine (diaphragm seal assembly with silver diaphragm shall be provided) • Clear water • Air
ii.	Range	:	As per process requirement
iii.	Accuracy	:	±1% of full scale
iv.	Dial size	:	150 mm
v.	Glass	:	Shatterproof
vi.	Over range protection	:	125% of maximum pressure
vii.	Housing material	:	Die cast aluminium
viii.	Material of sensor and other wetted parts	:	SS 316

ix.	Blow out disc	:	Required
x.	Process connection	:	As per process requirement
xi.	Material of dial	:	Aluminium with white back ground and black numerals
xii.	Accessories		• 3 way isolation valve • Impulse tubing, fittings • rubber • All other installation hardware

6.6. Scope of Work

Control panels, power distribution and control cabling, plant and area lighting, DG set, power transformer etc whatsoever required for completion of work & successful operation is included in the work.

The main Power supply will be provided by Utility authority for which the funds will be deposited through the provisional sum. The work up to DP and Metering will be carried out by the utility authority and the contractor will be required to make the remaining power supply arrangement for the STP. This will broadly include, but not limited to following:

The work after metering which includes 11 KV DP, transformer,11 KV cable with terminations, LT PMCC Panels, starters, LT cables etc. shall be provided by the contractor if supply is on 11 KV.

Provision of main LV switchboard, Screen DB cum Control Panel and lighting panels (as per drawing), glanding, termination and connection of incoming and outgoing cables including provision of lugs etc., metering, protections and indications shall be provided on the LV switchboard and other DBs as per the design criteria given subsequently.

Provision and installation of an APFC control panel having a capacitor bank with a rating of suitable kVAR (switchable in at least 8 steps) and associated protection, indications and metering, and glanding, termination and connection of the incoming

cable including provision of lugs, etc. The APFC panel shall have a micro processor based relay to improve the overall plant 'pf' up to a minimum of 0.98 lag.

Provision of earthing for all the electrical equipment such as main LV switchboard, other DBs and control panels, APFC panel, main motors, process equipment, valve actuators, drainage pump motor, exhaust fan motors, etc. by GS flats and wire of sizes given elsewhere in the specification and interconnecting with the auxiliary earthing grid inside STP/SPS, including installation on floor/wall, all including fixing, clamping, welding, bolting etc.

Provision and installation of XLPE/ PVC insulated cables, of sizes given elsewhere in the specification and drawing, in air, buried in ground and in trench and their termination and connection at the transformer, main LV switchboard, other sub-DBs, panels, motors, etc. including fixing, clamping, glanding, provision of lugs, etc.

1. Provision and installation of a local Start/Stop push button stations (boxes) made from GS sheet as required including its earthing by 12 SWG GI wire and termination of cable.
2. Provision of overall earthing, cabling and lighting systems as per the enclosed detailed specifications and drawings.

System Parameters

(a) Voltage	11 KV ± 10% , 3 phase, 3 wire for HT and 415V, 3 phase,50 cycles for LT system
(b) Short circuit level	1100 V±10 % 3 phase, 4 wire 18.4 KA for 1 second for 11 KV system
(c) Frequency	50 C/S ± 5%
(d) Ambient Temperature	50°C
(e) Earthing System	Solidly earthed
(f) Control circuit	AC, 230V, Single phase

(g) Lighting circuit AC, 230V, single phase

General Criteria

The General Criteria followed for the equipment and systems are as given below.

Equipment

All the indoor electrical equipment shall be rated and sized for a 'design ambient temperature' of 45^{o}C, while all the outdoor electrical equipment shall be rated and sized for a 'design ambient temperature' of 50^{o}C.

The main LV switchboard and other DBs shall be with 'Form-4' enclosure as per the Indian Standards. All indoor boards/panels shall be with a degree of protection of IP 54, while all outdoor equipment shall be with a degree of protection of IP 55.

All LT power cables shall be 1100 V grade, XLPE insulated, extruded inner and outer PVC sheathed, stranded aluminium conductor and armoured, while all control cables shall be 1100 V grade, PVC insulated, extruded inner and outer PVC sheathed, stranded copper conductor and armoured.

All the electrical equipment, accessories and systems shall conform to the latest editions of the Indian Standards or other equivalent international standards.

Cabling, Earthing and Lighting Systems

The cabling/earthing/ and lighting system shall got approved from Employer. Main earthing conductors outside and inside the building shall be planned in such a manner that all the equipment are connected to the earthing system by two connections in a reliable manner.

Protections

The following protections shall be provided on the LV switchboard/Sub-DB, as applicable.

i. Thermal overload and short circuit protection features on MCCBs and MCBs for feeders

ii. Thermal overload, locked rotor, short circuit, negative sequence and earth fault protection for main motor feeders

iii. Overload protection by thermal (bimetal) relays with single phasing preventor (SPP) for contactors for other motor feeders

Metering

The following metering shall be provided on the main LV switchboard/Sub-DBs.

i. Incomer

- Ammeter with selector switch
- Voltmeter with selector switch (only for main LV switchboard)
- Kilowatt meter (only for main LV switchboard)
- Power factor meter (only for main LV switchboard)
- Kilowatt-hour meter (only for main LV switchboard)

ii. Outgoing Feeders of main LV Switchboard

- MCCB and Ammeter with CT's & selector switch on main motor feeders

iii. Indicating Lamps

The following indications will be provided on the LV switchboard/Sub-DB, as applicable.

- Incomer
- Supply 'ON' (Red, Yellow & Blue)
- Phase Motor Feeders
- Motor 'ON', 'OFF' & 'Trip' indications (Red, Green & Amber)

6.7. Transformers

General

The transformer tank shall be made from high-grade sheet steel, suitably reinforced by stiffeners made of structural steel sections. All seams, flanges, lifting lugs, braces, and other parts attached to the tank shall be welded. The interior of the tank shall be cleaned by shot blasting and painted with two coats of heat resistant, oil insoluble paint. Adequately sized manholes shall be provided for ease of inspection and maintenance. Steel bolts and nuts exposed to atmosphere, shall be galvanised. The tank cover shall be removable and shall be suitably sloped so that it does not retain rainwater.

The thickness of transformer tank (rolling tolerance as per IS) shall be Top & (i) Bottom – 5 mm, (ii) Sides – 4 mm.Lifting lugs and eyebolts shall be so located that a safe clearance is obtained without the use of a spreader, between the sling and transformer bushings.

a. Transformers of rating above 200 kVA shall be equipped with detachable or separately mounted radiator banks. Transformers of rating 200 kVA and below shall be three star level with fixed type radiators. Fins of the radiators shall not have sharp edges and shall be rounded in shape.

b. When transformers are provided with separately mounted radiators, flexible joints shall be provided on the main oil pipes connecting the transformer tank to the radiator banks, to reduce vibration and facilitate erection and dismantling. The interconnecting pipes shall be provided with drain plug and air release vents.

c. The transformer core shall be constructed from high grade, non-ageing, cold-rolled, grain oriented, silicon steel laminations. The steel laminations shall be of "core" type. Each lamination shall be coated with insulation which is unaffected by the temperature attained by the transformer during service. Core laminations shall be annealed and burrs removed after cutting. Cut edges shall be insulated. The framework and clamping arrangements of core and coil shall be securely earthed inside the tank by a copper strap connection to the tank.

d. Windings shall be of insulated copper wire or copper strip. Windings and insulation shall be so arranged that free circulation of oil is possible between coils, between windings, and between winding and core. The windings shall be fully shrunk under

vacuum before assembly. High voltage end-windings shall be suitably braced to withstand short circuit stresses and stresses caused up by surges.

e. Off-load taps shall be provided on the HV winding.

f. The core and coil assembly shall be dried out and impregnated under vacuum.

g. The sequence and orientation of HV/LV side phase and neutral bushings shall be as specified in the latest edition of relevant IS.

h. Transformer shall operate without injurious heating at the rated KVA and at any voltage up to + 10 % of the rated voltage of any tap. Transformer shall be designed for 110 % continuous over fluxing withstand capability.

i. Noise level of the transformer shall be less than 80 dB conform to IS -2026.

Bushing

Solid porcelain bushings with brown glaze shall be used up to 12 kV class. Solid bushings shall have the characteristics specified in the latest edition of IS 2099.

Cable Terminations

LV side cable boxes shall have sufficient space for segregating the cable cores and for adequate clearance in air between bare conductors at the terminals. Cable boxes shall be complete with necessary glands, lugs and armour grips.

All auxiliary wiring from current transformers, buchholz relay, oil/winding temperature indicators, etc. shall be marshalled to a separate weatherproof and vermin proof marshalling box with an independent access cover. The degree of protection of the enclosure of the marshalling box shall be IP 55.

The marshalling box shall be complete with necessary cable glands and cable lugs. The marshalling box and components shall comply with the requirements specified for control cabinets elsewhere in this specification.

Applicable Standards

The transformer and its accessories shall conform to the latest editions, including all amendments and revisions, of the following standards.

a. Power transformer : IS 1180, 2026/IEC 60076

b. Fittings & Accessories : IS 3639

c. Transformer oil : IS 335/IEC 60296

d. Bushing > 1000 V AC : IS 2099/IEC 60137

e. Transformer above 200 KVA rating: CBIP Pub. No. 295"Manual on Transformers

f. Transformer of rating 200 KVA & below :Three star level with BEE Specifications

Fittings and Accessories

The following fitting and accessories shall be provided on the transformer.

- Inspection manhole in the cover.
- Lifting lugs for both the transformer and the core.
- Two earthing terminals on opposite ends of the transformer tank.
- Name plate, rating plate and diagram plate.
- Radiator banks with suitably located thermometer pockets for measuring inlet and outlet oil temperature.
- Conservator, complete with filling plug, sump and drain valves and a shut-off valve on the pipe connection between transformer tank and conservator, to permit removal of the conservator. The conservator shall be designed to maintain an oil seal up to a temperature of 1000 degree C.
- Oil temperature indicator with a range of minimum 30 degree Celsius up to the maximum operating temperature.
- Weather proof dehydrating breather with activated alumina or silica gel as the dehydrating agent.
- For transformer rating above 250 kVA, magnetic type oil level gauge mounted on the conservator, and with a low oil level alarm contact and a waterproof and dustproof terminal box. For transformer less than 250 kVA, oil level indicator shall be provided.

- Gas detector relays, with separate alarm and trip contacts, complete with shut-off valves.
- Separate drain valve, oil-sampling valve with plug and a top filter valve on the tank.
- Explosion vent with diaphragm. The device shall be rainproof. An equaliser pipe connecting the pressure relief device to the conservator shall be provided.
- Separately mounted, waterproof and dustproof marshalling box (IP 65) housing the oil temperature indicator with alarm and trip contacts and marshalling facilities for electrical devices mounted on the transformer. Winding temperature indicator shall be provided for transformer rating of 250 kVA and above.
- Adequate number of air vents for relieving trapped air during oil filling and during maintenance.
- Thermometer pockets and sensing element mounted on the transformer tank cover for measuring top oil temperature.
- Bidirectional wheels for movement of the transformers.
- Accessories for clamping the wheel to the foundation channel in order to withstand earthquake forces.
- Adequate amount of insulating oil required for first filling, plus 10% excess oil.

Tolerance on Losses

The permissible tolerances on the guaranteed values of transformer losses shall be as per IS 2026. The No load & Load losses of the transformer for rating above 200 KVA shall be as per CBIP Pub. No. 295: “Manual on Transformers”. The Load losses & 50% Load losses for Transformers of rating 200 KVA and below shall be as per BEE Specification, Three star level.

Rejection

The Engineer or the Engineer's Representative reserves the right to reject the transformer if the same does not meet the specification requirement, subject to tolerances as per IS 2026. The rejected transformers shall be replaced by transformers complying with the requirements of this specification at the Contractor's cost.

If the commissioning of the project is likely to be delayed by the rejection of a transformer, the Engineer's Representative reserves the right to accept the rejected transformer until the replacement transformer is made available. Transporting the rejected and replacement transformers as well as installation and commissioning of both the transformers shall be at the Contractor's cost.

6.8. Technical Particulars

The specific technical particulars of the transformer shall be as given below:

Sl.No.	Description	Particulars
1	Rated output (kVA)	As per design
2	Transformer installation	Outdoor plinth mounted
3	No load transformation ratio	11 kV/0.433 kV
4	Number of phases	Three
5	Rated Frequency	50 Hz
6	Impedance at principal tap	As per CBIP Pub. No. 295" ''Manual on Transformers'' for transformers of rating more than 200 KVA. Three star level BEE specification for transformers of rating up to 200 kVA.
7	Number of windings / Material of conductor	Two / Copper for transformer of rating above 200KVA
8	Type of cooling	ONAN

Sl.No.	Description	Particulars
9	Vector group	Dyn 11
10	LV neutral earthing	Solidly earthed
11	Design ambient temperature.	50°C
12	Winding temperature rise measured by resistance method	45°C for transformer of rating above 200 KVA and as per BEE specification for transformer of rating 200 KVA & below
13	Oil temperature rise by thermometer	40°C for transformer of rating above 200 KVA and as per BEE specification for transformer of rating 200 KVA & below.
14	Tap changer	Full capacity, off-circuit type on HV side with pad locking facility
15	Tap range	+ 5 % to -10 %
16	Tap step	2.5 %
17	Terminal connection	
a)	HV bushing	Bushings suitable for overhead ACSR "DOG" conductor
b)	LV cable box	Cable box suitable for terminating 1100 V, 3.5 core, XLP cables (Number and size of cable shall be as per the one line diagram)
c)	LV Neutral	LV neutral shall be through a 1.1 kV rated bushing, both inside the cable box for forming the 3 Ph, 4-wire system and outside the cable box for direct connections to earth pits.

Tests

All tests required by the specification including repeated tests and inspection that may be necessary owing to the failure to meet any tests specified, shall be carried out at the Contractor's expense.

If the transformer fails to pass the tests specified, the Engineer shall have the option to reject the unit. Additional tests shall be conducted to locate the failure and after rectification, all tests shall be repeated to prove that the rebuilt transformer meets the specification in all respects, all at the Contractor's expense.

The following tests shall be carried out on the assembled transformer during inspection at the manufacturer's works.

a) Temperature rise test on one transformer.

b) Measurement of resistance of windings at principal and extreme taps.

c) Measurement of voltage Ratio at each tap, polarity and phase relationships.

d) Measurement of impedance voltage at principal and extreme taps.

e) Measurement of no load current and no load losses at rated frequency and at both the rated voltage and 110 % rated voltage.

f) Measurement of efficiency at ½, ¾ and full loads.

g) Measurement of insulation resistance.

h) Induced over voltage withstand test .

i) Separate source voltage withstand test.

j) Magnetic unbalance test.

k) Impulse Test.

In addition to the above tests, a withstand test with lightning impulse, chopped on the tail, shall be carried out on one limb of HV winding of the transformer if impulse test has not been already carried out on transformer of similar capacity in the last two years. Type test certificate shall be submitted along with the bid, if such a test has been already carried out. If the type test has to be carried out, it shall be at the contractor's expense.

6.9. Main LV Switchboard, And Control Panels / Cabinets

The following clauses shall be deemed to apply for all LV switchboards, distribution boards/panels, marshalling boxes, control cabinets/panels, etc.

6.10. General Constructional Features

Sheet steel used for fabrication of switchboards, control cabinets, marshalling boxes, etc shall be cold rolled.

All panels, cabinets, kiosks and boards shall comprise rigid welded structural frames made of structural steel sections or of pressed and formed cold rolled sheet steel of thickness not less than 2 mm. The frames shall be enclosed by sheet steel of at least 2 mm thickness. Stiffeners shall be provided wherever necessary.

All doors, removable covers, gland plates, etc. shall be of at least 1.6 mm thickness and shall be gasketed all around the perimeter.

All doors shall be supported by strong hinges of the disappearing or internal type and braced in such a manner as to ensure freedom from sagging, bending and general distortion of panel or hinged parts.

All floor mounted panels/boards shall be provided with a channel base frame. Total height of all floor mounted cubicles/panels shall not be greater than 2300 mm. Where steel pedestals for mounting of boards/panels are specified, the total height including that of the pedestal shall not exceed 2500 mm. It should be extendable at both ends.

Switchboard/control cabinet/panel shall be dust and vermin proof. Degree of protection of the enclosure shall be IP 54 for indoor installations and IP 55 for outdoor installations.

6.11. LV Switchboard

Separate, segregated metal clad compartments shall be provided for main and auxiliary bus bars, each feeder and cable alleys. Metal clad cubicles/modules shall be provided with hinged doors in the front, with facility for padlocking door handles. More than one module may be arranged in the same vertical section. Circuits shall

be of the fixed type. The switchboard enclosure shall conform to “Form-4” as per IS 8623. It shall be possible to extend the switchboard on both sides

The fixed type module shall have all the circuit components mounted in the compartment, with bolted type power and control connections. It shall be possible to remove all circuit components after removing the connections and the component fixing bolts.

Instruments, relays and control devices shall be mounted flush on hinged door of the cubicles. Switchboard shall be complete with inter-panel wiring.

Each switchboard shall also be fitted with a label indicating its title. Each cubicle shall be fitted with a label on the front and rear of the cubicle. Each relay, instrument, switch, fuse, contactor and MCCB/MCB shall be provided with a separate label.

One metal sheet shall be provided between two adjacent vertical sections running to the full height of the switchboard except for the horizontal bus bar compartment. However, each shipping sections shall have metal sheets at both ends. After isolation of the power and control connections of a circuit, it shall be possible to carry out maintenance in a compartment safely, with the bus bars and adjacent circuits alive..

The Screen DB cum Control Panel shall have separate control section for mounting control and indicating devices and control logic wiring. The power section shall be with compartmentalized modules.

6.12. Bus Bars

The phase and neutral bus bars shall be rating indicated in the corresponding single line diagram. Bus bars shall be of aluminium and shall be provided with minimum clearances as specified. Bus bar shall be made of high conductivity, high strength aluminium complying with requirements of grade E91E of IS 5082. The bus bar shall be suitably braced with non-hygroscopic SMC supports to provide a through fault withstand capacity of 50 KA RMS symmetrical per second.

All bus bars and bus taps shall be insulated with close fitting sleeve of hard, smooth, dust and dirt free, heat shrunk PVC insulation of high dielectric strength, to

provide a permanent non-ageing and non- tracking protection, impervious to water, tropical conditions and fungi. The insulation shall be non- inflammable and self-extinguishing type and in fast colours to indicate phases. The dielectric strength and properties shall hold good for the temperature range of 0 to 95 degree centigrade. If the insulating sleeve is not coloured, bus bars shall be colour coded with coloured PVC tape at suitable intervals.

Bus bar joints shall be of the bolted type. High tensile bolts, spring washers shall be provided to ensure good contact at the joints. Bus bars shall be thoroughly cleaned at the joints and suitable contact grease shall be applied just before making a joint.

Direct access to, or accidental contact with bus bars and primary connections shall not be possible. All apertures and slots shall be protected by baffles to prevent accidental shorting of bus bars due to insertion of maintenance tools.

Sequence of red, yellow and blue phases and neutral for four-pole equipment shall be left to right and top to bottom, for horizontal and vertical layouts respectively.

6.13. Circuit Breakers

6.13.1. Moulded Case Circuit Breaker (MCCB)

MCCBs shall be of the air break, quick make, quick break and trip free type and shall be totally enclosed in a heat resistant, moulded, insulating material housing.

MCCBs shall have an ultimate short circuit capacity not less than the prospective short circuit current at the point of installation.

MCCBs shall have a service short circuit breaking capacity equal to the ultimate short-circuit capacity.

Each pole of MCCB shall be fitted with a bi-metallic thermal element for inverse time delay protection and a magnetic element for short circuit protection. Alternatively, they shall be fitted with a solid state protection system. Such a protection system shall be fully self-contained, needing no separate power supply to operate the circuit breaker tripping mechanism. Thermal element shall be adjustable.

Adjustments shall be made simultaneously on all poles from a common facility. Thermal elements shall be ambient temperature compensated. The ON, OFF and Trip position of MCCB shall be clearly Indicated and visible to the operator.

The MCCBs shall be provided with the following features.

- Common trip bar for simultaneous tripping of all poles.
- Shrouded terminals
- Time for clearing short circuit current of 20 msec.
- 2 NO + 2 NC auxiliary contacts
-

6.14. Miniature Circuit Breaker (MCB)

MCB shall be hand operated, air break, quick make, quick break type.

Operating mechanisms shall be mechanically trip-free from the operating knob to prevent the contacts being held closed under overload or short-circuit conditions.

Each pole shall be fitted with a bi-metallic element for overload protection and a magnetic element for short-circuit protection. Multiple pole MCBs shall be mechanically linked such that tripping of one pole simultaneously trips all the other poles. The magnetic element tripping current classification shall be of the type suitable for the connected load. Where this is not specified, it shall be Type C.

The short circuit rating shall be not less than that of the system to which they are connected.

6.15. Contactors

The power contactors used in the switchboard shall be of, air break, single throw, triple pole, electromagnetic type. Contactors shall be suitable for uninterrupted duty and rated for Class AC3 duty in accordance with the latest edition of IS 13947.

Operating coils of all contactors shall be suitable for operation on 240 V, single phase, 50 Hz supply. Contactors shall be provided with at least two pairs of NO and NC auxiliary contacts. Contactors shall not drop out at voltages down to 70 % of coil rated voltage.

Contactors shall be provided with a two element, positive acting, ambient temperature compensated, time lagged, hand reset type thermal overload relay with adjustable settings. The hand reset button shall be flush with the front door of the control module, and shall be suitable for resetting the overload relay with the module door closed. Relays shall be either direct connected or CT operated. Overload relay and reset button shall be independent of the "Start" and "Stop" push buttons. All contactor shall all be provided with single phasing preventer (SPP). Motor starters shall be complete with auxiliary relays, timers and necessary indications.

6.16. Switch Disconnectors and Fuses

LV switch disconnectors shall be of the load break, fault make, group operated type. For use on 3-phase systems, the switches shall be of the triple pole type with a link for neutral wire. For use on single phase system and DC systems, the switches shall be of the two pole type.

Switch disconnectors shall be of the heavy duty, quick make and quick break type. Their contacts shall be silver plated, and contact springs shall be of stainless steel. Their handles shall have provision for locking in both fully open and fully closed positions. Mechanical ON-OFF indication shall be provided.

Switch disconnectors for controlling motor circuits shall be of the load break, fault make type, and shall be capable of breaking locked rotor current of the associated motor.

Where combination u n i t s of switch disconnector and fuses are used, the following interlocks shall be incorporated.

(a) The fuses should not be accessible unless the switch disconnector is in fully open condition.

(b) It should not be possible to close the switch disconnector when the fuse cover is open, but an authorized person may override the interlock and operate the switch disconnector. After such an operation, the cover shall be prevented from closing if the switch disconnector is left in the "ON" position.

All fuses shall be of the HRC cartridge type, mounted on plug-in type of fuse bases. Fuses shall be provided with visible indicators to show that they have operated. Current vs. time characteristics of all types of fuses shall be furnished to the Engineer's Representative.

Fuses and links functionally associated with the same circuit shall be mounted side by side.

An adequate number of spare fuse cartridges of each rating shall be supplied and fitted in clips inside the panel.

6.17. Instrument Transformers

Current transformer (CT) shall have polarity markings indelibly marked on each transformer and at the lead terminations at the associated terminal block. CT shall be able to withstand the thermal and mechanical stresses resulting from the maximum short circuit current. CT core laminations shall be of high grade silicon steel.The accuracy class for CTS shall be 1.0 for metering & 5P10 for protection. Secondary winding of voltage transformer (VT) shall be rated for a two phase line to line voltage of 230 V. Identification labels giving type, ratio, output and serial numbers shall be provided.

6.18. Relays

Main protective relays shall be Numerical / Static type. All relays shall be enclosed in rectangular shaped, dustproof cases and shall be suitable for flush mounting.

All relays shall be accessible from the front for setting and resetting. Access to setting devices shall be possible only after the front covers of the relays are removed. Resetting facilities shall however be accessible external to the relay case.

All protective relays shall be of the draw-out type and shall be provided with operation indicators visible from the front. Auxiliary relays and timers shall be rated to operate satisfactorily between 70% and 110% of the rated voltage.

6.19. Control and Selector Switches

Control and selector switches shall be of the rotary type, having enclosed contacts, which are accessible by the removal of the cover. Control and selector switches for instruments shall be flush mounted on the front of the panels and desks. The ammeter selector switches shall have four positions for reading three phase currents and fourth shall be off position.

All control switches shall be of the spring return to normal type and shall have momentary contacts. Selector switches shall be of the stay-put, maintained contact type. Voltmeter selector switch shall have four positions – three for phase to phase voltage and fourth shall be off position.

6.20. Indicating Instruments & Meters

Electrical indicating instruments shall be 110 mm square with 2400 scale. Taut band type of instruments is preferred. Taut band moving coil instruments for use on AC systems shall incorporate built-in transducers.

Instrument dials shall be white with black numbers and lettering. Normal maximum meter reading shall be of the order of 60 % normal full scale deflection. Ammeters for motor feeders shall have suppressed s cal e to show current from full load up to six times the full load current. Instruments shall have an accuracy of Class 1.0.

6.21. Indicating lamps

Indicating lamps shall be of the cluster LED type, with low watt consumption. Indicating lamp shall be of the double contact, bayonet cap type rated for operation at either 240 V AC or at the specified DC system voltage as applicable. Lamps shall be provided with translucent lamp covers to diffuse light.

Bulbs and lenses shall be interchangeable and easily replaceable from the front.

6.22. Push Buttons

"Start" and "Stop" push buttons shall be coloured green and red respectively. Stop Push Button shall be lockable stay-put type with Mushroom head. The contacts shall be of silver alloy of 10 A continuous current rating at 240 V AC. Each push button shall be provided with 2 NO + 2 NC contacts Emergency stop push button shall be of press to lock and turn to release type.

6.23. Space Heaters

Adequately rated anti-condensation space heaters shall be provided, one for each control panel, for each switchboard and for each marshalling kiosk. Space heater shall be of the industrial strip continuous duty type, rated for operation on a 240 V, 1 phase, 50 Hz, AC system. Each space heater shall be provided with a single pole MCB with overload and short circuit release, a neutral link and a control thermostat to cut off the heaters at 40 degree Celsius.

6.24. Cubicle Lighting/Receptacle

Each control panel, control cabinet, marshalling box, etc. shall be provided with interior lighting by means of a 20 W fluorescent tube lighting fixture. A MCB shall be provided for the lighting circuit. The lighting fixture shall be suitable for operation from a 240 V, 1 Ph, 50 Hz, AC supply. A 240 V, 1 phase, AC receptacle (socket) plug point shall be provided in the interior of each panel with a MCB for connection of hand lamp.

6.25. Safety Arrangements

All terminals, connections and other components which may be “live” when front access door is open, shall be adequately screened. It shall not be possible to obtain access to an adjacent cubicle or module when any door is opened. Components within the cubicles shall be labelled to facilitate testing.

6.26. Power and Control Cable Terminations

Equipment terminal blocks for power connections shall be complete with adequate phase segregating insulating barriers, shrouds and suitable crimping type of lugs for terminating the cables. Double compression type cable glands shall be provided for all power and control cables.

Earthing connectors between cable armour and earth shall be routed outside the cable gland in an approved manner. Gland insulation shall be capable of withstanding a high voltage test of 3000 V for one minute.

6.27. Wiring for Control and Protective Circuits

All wiring for control, protection and indication circuits shall be carried out with 650 V grade, PVC insulated cable with stranded, tinned copper conductor of minimum 1.5 sq.mm size. The size of conductor for CT circuits shall be minimum 2.5 sq. mm.

All wiring shall be run on the sides of panels and shall be neatly bunched and cleated without affecting access to equipment mounted in the panel. All wiring shall be taken to terminal blocks without joints or tees in their runs.

All wiring shall be colour coded as given below.

AC Circuit : Red, Yellow or Blue determined by the phase with which the wire is associated

A C phase wire : White

A C neutral : Black

D C circuits : Grey

Earth connections : Green

Engraved core identification ferrules, marked to correspond with the wiring diagram, shall be fitted to each wire and each core of multicore cables terminated on the panels. Ferrules shall fit tightly on wires, without falling off when the wire is removed. Ferrules shall be of yellow colour with black lettering.

All wires forming part of a tripping circuit shall be provided with an additional red ferrule marked 'T'. Each wire shall be identified by a letter to denote its function followed by a number to denote its identity, at both ends. Unused core of multicore cables shall be ferruled U1, U2 etc., at both ends, and connected to spare terminals. Spare auxiliary contacts of electrical equipment shall be wired to terminal blocks.

6.28. Control Wiring Terminal Blocks

Terminal blocks shall be of the 650 V grade and stud type. Brass stud of at least 6 mm dia. with fine threads shall be used and securely locked within the mounting base to prevent turning. Each terminal shall comprise two threaded studs, with a link between them, washers, and matching nuts and locknuts for each stud. Connections to the terminals shall be at the front.

Terminals shall be numbered for identification, grouped according to function. Engraved 'black on-white' labels shall be provided on the terminal blocks describing the function of the circuit.

Terminals for circuits with voltage exceeding 110 V shall be shrouded. Terminal b l o c k s at different voltages shall be segregated into groups and distinctively labeled.

Terminals used for connecting current transformer secondary leads shall be 'disconnecting and shorting' type with a facility grounding the secondary. Terminal blocks shall be arranged with 100 mm clearance, between any two sets. Separate terminal stems shall be provided for internal and external wiring respectively. All wiring shall be terminated on terminal blocks, using crimping type lugs or claw type of terminations.

6.29. Test Terminal Blocks

Test terminal blocks, if any, shall be provided for secondary injection and testing of relays. A suitable metering block shall be provided where specified for the connection of a portable precision instrument to be operated when required for specific plant testing purposes.

6.30. Earthing of Switchboards/Panels

Each switchboard, control panel, etc. shall be provided with an earth bus bar running along its entire length. The earth bus bar shall be located at the bottom of the board/panel. Earth bus bars shall be of copper and shall be rated to carry the rated symmetrical short circuit current of the associated board/panel for one second, unless otherwise specified. Earth bus bars shall be properly supported to withstand

stresses induced by the momentary short circuit current of value equal to the momentary short circuit rating of the associated switchboard/panel.

Positive connection of the frames of all the equipment mounted in the switchboard to the earth bus bar shall be maintained through insulated conductors of size equal to the earth bus bar or the load current carrying conductor, whichever is smaller.

All instrument and relay cases shall be connected to earth bus bar by means of 650 V grade, green coloured, PVC insulated, stranded, tinned copper, 2.5 sq. mm conductor looped through the case earth terminals.

6.31. Applicable Standards

The following standards and codes of practice shall be applicable. These shall be the latest editions including all official amendments and revisions. The standards referred to therein shall also be applicable.

Air break switches, MCCBs, etc. for voltage not exceeding 1000 V AC or 1200 V DC	IS: 13947
Current transformer	• IS: 2705 / IEC: 60044
• Voltage transformer	• IS: 3156 / IEC: 44, 60186
• Electrical Relays	• IS: 3231, 3842 / IEC: 60255
• Contactors for voltage not exceeding 1000 V AC	• IS: 13947 / IEC: 60947
• Control Switches	• IS: 6875 / IEC: 60947
• High Voltage Fuses	• IS: 9385 / IEC: 60282
• Low voltage Fuse	• IS: 13703 / IEC: 60269
• Electrical direct acting indicating instruments	• IS: 1248 / IEC: 60051

AC electricity meters of induction type for voltage greater than 1000 volts	IS: 722, 8530 / IEC: 60145, IEC:60211
Porcelain post insulators for system with nominal voltages greater than 1000 volts	IS: 2544
• Specification for copper rods and bars for electrical purposes	• IS: 613
• Specification for low voltage switchgear and control gear	• IS: 13947 / IEC: 60947
Degree of protection provided by enclosures for low voltage switchgear and control gear	IS: 13947 / IEC: 60947
Marking and arrangement for switchgear, bus bars, main connections and auxiliary wiring	IS: 5578 / IS: 161.253
Code of practice for selection, installation and maintenance of switchgear and control gear	:IS: 10118
Miniature Circuit Breakers	:IS: 8828 / IEC: 60898
Control Switches/ Push buttons	:IS: 6875
Low voltage switchgear and control gear	:IS: 8623

6.32. Technical Particulars

The Specific technical particulars of switch board shall be as given below;

Sl. No.	Description	Particulars
1	Rated voltage, Phases and Frequency	415 V +/-15%, 3 Ph, 50 Hz +/-1%, conform to IS 8623
2	Design ambient temperature	45 Deg. Celsius
3	Type of Construction	Single front, fixed type
4	Maximum system voltage	476 V
5	One minute Power Frequency withstand voltage	
a)	Power circuit	3000 V (rms)
b)	Control Circuit	2000 V (rms)
c)	Auxiliary circuit connection to secondary of CTs	2000 V (rms)
6	Current rating of bus bars over design ambient temperature of 45°C	As per Line Diagram got to be approved from EIC
7	Short circuit withstand for main and auxiliary bus bars (1 sec.)	As per Line Diagram got to be approved from EIC
8	Maximum temperature of main and auxiliary bus bars at continuous rated current rating under site design ambient temperature of 45°C	85°C
9	Colour finish shade as per IS:5	
a)	Interior	Glossy white
b)	Exterior	Light gray, semi-glossy, shade 631 of

Sl. No.	Description	Particulars
		IS5
10	Earthing bus material and size	Copper, 25 x 6 mm
11	Clearances in air of live parts	25.4 mm
12	Power contactors	
a)	Contactor rated duty	Uninterrupted
b)	Utilization category	AC3
13	Motor Starters	For motor < 5.5 kW – DOL, >5.5 KW star delta > 75 KW soft starter
14	Type of Mounting	Floor
15	Cable Entry	Bottom

Tests

The following routine tests shall be carried out on the assembled switchboard/panel duri ng inspection at the manufacturer's works in addition to other tests.

(a) Inspection of assembly including inspection of wiring, i f necessary electrical operation tests.

(b) One minute power-frequency voltage dry withstand tests on the main circuits

(c) One minute power-frequency voltage dry withstand tests on the auxiliary circuits

(d) Checking of protective measures and of the electrical continuity of the protective circuit.

6.33. Capacitors and APFC Panel

General

The capacitor bank shall be complete with all parts that are necessary or essential for efficient operation. Such parts shall be deemed to be within the scope of supply whether specifically mentioned or not. It shall be complete with the required capacitors along with the supporting post insulators, steel rack assembly, copper bus bars, copper connecting strips, foundation channels, fuses, fuse clips, etc. The steel rack assembly shall be hot dip galvanized.

The capacitor bank may comprise of suitable number of single phase units in series parallel combination. However, the number of parallel units in each of the series racks shall be such that failure of one unit shall not create an over voltage on the units in parallel with it, which will result in the failure of the parallel units. The assembly of the banks shall be such that it provides sufficient ventilation for each unit. Each capacitor case and the cubicle shall be earthed to a separate earth bus.

Capacitor shall conform to IS 2834. Capacitors shall be of mixed dielectric or APP type. Each unit shall satisfactorily operate at 61.25 % of rated kVAR including factors of over voltage, harmonic currents and manufacturing tolerance. The units shall be capable of continuously withstanding satisfactorily any over voltage up to a maximum of 10 % above the rated voltage, excluding transients.

Each capacitor unit/bank shall be fitted with directly connected continuously rated, low loss discharge device to discharge the capacitors to reduce the voltage to 50 volts within one minute upon disconnection, in accordance with the provisions of the latest edition of IS:2834.

Unit Protection

Each capacitor unit shall be individually protected by a HRC fuse suitably rated for load current and interrupting capacity, so that only the faulty capacitor unit will be disconnected without causing the bank to be disconnected. An operated fuse shall give visual indication so that it may be detected during periodic

inspection. The fuse breaking time shall co-ordinate with the pressure built up within the unit to avoid explosion. Mounting of the individual fuse should be internal to the capacitor case.

APFC microprocessor b a s e d relay shall automatically switch ON/OFF the capacitor banks to attain the value of "pf" close to the set value. Switching shall follow first in first out (FIFO) method to ensure uniform use of all capacitor banks. At least eight steps shall be provided for switching.

Capacitor (APFC) Control Panel

Capacitor and capacitor control shall be housed in a metal enclosed cubicle. Capacitor shall be housed in the lower compartment and capacitor control unit at the top compartment, the two compartments being segregated.

The cubicle shall be fabricated out of 2 mm thick cold rolled sheet steel and shall of a degree of protection of IP 54. The panel shall comprise:

a. Isolating MCCB

b. Contactors with overload element

c. Relays responsive to current/voltage/kVAR/pf for automatic switching

d. Sequencing devices, timers and auxiliary relays for automatic sequential switching of capacitor units in and out of circuit

e. Auto-manual selector switch

f. Microprocessor based Automatic Power factor correction (APFC) Relay

g. Push button for opening and closing the power circuit.

h. Red and Green lamps for capacitors ON/OFF indication.

i. Protective relays to protect the healthy capacitor units when one unit fails in a series connection.

j. Space heater and cubicle lighting.

The specific technical particulars of capacitors shall be as given in the table below.

Sl. No.	Description	Particulars

1	Rated Capacity	As per design
2	Rated voltage, frequency and phases	433 V, 50 Hz, 3 Phase
3	Design ambient temperature	45 Degree Celsius
4	Insulation level	3 kV (rms)
5	Capacitor bank connection	Delta
6	Control	Automatic by "pf" correction relay (micro-processor based)
7	No. of steps for control	At least 8
8	Capacitor Bank Enclosure	
a)	Type	Floor mounted
b)	Colour finish / shade	Interior: glossy white Exterior: Light grey, semi glossy, shade 631 of IS 5

6.34. Tests and Test Reports

All routine and mutually agreed special tests shall be conducted in accordance with the latest edition of IS: 2834 and as applicable f o r the controls. Type test certificates for similar capacitor units shall be furnished.

6.35. Power and control cables

All existing undamaged / un-jointed cables having adequate length, meeting the requirements of the new designs, will be utilized in the new installations. The existing cables with ratings same or more than the requirement would be HV tested / IR tested during the execution of the project and decided accordingly. It will be checked whether the voltage drop of such cables will be limited to 2.5 % at rated equipment current rating. The applicable standards will be IS 1554, 7098, 8130, 5831, 3975, IEC 60183, 60227, 60502, 60885. The cable shall be ISI marked.

6.36. Technical Data Sheet

Description	Particulars
Voltage grade of cable	1100V
Permissible voltage variation	+10% & -15%
Permissible frequency variation	+ 3%
Material of conductor	Aluminum, H4-grade, Class-2
Type of conductor	Stranded
Material of insulation	Extruded PVC, Type-A / XLPE – (Refer Single Line Diagrams for details)
Material of inner sheath	Extruded thermoplastic or unvulcanized rubber
Material of armour	Galvanized steel
Material of outer sheath	Extruded PVC, Type-ST 2
Core identification	Required

6.37. Earthing System

6.37.1. Scope

The scope includes supply of earthing conductors and earth electrode pits and their installation including associated civil work as per the specifications and drawings, to the satisfaction of the Engineer's representative and the Electrical Inspector.

Proper earthing shall be provided to ensure adequate system neutral earthing and for equipment and personnel safety.

All work such as cutting, bending, supporting, painting/coating, drilling, welding, clamping, bolting and connection to structures, equipment frames, terminals, etc.

shall be in the Contractor’s scope of work. All incidental hardware and consumables such as fixing cleats/clamps, anchor fasteners, lugs, bolts, nuts, washers, bituminous compound, welding rods, anti-corrosive paint as required for the complete work shall be deemed to be included by the Contractor as part of the installation work.

6.38. Earthing System Installation

Earthing system shall conform to the latest edition including all official amendments and revisions of IS: 3043 and Indian Electricity Rules, 1956. All materials and fittings used in the earthing installation shall conform to the relevant Indian Standards or shall be as approved by the Engineer's Representative.

Installation work shall be in accordance with approved earthing layout drawings and any change in routing, size of conductors etc. shall be subject to the prior approval of the Engineer's Representative.

Installation of earth conductors in outdoor areas, buried in ground, shall include excavation of trench of size 600 mm deep and 450 mm wide, laying of conductor at 600 mm depth, welding as required of main grid conductor joints; as well as provision of risers upto 500 mm above ground at required locations and then backfilling of excavated area by material that is free from stones and other harmful mixtures. Backfill shall be placed in layers of 150 mm, uniformly spread along the trench and compacted by approved means. If the excavated soil is found unsuitable for backfilling, the Contractor shall arrange for suitable material from outside.

Metallic frames of all electrical equipment shall be earthed by two separate and distinct leads and then connected with earthing system

Neutral points of transformers shall be earthed by two separate and distinct connections to two treated electrode pits. The neutral of the transformer should be solidly earthed.

Crane rails shall be connected to the earthing system.

An earthing pad shall be provided under each operating handle of the disconnector. Operating handle of the disconnector and the supporting structure shall be bonded together by a flexible connection and connected to earth grid.

Cable sheaths and armour shall be bonded to the earthing system. Metal pipes and cable conduits shall be effectively bonded and earthed.

Neutral connection shall never be used for equipment earthing.

The scope of installation of earthing leads to the equipment and risers on steel structures/walls shall include laying the conductors, welding/cleating at specified intervals, welding to the main earth grids, risers, bolting at equipment terminals and coating welded joints by bituminous paint. Galvanized conductors shall be touched up with zinc-rich paint, when holes have to be drilled in them at site for bolting to equipment/structure.

The substation consisting of structure, transformer, fence and gate shall be properly earthed.

Wherever earthing conductor crosses underground service duct and pipes, it shall be laid 300 mm below them. If the distance is less than 300 mm, the earthing conductor shall be bonded to such service ducts/pipes.

Wherever earthing conductor passes through walls, GS sleeves shall be provided for the passage of earthing conductor. The pipe ends shall be sealed by suitable water-proof compound. Water stops shall be provided where earthing conductor enters the building from outside, below grade level.

Wherever there is hard rock and earthing resistance is not as per IS, than chemical earthing viz Pipe in Pipe or Strip in Pipe earthing may be provided.

Connections

All connections in the main earth conductors buried in earth/concrete shall be welded type. Connection between earthing conductor and earth leads shall also be of welded type. Connection between buried MS conductor and GS conductor above ground shall be done above ground.

Connection between earth leads and equipment shall be of bolted type.

6.39. Earth Electrode Pits

Electrodes shall, as far as practicable, be embedded below permanent moisture level.Test pits with concrete covers shall be provided for periodic testing of earth resistance. Installation of pipe electrodes in test pits shall be suitable for watering. The necessary materials required for installation of test pits shall be supplied and installed by Contractor. The installation work shall also include civil works such as excavation/drilling and connection to main earth grid.

Treated earth pits shall be treated with salt and charcoal. Soil, salt and charcoal placed around the electrode shall be finely graded, free from stones and other harmful mixtures. Backfill shall be placed in layers of 250 mm thick uniformly spread and compacted. If excavated soil is found unsuitable for backfilling, the Contractor shall arrange for a suitable soil from outside.

6.40. Technical Particulars

The specific technical particulars of earthing system shall be as given below.

Sl. No.	Description	Size & Material	No. of Leads
1	11 kV equipment, transformer neutral, body and 2-pole structure	50 x 6 mm GS flat	2 each
2	Main LV Switchboard at SPS	50 x 6 mm GS flat	2
3	STP Distribution board	50 x 6 mm GS flat	2
4	Capacitor Control panel	50 x 6 mm GS flat	2
5	Cable tray support	50 x 6 mm GS flat	2
6	DBs & LPs	25 x 3 mm GS flat	2
7	Local PB station	12 SWG – GS	1
8	Motors		

Sl. No.	Description	Size & Material	No. of Leads
a) b)	Small motors Main motors	8/12 SWG GS wire 50 X 6 mm GS flat	2 2
9	Earth Electrode	40 mm dia., 3 M long, heavy duty GI pipe electrode	-
10	Main grid buried in ground	50 x 6 MS flat	-

6.41. Cabling system

General

The cabling system covers the supply of cable trays, racks, supports and associated accessories, hardware and their installation. It shall be the responsibility of the contractor to complete the cabling system in all respects.

The following points shall be noted while planning cabling system.

a) Inside the building: Cable trenches with cable racks and or cable trays
b) Cables shall be clamped to the cable racks at regular intervals
c) All cable trays shall be hot dip galvanized while racks and supports shall be painted.
d) All steel sections such as angles, channels, and brackets etc., required for supporting the cable trays shall be supplied by the contractor and fabricated at site.
e) Flexible metallic conduits shall be used for termination of connection to equipment such as motors, limit switches and other apparatus.

6.42. Installation of Cables

The Contractor shall install, test and commission the cables in accordance with the approved drawings, and instructions issued by Engineer's Representative. Cables shall be laid directly buried in earth, on cable racks, in built up trenches and supports, on trays, in conduits and ducts or bare on walls, ceiling etc. as per approved

drawings. Contractor's scope of work includes unloading, laying, fixing, jointing, bending, and termination of the cables. The Contractor shall also supply the necessary materials and equipment required for jointing and termination or the cables.

All apparatus, connections and cable work shall be designed and arranged to minimize risk of fire and any damage, which might be caused in the event of fire. Wherever cables pass through floor or wall openings or other partitions, suitable bushes of an approved type shall be supplied and put into position by the Contractor. The Contractor shall seal the cables into the bushes using fire resisting materials to prevent the spreading of fire through each partition.

Standard cable grips and reels shall be utilized for cable pulling. If unduly difficult pulling occurs, the Contractor shall check the pull required and suspend pulling until further procedure has been approved by the Engineer's Representative. The maximum pull tension shall not exceed the recommended value for the cable measured by the tension dynamometer. In general, any lubricant that does not injure the overall covering and does not set up undesirable conditions of electrostatic stress or electrostatic charge may be used to assist in the pulling of insulated cables in conduits and ducts.

After pulling the cable, the Contractor shall record cable identification with date pulled neatly with waterproof ink in linen tags / aluminium tag and shall securely attach such identification tags. Identification tags shall be attached to each end of each cable with non-corrosive wire. The said wire must be non-ferrous material on single conductor power cable. Tags may further be required at intervals on long runs of cables on cable trays and in pull boxes. Cable and joint markers and RCC warning covers shall be provided wherever required.

Sharp bends and kinks in cables shall be avoided. The bending radii for various types of cables shall not be less than 15 times the overall diameter of the cable.

Power, control and instrumentation cables shall be laid in separate cable racks/trays.

Where cables cross roads or water/sewage pipes, the cables shall be laid in reinforced spun concrete or steel pipes. For road crossings, the pipe for the cables shall be buried at not less than one meter depth.

Cables laid in ground shall be laid on a 75 mm riddled earth bed. The cables shall then be covered on top and at their sides with riddled earth of depth of about 150 mm. This should be then filled up to a depth of about 100 mm above the top of uppermost cable to provide bedding for the protective cable covers which shall be placed centrally over the cables. The protective cable covers for LV cables may be of earthenware and for HV cables of reinforced concrete. The RCC covers shall have one hole at each end, to tie them to each other with GI wires to prevent displacement. The trench should be then backfilled with the excavated soil and well rammed in successive layers of not more than 300 mm thick, with the trenches being watered to improve consolidation wherever necessary. To allow for subsidence, a crown of earth not less than 50 mm in the center and tapering towards the sides of the trench should be provided.

Each cable shall be pulled into the particular conduit and shall be taken from the particular reel designated for the run. In hand holes, pull boxes or junction boxes having any dimension over 1000 mm, all conductors shall be cabled and/or racked in an approved manner. Care shall be taken to avoid sharp bending or kinking cables, damaging insulation or stressing cable beyond manufacture's recommendations in pulling. Cable shall be protected at all times from mechanical injury and from absorption of moisture at unprotected ends.

In each cable run, some extra length shall be kept at a suitable point to enable one or two ‘straight through joints’ to be made, should the cable develop a fault at a later date.

Cables on cable racks, and conduits shall be formed to avoid bearing against edges or trays, racks, conduits or their supports upon entering or leaving racks or conduits.

Cables splices shall not be used except where permitted by the Engineer's Representative. Splices shall be made by Contractor for each type of wire or cable in accordance with the instructions issued by cable manufacturers and the Engineer's

Representative. Before splicing, insulated cables shall have conductor insulation stepped and bound or penciled for recommended distance back from splices to provide a long leakage path. After splicing, insulation equal to that on the spliced conductors shall be applied at each splice.

At cable terminal points, where the conductor and cable insulation will be terminated, terminations shall be made in a neat, skillful and approved manner by specially trained staff. Terminations shall be made by the Contractor for each type of wire or cable in accordance with instructions issued by cable manufacturers or the Engineer's Representative.

Control cable termination shall be made in accordance with wiring diagrams, using proper colour codes for the various control circuit, by code marked wiring diagram.

When control cables are to be fanned out and corded together with cord, the Contractor shall make connections to terminal blocks, and test the equipment for proper operation before cables are corded together. If there is any doubt about correctness of connection, the Contractor shall make a temporary connection with sufficient length of cable so that the cable can be switched to another terminal without splicing. After correct connections are established, cables shall be cut to their correct lengths, connected to terminals in the specified manner, and corded together where necessary to hold them in place in a skillful manner. Jointing of cables shall be in accordance with relevant Indian Standards Codes of Practice and manufacturer's instructions.

Materials and tools required for cable jointing work, including cold setting bituminous compound shall be supplied by the Contractor. Cables shall be firmly clamped on either side of a ‘straight through joint’ at a distance of not more than 300 mm away from the joints. Identification tags shall be provided at each joint at all cable terminations.Cable seals shall be examined to ascertain if they are intact and that cable ends are not damaged. If the seals are found to be broken the cable ends shall not be jointed until after due examination and testing under supervision of the Engineer's Representative. Before jointing is commenced, insulation resistance of both sections of cables to be jointed shall be checked by megger.

After installation and alignment of motors, the Contractor shall complete the conduit installation, including a section of flexible conduit between motor terminal box and trench/tray. The Contractor shall install and connect the power, control and heater supply cables as per equipment manufacturer's drawings, if any. The Contractor shall be responsible for correct phasing of the motor power connection and shall interchange connections at the motor terminal box, if necessary, after each motor is test run.

Connections to recording instruments float switches, level electrodes, limit switches, pressure switches, thermocouples, thermostats and other miscellaneous equipment shall be done as per manufacturer's drawings and instructions.

Metal sheath and armour of the cable shall be bonded to the earthing system of the station. The size of conductor for bonding shall be appropriate with the system fault current. All cables shall be tested for insulation resistance before jointing. After jointing is completed, all cables shall be tested again by a 1000 volt megger.

Cable core shall be tested for

a) Continuity;

b) Absence of cross phasing;

c) Insulation resistance to earth; and

d) Insulation resistance between conductors.

Contractor shall furnish testing kits and instruments required for field testing.

6.43. Outdoor HV Substation Equipment with Structure

General

The scope of supply consists of a two pole (or more, as required) galvanised steel (GS) structure fabricated out of ISMBs and ISMCs; PCC poles for drawing overhead line; GS structural sections for supporting and fixing various equipment; transformer,

lightning arresters, disconnector, drop-out fuses, insulators and hardware, ACSR conductor, etc.; fixing accessories, and chain link fencing with padlockable gate.

The design, material, construction, manufacture, inspection and testing of all HV outdoor substation equipment and overhead line shall comply with the currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed.

The equipment shall conform to applicable standards. All standards and code of practices shall be the latest editions including all official amendments and revisions.

The details of the steel structure and support sections/members shall be subject to approval of structural design calculations to be furnished by the contractor.

6.44. Disconnector

Constructional Features

i. The disconnectors shall conform to IS 9921 and IEC 60129.

ii. The disconnector switch shall be complete with all parts that are necessary for complete operation. Such parts shall be deemed to be within the scope of supply, whether specifically mentioned or not. Clamps/connectors shall also be supplied.

iii. The disconnector design shall be such that it is free from visible corona discharge in both closed and open positions, at the visible discharge test voltages as per the applicable standards.

iv. The disconnector shall be provided with high current carrying contacts on the hinge and jaw ends. All contact surfaces shall be silver faced copper.

v. The disconnector handle shall be provided with a padlocking facility to lock it in fully open or fully closed positions. Rust proof padlocks shall be supplied with the disconnectors.

vi. Insulator used in the assembly of disconnector shall be of porcelain and of brown colour. Insulator cap and base shall be of high-grade cast steel or malleable steel casting and they shall be machine faced and galvanised.

vii. Disconnector base shall be of galvanized steel.

Operating Mechanism

i. Operating devices for disconnector shall be manually operable.

ii. Operating mechanism shall provide a quick, simple and effective operation. One man shall be able to operate the disconnector without undue effort.

iii. The manual operating handles shall be mounted on the base of the supporting structure. Guide bearings shall be provided at a height of 750 mm above grade level. All brackets, angles, guides, guide bearings or other members necessary for attaching the operating mechanism and the operating handles to the supporting structure shall be supplied as an integral part of the disconnector. Rustproof pins and bearings of bronze bushing, ball and roller type, shall be furnished. All bearings shall be weather protected by means of covers and grease retainers. Bearing pressures shall be kept low to ensure long life and ease of operation.

iv. Disconnector and its operating mechanism shall be such that it cannot be dislodged from its open or closed positions by gravity, wind pressure, vibrations, shocks or accidental touching or breaking of the connecting rods or the operating mechanism.

The specific technical partculars of disconnectors shall be as given below.

Sl.No.	Description	Particulars
1	Installation	Outdoor
2	Rated voltage	11 kV
3	Rated Current	40 A / as per approved SLD
4	Frequency	50 Hz
5	Short circuit withstand rating for one second	26 kA (rms)
6	Design ambient temperature	50° C

Sl.No.	Description	Particulars
7	Impulse withstand voltage across the isolating distance Across the isolating distance. Between poles and earth	 75 kV rms /conform to IS 75 kV rms /conform to IS
8	One minute power frequency withstand voltage kV Across the isolating distance. Between poles and earth	 28 kV rms /conform to IS 28 kV rms /conform to IS
9	Phase spacing (minimum)	914 mm/ conform to IS

6.45. Lightning Arrester

Lightning arrester (LA) shall be of outdoor, metal oxide (gapless) type and shall conform to IEC 60099. LA shall be of hermitically sealed type and of self-supporting construction, suitable for mounting on steel structures.

Housing of the LA shall be of porcelain, having adequate mechanical strength and rigidity for satisfactory operation under climatic conditions obtaining at site. Porcelain shall be finely glazed and shall be free from imperfections.

LA shall incorporate anti-contamination feature to prevent arrester failure, consequent to uneven voltage gradient in the event of contamination of the arrester housing.

LAs shall be complete with insulating base with a provision for bolting to flat surface of supporting structure.

LA shall be complete with line and earth terminals. The terminal clamps/connectors on the earth terminal of the arresters and the discharge counter incoming and outgoing terminals shall also be provided.

The specific technical particulars of the LA shall be as given in the table below.

Sl. No.	Description	Particulars
1	Type	Metal Oxide (Gapless)
2	Rated voltage	9.6 kV
3	Rated frequency	50 Hz
4	Nominal discharge current 8/20 Micro Sec current wave	10 kA (peak) /conform to IS
5	High current impulse 4/10 Micro Sec current wave	100 kA (peak) /conform to IS
6	Residual voltage corresponding to steep current impulse of 10 kA (peak)	108 kV (peak) /conform to IS
7	Long duration line discharge capability	Class 2
8	Lightning impulse withstand voltage of housing 1.2/50 Micro Sec current wave	75 kV (peak) /conform to IS
9	Total creepage distance of housing	900 mm /conform to IS

6.46. Insulators

The porcelain post insulators shall conform to IS 2544 and IEC 60273, the insulators for overhead lines shall conform to IS 731 and IEC 60305, 433 and the insulator fittings shall conform to IS 2486.

Porcelain used for the manufacture of insulators shall be homogeneous, free from flaws or imperfections that might affect the mechanical or dielectric quality. They shall be thoroughly vitrified, tough and impervious to moisture. The glazing of the porcelain shall be of uniform brown color, free from blisters, burns and other similar

defects. The porcelain shall be sound, free from defects and smoothly glazed. Insulators shall have compression type glaze with a good lustre.

Insulators shall be designed to avoid excessive concentration of electrical stresses in any section or across leakage surfaces. Design features, which increase radio influence level, shall be avoided.

All metal parts shall be made of commercial grade malleable iron or open hearth or electric furnace steel, hot dip galvanised to relevant standards. Castings, if any shall be free from blow holes, cracks and such other defects.

The specific technical particulars of insulator shall be as given in the table below.

Sl.No.	Description	Particulars	
1.	Type	Strain	Post
2.	Rated voltage	11 kV	11 kV
3.	Type of insulators	Disc	Stack
4.	No. of insulators	3 per string	2 no.
5.	Impulse withstand voltage of 1.2/50 micro sec. wave	75 kV (peak)	75 KV (peak)
6.	Power frequency voltage withstand	28 kV rms / conform to IS	28 kV rms / conform to IS
7.	Dry Wet	28 kV 28 kV	28 kV 28 kV
8.	Visible discharge power frequency test	27Kv / conform to IS	27kV / conform to IS
9.	Total creepage distance	900 mm/ conform to IS	900 mm/ conform to IS

6.47. Drop-out Fuses

Drop-out fuse assembly shall be complete with fuse carrier, post insulator, jaw and hinge, live parts, terminals, channel base, fixing bolts, nuts and washers. Fuse links shall also be supplied.

All materials used in the manufacture of drop-out fuses shall be suitable for conditions specified and shall withstand variations of temperature and atmospheric conditions without deterioration or distortion of any kind in any part. All non-metallic parts of fuse carrier shall be of tough, non-ignitable insulating materials.

Mounting of drop-out fuses shall be such that its isolation/removal/replacement is easy. It shall have positive guides for this purpose.

Bird proof constructional features shall be provided.

It shall be possible to adjust spring pressure of the top contact to ensure consistent performance

All current carrying parts shall be of copper alloy. The contacts shall be of gun metal brass or phosphor bronze. The contact surface shall be silver plated to ensure low contact resistance.

Fuse links shall be of such construction as to prevent danger from overheating, arcing and scattering of hot metal or powder or emission of flame, when operating in service.

When the fuse link ruptures or when the fuse carrier is pulled downwards, the carrier shall swing free to an inverted position. The carrier shall be brought to a cushioning stop to eliminate shock on the carrier and lower insulator unit.

The base channel and all ferrous parts shall be hot-dip galvanised as per the applicable standards.

Drop-out fuse base channel shall bear a name plate describing the major technical particulars. Fuse base, fuse link and fuse carrier shall bear the markings as per IS.

An operating rod with provision at the top for switching and removing fuse carrier shall be provided. The rod shall be minimum 6.0 m long unless otherwise stated.

Multi-bolt (bi-metallic) terminal clamps shall be provided at the top and bottom of fuse base contacts suitable for connection to the ACSR conductor.

Fuse kit shall be supplied, consisting of fuse-link assembly, refusing tool and any other item necessary to restore the fuse units to service after an operation.

Drop-out fuse frame shall have two earthing terminals. The specific technical parameters of drop-out fuse shall be as given below.

Sl.No.	Description	Particulars
1.	Installation	Outdoor
2.	Rated Voltage	11 kV
3.	Rated Frequency	50 Hz
4.	Rated Current of contacts	40 Amp/ as per approved SLD
5.	Rated current of fuse links	10 A /as per approved SLD

6.48. Lighting System

Scope

This covers supply, installation and commissioning of all equipment necessary for a complete lighting and receptacle system. The type of lighting fixtures and receptacles shall be as specified. The quantity required shall be as per the approved lighting layout drawings to be submitted by the contractor. Equipment shall include lighting panels, lighting fixtures, lighting fixture supports, street lighting poles, switches, receptacles, ceiling fans, exhaust fans, conduits, wires, cables, and miscellaneous accessories as necessary for a complete system.

6.49. Lighting Fixtures

The lighting fixtures offered shall comply with the following requirements.

a) The fixtures shall be suitable for operation on a nominal supply of 240 V, single phase, 50 Hz, AC with a voltage variation of + 10 %.

b) All lighting fixtures shall be supplied complete with lamps and all necessary accessories such as ballast, capacitor, etc. for their satisfactory operation.

c) Starter of the fluorescent light fixture shall be replaceable without disturbing the reflector or lamps and without the use of any tool.

d) The capacitor of the lighting fixture shall have adequate value of capacitance to correct the power factor of its fixture to 0.98 lag.

e) Lamp holders for fluorescent tubes shall be of the spring loaded, low contact resistance, bi-pin rotor type, resistant to wear and suitable for operation at the specified temperature, without deterioration in insulation value, contact resistance or lamp holding quality.

f) Lamp-holders for HPSV lamps shall be of GLS type, manufactured in accordance with the relevant standard and designed to give long and satisfactory service.

g) Lighting fixture reflectors shall generally be manufactured from steel or aluminum sheet of not less than 20 SWG thickness.

h) Polystyrene or aluminum egg-box type louvres shall be provided wherever specified.

i) Each fixture shall be complete with a four way terminal block for connection and looping of incoming and outgoing cables. Each terminal shall be able to accept two 2.5 mm2 copper stranded conductors.

j) Each lighting fixture shall be provided with an earthing terminal suitable for connecting 16 SWG copper stranded conductor.

k) All metal or metal enclosed parts of the housing shall be bonded and connected to the earth terminal to ensure satisfactory earthing continuity throughout the fixture.

l) The enamel finish shall have a minimum thickness of 2 mils for outside surface and 1.5 mils for inside surfaces. The finish shall be non-porous and free from blemishes, blisters, and fading.

m) All reflectors and louvers shall be finished to the same standard as the fixture housing.

n) The ligting fixtures with lamps shall be preferably of LED type being of long life and low electricity consumption

6.50. Receptacle Units

Decorative and industrial type receptacle units of 5 A, 15/16 A and 32 A rating with switches/MCBs shall be supplied. The units shall be suitable for mounting flush on GS sheet boxes. Receptacles in the chlorine house shall be of corrosion proof type.

The receptacle shall be suitable for 240 V, 1 Ph, (or 415 V, 3 Ph), 50 Hz AC supply. Single phase decorative receptacle shall be provided with a switch of the same current rating while Single phase industrial receptacle shall be associated with a MCB of the same current rating, housed in the same enclosure. Two phase receptacles shall be associated with a MCB of the same rating, housed in the same enclosure. The enclosure for all outdoor receptacles shall be provided with degree of protection of IP55.

Applicable Standards

All standards and codes of practice referred to below shall be the latest edition including all official amendments and revisions.

Industrial luminaire with metal reflector	:	IS 1777
Ballast for fluorescent lamp	:	IS 1534
3 pin plugs & sockets	:	IS 1293
General safety requirements for luminaires	:	IS 1913
Luminaires for street lighting	:	IS 10322
Fitting for rigid steel conduits for electrical wiring	:	IS 2667
Code of practice for interior illumination	:	IS 3646 & IS 6665
Switches for domestic & similar purposes	:	IS 3854
Electric ceiling type fans & regulators	:	IS 374
Code of practice for electrical wiring installation	:	IS 732

6.51. Tests and Test Reports

Type tests, acceptance tests and routine tests for the lighting fixtures, accessories and receptacles covered by this specification shall be carried out as per the relevant standard.

Manufacturer's type and routine test certificates shall be submitted for tests conducted as per relevant standards for the fixtures, accessories and receptacles.

The following routine tests shall be conducted as per the relevant Indian Standards.

1. Each fixture shall be tested at 1500 Volts (rms), 50 Hz, AC for one minute and no flash over or breakdown shall occur between current carrying parts and ground.

2. Insulation resistance of each fixture shall be tested at 500 V DC and the insulation resistance so measured shall not be less than 2 megaohms between all current carrying parts and ground.

3. All luminaires provided with glass covers shall be subjected to thermal shock-proof test. This test shall be conducted to ensure that the cover glass will withstand sudden variation in surface temperature due to rainfall or splashing water when the lighting fixture is lit. The cover glass shall be heated in an oven to attain a steady temperature of 1000 C and then plunged into cold water. No crack should develop.

4. Contractor shall ensure use of calibrated test equipment having valid calibration test certificates from standard laboratories traceable to National Standards.

6.52. Drawings/Documents

1. The bidder shall furnish with the bid, relevant descriptive and illustrative literature on lighting fixtures, accessories and receptacles as well as preliminary details of lighting panels, conduits, cables, etc.
2. The following drawings/documents shall be furnished after the award of contract for approval of Engineer's representative:
   - **i.** Dimensional drawings of lighting fixtures
   - **ii.** Mounting details, cable entry facility and weights of lighting fixtures
   - **iii.** Light distribution diagrams (zonal and isocandela) of lighting fixtures
   - **iv.** Utilization factor tables of lighting fixtures
   - **v.** Design calculation for lighting system, lighting and receptacle layout and circuiting diagram
   - **vi.** One line diagrams of lighting panels including rating of all equipment

6.53. Lighting System Installation

The Contractor shall supply, install, test and commission the complete system of lighting and receptacles in accordance with the approved lighting drawings and documents and in accordance with relevant Indian Standards, codes of practice, Indian Electricity rules and safety codes in the locality where the equipment/system is to be installed. Nothing in this specification shall be construed to relieve the contractor of this responsibility.

6.54. Installation of Lighting Panel, Lighting Fixtures & Receptacles

The scope of installation work shall include mounting of lighting panel, lighting fixtures and receptacles at locations as per the approved drawings. All work associated with installation such as providing and fixing of wooden blocks, ball sockets, hooks, etc., as required, drilling holes in walls, ceilings, etc., or any civil work including scaffolding, provision of ladders, etc., together with supply of hardware shall form part of the Contractor's work. All work items necessary for completing earthing connections shall be included in the scope of work.

6.55. Wiring

a) The work shall comprise wiring in heavy gauge (minimum 16 SWG) GI conduits, fixed and supported at intervals of 500 mm on walls, ceiling etc.; installation of light control switches and receptacles housed in GS boxes; earthing with 16 SWG copper wire run along the conduit and clamped to it at every 500 mm; and termination of cables/wires at lighting panels, light control switches, receptacles, lighting fixtures etc., as required. The minimum size of conduit shall be 20 mm. Space factor (ratio of total wire area to internal conduit area) shall be 40 %.

b) Supply of all the items of work detailed above including 650 V grade, 2.5/4 sq. mm stranded copper conductor PVC insulated cables; 5 / 10 switches; GS conduits and accessories (such as junction boxes, tees, elbows, etc); 16 SWG GS boxes complete with gasket, knockouts for conduit entries, earthing terminal with bolts, nuts and washers; 16 SWG copper earthing wire; flexible conduit etc. shall be included in the Contractor's scope. All work necessary for fixing boxes, conduits etc., together with supply of necessary accessories hardware, shall also be included in the Contractor's work.

c) All light control switches and receptacle units (connected on the same phase) at one location (such as room entrance), shall be housed in one common GS sheet steel box.

6.56. Lighting Fixtures

Receptacle and lighting fixtures shall be fed from different circuits and wiring for the same shall be done in different conduits. The maximum load on any circuit shall not exceed 1800 Watts. In large rooms, the lighting system shall be distributed over two phases. Switches/receptacles wired on different phases shall be separated by a minimum distance of 1.8 m. Wires belonging to different phases shall not be run in the same conduit. However, more than one circuit on the same phase can be run in the same conduit. For every phase wire, a separate neutral wire shall be run. Neutral wire shall not be looped. Size of wire chosen shall be such as to limit the voltage drop to within 3 %. Minimum area of conductor shall be 2.5 sq mm stranded copper for lighting and receptacle circuits, and current density shall not exceed 2.5 A/sq mm.

Generally, not more than 8 to 10 lighting points shall be wired in one circuit. For calculating connected loads of various circuits, a multiplying factor of 1.25 shall be assumed on the rated lamp wattage for sodium vapour and fluorescent lamp fixtures to take into account the losses in the ballast. A loading of 100 watts and 500 watts shall be assumed for each, single phase 5 amps and 15 amps receptacles respectively.

For street lighting, steel tubular poles complete with fixing brackets shall be used. These poles shall be coated with bituminous preservative paint on the inside as well as on the embedded outside surface. Exposed outside surface shall be painted with one coat of red oxide primer. After completion of installation, two coats of aluminium paint shall be applied. Contractor shall supply and erect the poles (including foundation work), mount the assembled fittings, and install the necessary cabling. The Contractor's scope includes supply and installation of cables required between lighting panel and 14 SWG GS junction box mounted on the street lighting pole and between junction box and metal enclosed control gear box. Contractor shall earth street light pole and junction box with 8 SWG GS wire tapped off from the 8 SWG GS wire to be laid along the street lighting cable. The Contractor shall interconnect this earthing grid to plant main earthing grid. Height and type of pole shall be subject for an engineer’s approval.

Before a completed installation is put into service, installation tests stipulated in the latest edition of IS: 732 and other codes of practices shall be carried out by the Contractor in the presence of the Engineer's Representative.

6.57. DG Set

Silent DG set (As per CPCB norms) complete with 1500 RPM Diesel Engine of suitable BHP & AC Brush less SPDP Alternator mounted on a common base frame & coupled through a flexible coupling or close coupled. Alternator shall be self-regulated with standard Alternator Protection (Over Voltage, Over Speed & under voltage, under speed warning & shutdown). Engine shall have residential silencer, up to 3 M Exhaust piping, electronic/Mechanical governor, Manual & electric start, Batteries, Engine instrument panel, AVM and with Weatherproof, powder coated Acoustic enclosure for DG set for sound attenuation fabricated from 1.6mmCRCA sheet steel (structure) with side wall fabricated from 1.6mm CRCA sheet & filled

with 100mm thick glass wool (96kg/m3) /Foam as per IS 8183 or equivalent foam thickness and pressure, the doors are fabricated from 1.6 mm CRCA sheet packed with acoustic material, floor of MS chequrred plate 5.0mm thick, canopy fixed with axial flow fan of alstom, CG, almonard make. All doors/opening are sealed with neoprene/EPDN gaskets. The enclosure has built in fuel tank, residential silencer (isolated from main DG chamber) with protection and tripping of DG set against temperature of more than 50 degree centigrade. All controls for operation of DG set are from outside the enclosure with DG control panel having Microprocessor based GenSet monitoring & control system, MCCB, Ammeter, Voltmeter, PF meter, frequency meter, KWH meter, Ind lamps etc. mounted inside enclosure, visible and accessible from outside. The enclosure should be suitable for designed capacity DG set and alternator. Noise level shall be less than 75db(A) at a distance of 1 m duly certified by authorized agency complete in all respect. The DG set shall be Air cooled & naturally aspirated up to 30 KVA rating and Radiator cooled & turbo charged for rating above 30KVA.

Important Note (To be strictly adhered to by the contractor)

(1) The work shall be carried out in the best manner, in conformity with the specification, drawings, standards, BOQ and the code of practice of IS as well as to the instruction of the Engineer-in-charge.

(2) In addition, the work shall conform to the requirements of the following:

(3) Indian Electricity Act and rules & regulations framed there under.

(4) Fire insurance regulations

(5) Rules and regulations laid down by the Chief Electrical Inspector and other statutory authorities like Utility authorities etc.

(6) All materials, fittings, equipment/items, erection hardware and accessories etc to be supplied by the Contractor shall be of the best quality and shall conform to specification and drawings. These shall be manufactured & supplied in accordance with the latest revision of the IS.

(7) The Contractor shall be a valid license holder of Agra to carry out the electrical installation work and documentary evidence to this effect shall

be `furnished by him before commencement of work.. Similarly the skilled workmen / Electricians / Supervisors deputed by the Contractor should also hold valid license issued or recognized by the electrical licensing board of the respective state.

(8) The Contractor shall provide in due time, in adequate number, and in appropriate sequence all services, materials, equipment, fabrication & erection plant/ Rigs / Tools and tackles, adequate competent manpower as required for erection and any incidental work, for satisfactory execution and completion of the works covered under this specification, strictly within the agreed time schedule.

(9) Any equipment, materials or fittings not specifically mentioned in this specification or drawings, but are genuinely necessary for the safe and efficient operation and maintenance of the works as per sound engineering practice and current statutory requirement shall also be supplied / fabricated / erected / tested / commissioned by the Contractor, and it is specifically agreed and understood that such items are also deemed to be included in the scope of work of the Contractor within the quoted price and no extra payment will be made on this account.

(10) All safety procedures and practices shall be kept in view during execution of work in accordance with good practice. (Refer IS: 5216 – 1969 – guide for safety procedures and practices in electrical work).

(11) The electrical Contractor shall take care of existing services and co-operate with other such contractor at site and shall coordinate his works with works of other contractors with the least amount of damage and interference to their works.

(12) At any point of time one responsible person should be kept from the beginning to end of the job on full time basis.

(13) All meters have to be calibrated in an approved testing laboratory before energisation and test report should be furnished to this effect.

(14) All rates quoted shall be inclusive of all sundry materials like hardware,

clamps, cleats, nuts and bolts, cement and sand, coke and salt, solders, fluxes including all consumables like electrodes, gases etc.

(15) The Contractor shall put up temporary structure to store his materials. Materials supplied by the Owner, if any, shall also be kept in the stores. Security of the materials, insurance etc. for the stores shall be in the Contractor's scope.

(16) On completion of the job all wooden crates, small pieces of cable/ wire etc. shall be removed by the Contractor.

(17) All woks carried out by the Contractor shall have to be guaranteed for twelve months from the date of completion.

(18) All the approvals connected with drawings, installation etc. to be obtained from utility/Engineer before start of the job and in full conformity to their requirement. Proper coordination with utility and payment of supervision charges as applicable shall also be paid to the utility by the Contractor which shall be reimbursed by the Owner on reproduction of the original receipt.

(19) After completion of all activities described in the B.O.Q. and specification to the entire satisfaction of utility Engineer, the Contractor shall hand over the same after energizing, testing & commissioning of the system as a whole along with "As built" drawing.

6.58. Inspection Requirement

General

1. All inspection and testing shall be carried out in accordance with the Specification and in absence of Specification relevant Indian Standard or internationally approved equivalent standard.
2. The Contractor shall carry out at the place of manufacture tests of the Plant / Equipment at any part of the Works.
3. The Employer shall be entitled to attend the aforesaid inspection and/or tests by his own duly authorised and designated representatives.
4. The Employer and his duly authorised representative shall have access to the Contractor's premises at all suitable times to inspect and examine the material

and workmanship of the mechanical and electrical plant and equipment during its manufacture there. If part of the plant and equipment is being manufactured on other premises, the Contractor shall obtain permission for the Employer or his duly authorised representative, to inspect as if the plant and equipment was manufactured on the Contractors own premises. Testing (including testing for chemical analysis and physical properties) shall be carried out by the Contractor and certificates submitted to the Engineer's Representative who will have the right to witness or inspect the above mentioned inspection / testing at any stage desired by him.

5. The procedure for the testing and inspection to be carried out during or following the manufacture of the materials to ensure the quality and workmanship of the materials and to further ensure that they conform to the Contract in whatever place they are specified shall be as described below.

6. The Contractor shall give the Employer at least 21 clear days' notice in writing of the date and the place at which any plant or equipment will be ready for inspection / testing as provided in the Contract. The Employer or his duly authorized representative shall thereupon at his discretion notify the Contractor of his intention either to release such part of the plant and equipment upon receipt of works tests certificates or of his intention to inspect. The Employer shall then give notice in writing to the Contractor, and attend at the place so named the said plant and equipment which will be ready for inspection and/or testing. As and when any plant shall have passed the tests referred to in this section, the Engineer's Representative shall issue to the Contractor a notification to that effect.

7. The Contractor shall forward to the Employer 3 duly certified copies of the test certificates and characteristics performance curves for all equipment.

8. If the Engineer's Representative fails to attend the inspection and/or test, or if it is agreed between the parties that the Engineer's Representative(s) shall not do so, then the Contractor may proceed with the inspection and/or test in the absence of the Engineer's Representative and provide the Employer with a certified report of the results.

9. If any materials or any part of the works fails to pass any inspection / test, the Contractor shall either rectify or replace such materials or part of the works and shall repeat the inspection and/or test upon giving a notice. Any fault or shortcoming found during any inspection or test shall be rectified to the satisfaction of the Engineer before proceeding with further inspection of wiring of that item. Any circuit previously tested, which may have been affected by the rectification work, shall be re-tested.

10. Where the plant and equipment is a composite unit of several individual pieces manufactured in different places, it shall be assembled and tested as one complete working unit, at the maker's works.

11. Neither the execution of a inspection test of materials or any part of the works, nor the attendance by the Engineer's Representative(s), nor the issue of any test certificate shall relieve the Contractor from his responsibilities under the Contract.

12. The test equipment, meters, instruments etc., used for testing shall be calibrated at recognized test laboratories at regular intervals and valid certificates shall be made available to the Engineer's representatives at the time of testing. The calibrating instrument used as standards shall be traceable to National / International standards. Calibration certificates or test instruments shall be produced from a recognized Laboratory for the Engineer's consent in advance of testing and if necessary instruments shall be recalibrated or substituted before the commencement of the test.

13. The Contractor shall not pack for shipment any part of the Plant until he has obtained from the Employer or his authorized representative his written approval to the release of such part for shipment after any tests required by the Contract have been completed to the Employer's satisfaction.

14. The following Testing shall be carried out for all the equipment as applicable

    a) Visual Inspection.

    b) Material Certificates for all the specified material shall be furnished.

c) Welding Qualifications

d) Dimension Checking

e) Stage Inspections (in process inspection)

f) Dynamic balancing for all rotating parts

g) Hydrostatic / Leak testing for all pressure parts, Pneumatic Leak Test wherever applicable

h) Operation check

i) Liquid penetration tests or magnetic particle tests for all machined surfaces of pressure parts.

j) Ultrasonic test for forging materials viz.,

k) Plates of thickness 20mm and above for pressed / formed parts such as heads, etc.

l) Plates, flanges and bars of thickness / dia 40mm and above used for fabrication of pressure and load bearing members and rotating parts.

m) Radiographic testing for all but welded parts, as per applicable codes.

n) Hardness tests for all Hardened surfaces.

15. The Contractor shall maintain proper identification of all materials used, along with reports for all internal / stage inspection work carried out, based on the specific job requirement and or based on the data sheets / drawings / specifications.

TECHNICAL SPECIFICATION

CHAPTER – 7

APPURTENANCES

A. SLUICE VALVES

7.1. GENERAL:

All valves shall be double – flanged valves of Indian manufacture and in the size range to 300mm and above conforming to IS:14846 – 2000 or any other national standard equivalent or higher than the Indian Standards mentioned. The materials used in construction, the design and all other relevant features shall be such that the valves are entirely suitable for use of force mains. Valves shall be of suitable pressure rating which shall not be less than twice the n o r m a l operating pressure.

DESIGN:

The design of the valves will be such that erosion, cavitation, vibration and head loss (in the fully open position) shall be a minimum.

7.2. SLUICE VALVES:

Sluice valves shall generally conform to IS: 14846 – 2000. Valves should close with clockwise rotation of the hand wheel. The direction of closing should be marked on the hand wheel. Valves shall be flanged (flat faced) and drilling shall conform to IS: 1537.

7.3. MATERIALS OF CONSTRUCTION:

Body	-	C.I to IS: 210 Gr. FG 200
Wedge	-	C.I. to IS: 210 Gr. FG 200
Seat Rings	-	Bronze / SS 304
Channel lining	-	Gun Metal
Shoe	-	Gun Metal
Spindle	-	SS AISI 431

Parameters:

Quantity	-	As per Bill of Quantities
Size	-	As per Bill of Quantities
Rating	-	10 Bar (PN 1.0)

Shop Testing Witnessing:

Seat leakage test	-	10 bar (1.0 M

7.4. VALVE BODIES:

A. Castings:

The structure of the castings shall be homogeneous a n d free from non-metallic Inclusions and other injurious defects. All surface of casing which are not machined shall be s m o o t h and shall be carefully field to remove all foundry irregularities.

B. Forgings:

All major stress bearing forgings shall be made to a standard specifications, which shall be submitted if required to the Engineer for approval before work is commenced. Forgings shall be subjected to non-destructure tests to detect flaws if any. Forgings shall be heat treated for the relief of residual stresses. The name of the maker and particulars of the heat treatment proposed for such forging shall be submitted to the CMWSSB. The Executive Engineer or his inspector may inspect such forgings at the place of manufacture with a representative of the Contractor.

C. Workmanship:

Workmanship and general finish shall be of first class commercial quality and in accordance with best workshop practice.

All similar items of the valve and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same materials as the originals and shall be accurate and to specified

tolerances so that replacements made to manufacturer's drawings may be readily installed.

All parts, which can be worn or damaged by dust, shall be totally enclosed in dust proof housings.

D. Protective Coating:

Protective coating shall comply with IS:14846 2000.

7.5. LUBRICATION:

All the points where lubrication is needed, the Contractor shall furnish full details of the method to be employed. The supply of the requisite lubricating equipment and lubricants for commissioning and operating and maintaining the valves shall be furnished.

7.6. FLANGES:

Valves of sizes 80mm – 300mm shall have flat flanges as per IS:1538 Part IV Table – 1. The flange – to – flange distances shall be as per IS 14846.

7.7. JOINTING MATERIALS:

Each valve shall be supplied under this contract, with all requisite joint rings, nuts, bolts and washers for making the joints on all the valves to be installed under this contract. Jointing material between the connecting flanges shall conform to the relevant IS code. Unless otherwise specified bolting used for jointing exposed connections shall be of carbon steel, conforming to IS 210 Grade 20 Grade B, with galvanized finish.

7.8. FACTORY TESTS:

All the valves shall be tested at the factory for smooth, trouble free operation and operating torque requirements by operating between fully open and fully closed position three times.

The hydrostatic tests shall consist of Closed End Tests where valve is held on both sides. Each valve is subjected to three hydraulic testes.

a) Wedge open and pressure applied for 5 minutes to the whole body of the valve pressure given in Section 19.4.

b) Second Test shall be applied to one face with pressure given in Section 19.4

c) Third Test shall be similar to second, but pressure applied to the other side of the wedge with same pressure.

For valves having terminal position shall be subjected to open- end test. Testing for valves from Foreign Manufactures:

- **Sampling:** Each valve is recommenced to be tested.
- **Testing and Inspection:** For foreign manufacturer: The testing and inspection procedure in this case shall confirm with respective equivalent code.

B. AIR VALVES

7.9. CONSTRUCTIONAL FEATURES:

Double ball air valves shall be of the kinetic, double orifice type able to release air in small quantities under pressure and in large quantities during filling. They have to allow for large inflow of air during emptying. The type and locations shall be fixed according to the detailed design and after approval by the Engineer in charge. The valves shall have an integrated sluice valve. If required, they shall be installed on a flange welded on the MS pipe / special. The possible air velocity (inflow and outflow) must be at least 20 m/s

Materials of Construction and Pressure Rating : Pa) Body Hydrostatic test -15 bar (1.5 M Pa) Back Seat Leakage test - 15 bar (1.5 M Pa

Body	CI to IS Gr. FG 200
Cowl	CI to IS Gr. FG 200
Valve seat,	Leaded tin bronze
Spindle	SS. AISI 304
Orifice	SS. AISI 304
Ball	Seasoned teak wood, covered with neoprene rubber
Ball seat	Anti-stick material such as nitrile rubber or equivalent
Pressure	Suitable for 16 Kg / sq.cm, Working Pressure
Ball seat	Anti-stick material such as nitrile rubber or equivalent
Pressure	Suitable for 16 Kg / sq.cm, Working Pressure

7.10. FIXING OF VALVES:

General:

The specification lays down the requirement for lowering, laying and jointing Sluice Valves.

Preparation:

The sluice valves and tailpieces shall be examined before laying for cracks and other flaws. Only undamaged S.S. shall be used.

The sluice valve shall be operated and checked before laying. All grit and foreign material shall be removed from the inside before placing. All the four faces shall be thoroughly cleaned and coated with a thin layer of mineral grease. The tightening of gland shall be checked with a pair of inside calipers. Clearance between the top of stuffing box and the underside of the gland shall be uniform on all sides.

Jointing Materials:

The Contractor shall provide all the necessary jointing materials such as nuts, bolts, rubber packing, white zinc, jute, lead wool et., at is cost. All tools and plant required for installation of sluice valve shall be provided by the Contractor at his cost. All the jointing materials shall be got approved from the Engineer in charge before use. The nuts and bolts shall confirm to IS:1364 and the rubber packing shall confirm to IS:638.

Installation:

The sluice valve shall be lowered into trench carefully, so that no part is damaged during lowering operation. If necessary tailpieces shall be fitted with sluice valve first outside the trench and then lowered into the trench.

The rubber packing shall be three ply and of approved thickness. The packing shall be of full diameter of the flange, with necessary holes and the sluice valve bore. It shall be even at both the inner and outer edge. The flange faces shall be thoroughly greased. If flanges are not free the Contractor shall use thin fibres of lead.

After placing the packing, nuts and bolts shall be inserted and tightened to make the joint.

The valve shall be tightly closed being installed to prevent any foreign materials from getting in between the working parts of the valve.

Each flange bolt shall be tightened a little at a time taking care to tighten

diametrically opposite bolts alternately.

The sluice valve shall be installed in such a way that spindle shall remain in truly vertical position. The other end of the tailpiece shall be fitted with pipes so that continuous lines can work. Extra excavation necessary to facilitate the lowering and fixing of sluice valve shall not be paid for. work. Extra excavation necessary to facilitate the lowering and fixing of sluice valve shall not be paid for

Testing:

After installation of sluice valve the same is tested to 1 ½ times of its test pressure.

The joints of sluice valve shall with stand the test pressure of pipelines.

Defects noticed during test and operation of sluice valve shall be rectified by the Contractor at his own cost, without any extra claim, to the entire satisfaction of the Engineer in charge.

Mode of Measurement and Payment:

The measurement shall be taken per number of sluice valves of specified size and payment shall be on number basis for providing and fixing.

7.11. Fixing of Air Valves:

General:

The specification placed down requirement for lowering laying and fixing Air Valves.

Preparation:

The air valves and the isolating valves shall be examined before laying for cracks and other flaws. Only undamaged air valve shall be used. The air valves shall be opened and shaken for the air opening below the vulcanite balls on the bronze seats of the balls before fixing. All grid and foreign material shall be removed from the inside before placing. The flanged face shall be thoroughly cleaned and coated with a thin layer of mineral grease. In case of screw down type, the threads shall not be in damaged condition.

Jointing Materials:

The contractor shall provide all the necessary jointing materials, such as nuts, bolts, rubber packing, white zinc jute, lead wool etc., at his cost. All tools and plant

required for installation of air valve shall be provided by the Contractor at his cost. All the jointing materials shall be got approved from Engineer in charge before me. The nuts and bolts shall conform to IS: 1364 and the rubber packing shall conform to IS:638.

Installation:

The air valves shall be fixed on a branched flange Tee on the main pipe line. the air valve and isolating sluice valve shall be housed in a chamber.

Testing:

The specification pertaining to sluice valve shall also apply to air valves.

Mode of measurement and payment:

The measurement shall be taken per number of air valves of specified s i z e and payment shall be on number basis for providing and fixing.

7.12. Fixing of C.I. M.H. Frame and Cover in RCC slab:

General:

The specification includes all requirements of fixing C.I. M.H. frame and cover of specified size and weight in the RCC slab with locking arrangement. For Fixing the C.I. M.H. frame and cover of specified size and weight, the frame shall be fixed generally at the time of casting RCC slab with proper anchoring.

After fixing the M.H. frame and cover locking arrangement shall be provided as per following unless specified in the wording of the item. The size of the M.S. flat shall be 50 x10mm with MS bar U shape of 16mm diameter. The U shape M.S. bars shall be properly embedded in the RCC roof slab and anchored. The C.I. M.H. frame and cover and the locking arrangement after fixing shall be painted with anticorrosive black paint. The work shall be done to the entire satisfaction of the Engineer in charge.

Mode of measurement and payment:

The item shall include:

a) All labour for fixing M.H. frame and cover

b) All material and labour of locking arrangement

c) Painting of the frame, cover and locking arrangement.

7.13. PRESSURE GAUGES:

Material:

The brief specifications f o r pressure gauges are as follows:

The pressure gauges shall be of Bourdon type having a range between 0 to 9 kg/ sq.cm. The diaphragm material should be of 316 SS. Accuracy of the pressure g a u g e s h a l l be 1% with a dial diameter of150mm. The case shall be of IP 65, die cast AI. The pressure gauge shall be directly mounted with connection of ½" N.P.T.M.

Erection:

The pressure gauges shall be, mounted as near to the process as possible. Impulse tubing / piping length shall be minimum possible. The pressure gauges shall be mounted in a vibration free location. They shall be readily accessible from grade, platform, fixed walkway or fixed ladder and shall be visible from where related equipment is operated.

The pressure gauges shall have one isolating valve and one drain / vent valves for depressurizing. The drain / vent valve shall be plugged. The valves used shall be having ½ "NPTF connections and the material shall be ASTM A 216 GR. WCB or ASTM A 105 unless otherwise specified. The trim shall be AISI 410 unless otherwise specified. All connection shall be made using thread seals preferably

PTFE tape

Right tools shall be used and any limits regarding torque for tightening shall be strictly adhered to. Impulse piping shall be done using ½" O.D. seamless annealed SS tubing to ASTM A 269 GR. TP – 136 L with minimum wall thickness of 1.65mm. Compression fittings shall be used. The impulse piping must be supported by an angle of channel and strapped at every meter length. The angle / channel itself must be supported by welding it to some structure. The pressure gauge shall be covered with box.

TECHNICAL SPECIFICATIONS

CHAPTER 8

MAINTENANCE PERIOD

1. It is the sole responsibility of the contractor to Operate and maintain the entire system up to Overhead Tanks to assure the designed quantity and quality successfully for the maintenance period of 60 calendar months

2. The following measures are to be taken essentially by the contractor

- Necessary maintenance crew with supervisory staff shall be deployed. The staff pattern proposed by the contractor for the maintenance of the completed project should be got approved by the Employer one month before the issue of completion certificate. The entire strength of maintenance crew with the supervisory personnel should be available from the first day of the maintenance period.

- The contractor should keep all spares required for replacements at the head works, pumping main, distribution system, pump sets etc readily available to ensure uninterrupted water supply to the beneficiaries.

- All the equipment that goes out of order during the course of the maintenance period shall be rectified/replaced immediately to ensure uninterrupted water supply. If any equipment/machinery is found to be defective either due to manufacture or due to unsatisfactory maintenance, the same should be replaced by the contractor at his cost.

- The contractor is responsible for the incidence of any theft; malpractice etc within the project area during the maintenance period and the contractor shall keep the Employer indemnified.

- During the period of maintenance, all costs towards labour, spares,

consumables, chemicals, repairs and renewals shall be borne by the firm / Contractor.

- The electrical energy charges considered for estimation purpose at the rate of Rs 6.50 per Unit during the maintenance period shall be borne by the firm/Contractor
- The contractor shall ensure complete quality service during the maintenance period.
- Necessary log books indicating the quantity of water pumped, and maintenance carried out and repairs attended with details of spares changed shall be maintained by the contractor on a day to day basis and produced to the Engineer in charge whenever called for.

TECHNICAL SPECIFICATION

CHAPTER 9- ENVIRONMENTAL MANAGEMENT PLAN - Water Supply

PRE - CONSTRUCTION PHASE MITIGATION MESURES

Sl. No.	Potential Negative Impacts	Mitigation Measures	Time frame	Responsible agencies
	PRE-CONSTRUCTION STAGE			
1	Clearances	All clearance required for Environmental aspects during construction shall be ensured and made available before start of work.	Before construction	ULB / Concerned Departments & agency / Contractor

2	Tree Cutting	i) Try to save the trees by changing the alignment ii) Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required. ii) Identify the number of trees that will be affected with girth size & species type along the sewer mains, pumping / lifting station sites and sewerage treatment plant site. The details to be indicated in a strip map plan. iii) Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department. iv) Undertake afforestation in nearby areas. v) Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area.	Pre-construction & construction phase	Contractor
Sl. No.	**Potential Negative Impacts**	**Mitigation Measures**	**Time frame**	**Responsible agencies**
3	Utility Relocation	i) Identify the common utilities to be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc ii) Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts.	Pre-construction & construction phase	Concerned departments
4	Baseline parameters	Adequate measures shall be taken and checked to control the Baseline parameters of Air, Water and Noise pollution. Base line parameters shall be recorded and ensured conformance till the completion of the project.	Pre-construction, construction & post- construction phase	Prospective contractor

	Planning of temporary Traffic arrangements	i) Temporary diversion will be provided with the approval of the Engineer. Detailed traffic control plans will be prepared and submitted to the Engineers for approval, one week prior to commencement of works. ii) The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous	Pre-construction & construction phase	Prospective contractor
6	Disposal of waste water.	i) The waste water quality shall comply with the standards of UPPCB to let out into the stream / nullah /open land /irrigation purposes, and necessary permission to be obtained from the concerned department. ii) Ensure efficient working condition of treatment	Pre-construction & construction phase	Prospective contractor
7	Storage of materials	The contractor shall identify the site for temporary use of land for construction sites /storage of construction materials, etc.	Pre-construction & construction phase	Prospective contractor
8	Construction of labour camps	Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. The construction will commence only upon the written approval of the Engineer. The contractor shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer.	During construction the	Prospective contractor

ENVIRONMENTAL MANAGEMENT PLAN –
WATER SUPPLY PROJECTS CONSTRUCTION & OPERATION PHASE MITIGATION MESURES

Sl. No.	Systems / Impacts	Action to be taken	Responsible agencies	Time frame for
3	Distribution Network and OHTs			
3.1	Shifting of community utilities	Ensure community consensus and minimum impact to community utilities like telephone cable, electric cables and electric poles, water taps. Proper clearance to be obtained from the concerned authorities and sent to the	Prospective contractor	Pre-construction and Construction
3.2	Laying of distribution pipelines	i) Traffic regulation: Adequate actions to direct and regulate traffic shall be taken in consultation with PIA, Dept. of Police to prevent jamming of roads during construction. While planning alternative routes, care to be taken to minimize congestion and negative impacts at sensitive receptors such as Schools & hospitals. ii) Adequate precautions should be taken while laying the water distribution lines to avoid	Prospective contractor	During construction
3.3	Using of modern	Using of modern machineries such as JCBs, backhoes etc, shall be used to minimize the construction period.	Prospective	During construction
3.4	Disposal of construction debris and excavated materials.	i) A suitable site should be identified for safe disposal, in relatively low lying areas, away from the water bodies, residential and agricultural fields etc., and got approved by the Engineer. ii) Care should be taken that dumped material does not affect natural drainage system. iii) Minimize the construction debris by balancing the cut and fill requirements.	Prospective contractor	During construction

3.5	Dust Pollution near settlements	i) Unpaved haul roads near / passing through residential and commercial areas to be watered thrice a day. ii) Trucks carrying construction material to be adequately covered to avoid the dust pollution	Prospective contractor	During construction
3.6	Vehicular noise pollution at residential / sensitive receptors.	Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas. Construction activity induced noise level shall be mitigated at the residential and sensitive receptors. The Contractor shall employ mitigation measures as directed by the PIA. ii) Stationary construction equipment will be kept at least 500m away from sensitive receptors. iv) All possible and practical measures to control noise emissions	Prospective contractor	During construction

Sl.No.	Systems / Impacts	Action to be taken	Responsible agencies	Time frame for
3.7	Protection of residential / sensitive receptors.	i) Noisy construction operations in residential and sensitive areas should be restricted between 7.30 am and 6.00 pm. ii) Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. iii) Provision of enclosing generators and concrete mixers at site. iv) Sound barriers in inhabited areas shall be installed during the construction phase.	Prospective contractor	During construction
3.8	Barricading site	The construction site should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians	Prospective Contractor	During construction
3.9	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. ii) All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the PIA. Provide temporary crossing / bridges wherever necessary to facilitate normal life and business iv) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. v) The contractor shall supply all necessary safety appliances such as safety goggles, helmets,safety belts, ear plugs, mask etc to workers and staffs. vi) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone	Prospective contractor	During construction
4.0	**Environmental enhancement and special issues:**		**Implementing Agency**	**Location**

4.1	Flora and Chance found Fauna	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. The Engineer will report to the nearby forest office (range office or divisional office) and will take appropriate steps/ measures, if required in	Prospective contractor	Project area
Sl.No.	**Systems /Impacts**	**Action to be taken**	**Responsible agencies**	**Time frame for**
4.2	Chance Found Archaeologic al Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.	Prospective contractor	Project area
		The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and dam aging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.		
4.3	Monitoring of environment parameter	The contractor shall undertake seasonal monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameter to be monitored, frequency and duration of monitoring plan shall be prepared	**Prospective contractor**	Corridor of Impact

4.4	Sensitive Areas	The sensitive areas like Schools, hospitals to be provided with suitable noise barriers and safety measures, prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement during construction and their effectiveness to be checked during operation phase.	**Prospective contractor**	Corridor of Impact
4.5	Clearing of Construction of Camps and restoration	Contractor to prepare site restoration plans for approval by the Engineer. The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the Engineer.	**Prospective contractor**	All construction workers camps
4.6	Tree Protection, Tree Planting,	• Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime focus during Construction/post construction • Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary • Re-plantation of atleast twice the number of trees cut should be carried out along the project road. Since the major portion of the project road may pass through open lands, planting of trees along the entire stretch of the road is recommended as an enhancement measure. Growth and survival of trees planted shall be ensured and monitoring done at least for a period of 3 years .Survival status shall be reported on monthly basis to Engineer in- charge.	Concerned agency/Contractor	All tree plantation / greenery areas of the project

Environmental Monitoring Plan

To monitor the extent of environmental impact of the proposed /implemented project, the contractor has to periodically monitor the ambient environmental quality along the proposed project area. The monitoring requirement for the different environmental components is presented in table below

Environmental Monitoring Plan

Air Quality Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)
Parameter	SPM, RPM, SO_2, NO_x, CO and Pb
Sampling Method	Use method specified by CPCB for analysis
Standards	Ambient Air Quality Standards, CPCB, 1994, Air (Prevention and Control of Pollution) Act,1981
Frequency	Once before start of work & once every season of the year during construction period & upto 18 months (operation Period)
Duration	Continuous 24 hours / or for 1 full working day
Location	Sensitive locations, especially in the downwind direction along the pipe laying work, pumping / lifting station locations, W TP site.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the Engineer shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency
Water quality Monitoring	
Project stage	Pre Construction, Construction & Operation period (as agreed)

Parameter	• pH, BOD, COD, DO, TDS, Pb, Oil & Grease and Detergents for Surface water. • Water pH, TDS, Total hardness, Sulphate, Fluorides, Chloride, Fe, Pb for groundwater. In addition to parameters (E.coli) determining drinking water quality.
Sampling Method	Grab sample collected from source and analysis as per Standard Methods for Examination of water and Waste water.
Standards	Indian standards for Inland Surface W ater (IS; 2296, 1982) and for Drinking water (IS; 10500,1991)
Frequency	Twice a year (pre monsoon and post monsoon seasons) during the construction period
Duration	Grab sampling
Location	Locations representing water quality at • source & surface water quality in the vicinity • transmission lines • storage points, • distribution at representative locations including tail end.
Measures	At locations of variation in water quality/increased pollution, remedial measures to be adopted /all inflow channels shall be checked for pollution loads and channels delivering higher pollution load to the source shall be terminated from feeding the water source.
Implementation Supervision	Contractor through approved monitoring agencies Implementing agency

Noise Level Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)
Parameter	Noise levels on dB (A) scale.
Special guidance	• Free field at 1 m from the equipments whose noise level are being determined. • Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
Standards	National Ambient Air Quality Standards in respect of Noise, Noise Pollution (Regulation and Control) Rules,
Frequency	Once every season (except monsoon) for each year of construction
Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged
Location	• W herever the contractor decides to locate the equipment yard. • At sensitive locations such as school, hospitals etc
Measures	In case of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency
Soil Quality Monitoring	
Project stage	Pre Construction, Construction & Operation (as agreed)
Parameter	Monitoring of Pb, SAR and Oil & Grease

Sampling Method	• Sample of soil collected to be acidified and analysed using absorption spectrophotometer
Standards	Threshold for each contaminated set by IRIS database of USEPA until national standards are promulgated
Frequency	• During the pre monsoon post monsoon seasons each year for the entire construction and operation phase
Duration	Grab sampling
Location	• At pumping / lifting station, WTP locations, OHT/distribution points etc
Measures	At location of increased in pollution levels, source shall be identified and shall be diverted.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency

Apart from the above mentioned monitoring requirements, any major accidents /spillage during bulk transport of hazardous materials by the contractor, depending on the type of spillages / accidents, the parameters to be monitored will be decided by the Engineer and should be carried out by the contractor through approved monitoring agencies and supervised by the Implementing agency at their own cost.

FORMATS FOR REPORTING:

Formats for reporting / monitoring the progress / parameters achieved will be finalized in consultation with the successful bidder.

Environmentat Compliance Report

The contractor shall submit a monthly progress report as per the reporting format approved by the Engineer, on the status of the implementation of the EMP, and get it duly approved by the Engineer for its compliance and for proceeding with the work. The Engineer and the Environmental and Social Safeguard (ESS) Manager, who will have access and authority to monitor the status based on the same and for which necessary facilities shall be made by the contractor.

TECHNICAL SPECIFICATONS

CHAPTER 10

REFERENCE /CODE OF PRACTICE (Latest Version shall apply)

Description	BIS No.
Ordinary Portland Cement (33 Grade)	269-1976
43 Grade Ordinary Portland Cement	8112-1989
Pozzolona Portland Cement	1489-1991
Hydrophobic Portland Cement	8043-1978
Rapid Hardening Portland Cement	8041-1990
Low Heat Portland Cement	12600-1989
Standard sand for testing of cement	650-1966
Methods of Test for Pozzolonic Materials	1727-1967
Methods of sampling and test for water & waste water to 37) (Physical & chemical)	3025-1984 (Part 1
Methods of Sampling hydraulic Cement	3535-1986
Methods of Physical tests for hydraulic Cement	4031-1988 (1 to 14)
Methods of Chemical analysis of hydraulic cement	4032-1985
Aggregates coarse & Fine from Natural resources	383-1970

For concrete.	4082/1977
Sand for Masonry Mortar	2116-1965 and 1542/1977
Methods of tests for aggregates for concrete	2386-1963 (Part 1 to 8)
Part 1-Particle size and shape	2386-1963 (Part-1)
Part II-Estimation of deleterious Materials & (Part-II) Organic impurities	2386-1963
Part III – Soundness	2386-1963 (Part-III)
Methods for sampling of aggregates for concrete	2430-1986
Specifications for test sieves	460-1978
Part-1-Wire cloth test Sieves	(Part-I)
Common Burnt clay building bricks	1077-1976

Mild Steel and Medium tensile steel bars and hard

Drawn steel wire, concrete reinforcement, Part-I-Mild Steel & Medium tensile steel Bars Part-II-Hard drawn steel wire	432-1982
High Strength deformed steel bars and wires for Concrete reinforcement	1786-1985
Bending and flexing of bars for concrete reinforcement	2502-
1969 Recommendations for detailing of reinforcement in reinforced concrete works	5525-1969
Method for tensile testing of steel wire	1521-1972
Method of test for determining modulus of elasticity	2854-1964
Glossary of terms relating to cement concrete 1972 (Part 1 to 12)	6461-
Methods of test for strength of concrete	516-1959
Methods of sampling and analysis of concrete	1990-
1959 Methods of testing bond in reinforced concrete Pull out test	2770-1967
Methods of test for permeability of cement Mortar and concrete	3085-1965
Methods of test for splitting tensile strength Of concrete cylinders	5816-1970
Methods of tests for determining setting time of Concrete by penetration resistance	8142-1976
Code of practice for construction of	2911 (Part I)
Pile foundations (concrete piles)	Sec-1-1979

Driven cast-in-situ concrete piles	Sec-2-1979
Bored cast–in-situ piles	Sec-3-1979
Driven pre-cast concrete piles	Sec-4-1984
Bored pre-cast concrete piles	
Code of practice for construction of raft foundation	2950-1981
Design Aids for reinforced concrete	SP 16-1980
Explanatory Hand Book on Codes for earth Engineering	SP 22-1982
Explanatory Hand Book on IS Code 456-19	SP24-1983
Hand Book on causes and prevention of cracks in buildings	SP 25-1984
Hand Book on concrete reinforcement & detailing	SP 34-1987
Brick Masonry	2212-1962

Construction of Stone Masonry	1957-1967
Centrifugally Cast (Spun) Iron pressure pipes for	
Water, gas and sewage including fittings	1536-1989
Specifications for Centrifugally Cast (Spun) D.I Pipes for Water, Gas and Sewage	8329-1990
DI Fittings for pipes for water, gas & sewerage	9523-1980
Dimensional requirements of rubber gaskets for Mechanical joints and push on joints for the use With C.I / D.I. Pipes	12820-1986
C.I. Specials for Mechanical and push on flexible joints for pressure pipe lines for	13382-1992
Horizontally cast iron double flanged pipes for water. Gas and sewage	7181-1986
Cast iron fittings for pressure pipes for water, gas And sewage	1538-1976 (Part 1 to 24)
Rubber rings for jointing C.I. Pipes, RCC Pipes &	5382-1969
Pig Lead (caulking lead)	782-1978
Hemp yarn	6587-1966
Rubber Insertion to be used in jointing CI D/F pipes	638-1979
Bolts & Nuts to be used in jointing CI D/F Pipes	1363-1967
Unplasticized PVC Pipes for potable water supplies.	4985-1988
Injection moulded PVC socket fittings with Solvent cement joints	7834-1987 (Part 1 to 8)
Fabricated PVC fittings for potable water supplies	10124-1988 (Part 1 to 13)
Methods of test for unplasticized PVC pipes for	12235-1986
Potable water supplies	(Part 1 to 11)
Sluice valves for water works purposes (50 to 300 mm Dia size)	780-1984
Sluice valves for water works purposes (300 to 1200mm Dia	2906-1984
Surface boxes for sluice valves	3950-1979
Manhole covers for sluice valves	1726-1974

Laying of Cast-Iron Pipes	3114-1985
Laying of DI Pipes	12288-1987
Laying and jointing of un plasticized PVC Pipes	7634-1975 (Part 3)
Batch type concrete mixer	1791-1968
Sheep foot roller	4616-1968
Safety code for excavation works	3764-
1966 Safety code for scaffolds and ladders	
Part-I Scaffolds	3696-1966 (Part I)
Part II-Ladders	3696-1966 (Part-II)
Safety code for piling and other deep foundations	5121-1969
Safety code for working with construction machinery	7293-1974
Hard drawn Steel Wire	1785-1983 (Part I and II)
Structural Steel	226-1975
Hard rolled mils steel for concrete	1139-1966
Hard drawn Steel Wire	1566-1982

American Society for Testing of Materials

British Standard	2494-1955 (Part I)
Welding Electrodes	814-1970
Steel Sheets	225-1975
Guinitting	7322-1994

Welded Joints	3589-1966 and 2041-1962
Tensile Test	223-1950

Mechanical and Electrical Works

Submersible Pump	8030-1976
Submersible Motor	9283-1979
Earthing	3043-1966
Transformer	1180-1964
Generator	22 53-4722

ADDITIIONAL SPECIFICATION

1. The arrangements of TMT D500 rods for all RCC works shall be in accordance with the working drawing supplied.
2. (i) Payments for centering works for all RCC items shall be made only after the concrete is laid, even though separate items for centering works are included in the schedule. The centering and form work shall be provided to the extent and area ordered by the Executive Engineer during execution.
3. All cement concrete for RCC works shall be machine mixed and vibrated.

CEMENT

The contractor has to make his own arrangements for the procurement of Cement of required Specifications for the works subject to the followings:

(a) The contractor shall procure cement required for the works only from reputed cement factories (main producer of their authorized agents, manufacturing cement to ISI standard) acceptable to the Engineer – in – charge. The Contractor shall be required to furnish to the Engineer – in – charge bills of payment and cost certificates issued by the manufacturers or their authorized agents to authenticate procurement of qua lity cement from the approved cement factory. The contractor shall make his own arrangement for safe haulage and adequate storage of cement.

(b) The contractor shall procure in standard packing of 50kg per bag from the authorized manufacturers. The contractor shall make necessary arrangement at his own cost to the satisfaction of Engineer – in – charge for actual weightment of random sample from the available stock and shall conform to the specification laid down by the Indian Standard Institution or other standard foreign institution as the case may be. Cement shall be go tested for all the tests as directed by the Engineer–in–charge atleast one month in advance before the use of cement bags brought and kept at site godown.

(c) The employer will furnish air recraing agents and admixtures required to the contracts free pf cost at the employer stores. The use of such admixtures and agents shall be made as per the instructions of the Engineer–in–charge. The cost of cartage / storage handling, batching mixing shall be borne by the Contractor and shall be included by him to unit rate tendered for concrete.

(d) The contractor should store the cement of 60 days requirement atleast one month advance to ensure the quality of cement to brought to site and shall not remove the same

without the written permission of Engineer–in–charge.

(e) The contractor shall forthwith remove from the works area, and the cement that the Engineer–in–charge may disallow for use on account of failure to meet with required quality and standard.

(f) The contractor will have to construct sheds for storing cement having capacity not less than the cement required for 90 days use, at approved locations. The Engineer - in–charge or the representative shall have free access to such store at all times.

(g) The contractor shall further at all times satisfy the Engineer–in–charge on demand by production of records and test books or by submission of returns and other proofs as directed that the cement is being used as tested and approved by the Engineer-in- charge for the purpose and the contractor shall at all times, keeps his record upto date and enable the Engineer – in – charge to apply such checks as he may desire.

(h) Cement which has been unduly long in storage with the contractor or alternatively has deteriorated due to inadequate storage and thus become unfit for use on the works will be rejected by the Department and no claim will be entertained. The contractor shall forth with remove from the work area any cement the Engineer – in – charge may disallow for use of work and replace it by cement complying with the relevant Indian standards.

STEEL

The contractor shall provide T M T 5 0 0 D rods and structural steel etc., required for the works, only from the main and secondary producers manufacturing steel or other authorized agents to the prescribed specifications. Bureau of Indian standards requirements and licensed to affixing ISI set certificate issued by the Government approval laboratory certification are to be produced to Engineer-in - charge before use on works.

The Diameters and weight of steel should be as follows:-

Sl.	Diameter of Rod	Sectional Weight in kg per
1.	6 Millimeters	-
2.	8 Millimeters	-
3.	10 Millimeters	-
4.	12 Millimeters	0.8
5.	14 Millimeters	0.2
6.	16 Millimeters	1.5

7.	18 Millimeters	2.0
8.	20 Millimeters	2.4
9.	22 Millimeters	2.9
10.	25 Millimeters	3.8
11.	28 Millimeters	4.8
12.	25 Millimeters	6.3
13.	20 Millimeters	4.0
14.	32 Millimeters	6.3

Note: - If any rods other than those specified above are used the weight shall be as per standard steel tables

Smart Water Meter

The smart water meter shall consists of the following equipment

1. Ultrasonic Water meter

2. Meter Reading device

3. Meter reading software

4. AMR System

Smart meters must support the AMI (Automated Metering Infrastructure) and deployment of AMI infrastructure will be contractor's responsibility

Ultrasonic Water Meter: A battery operated inline Ultrasonic water meter with no moving part, with a battery life of minimum 10 years. Meter must comply to IP68 for indoor and outdoor operation, including fully submerged installations. The meter should be type approved and verified according to international water meter Standard OIML R 49 and or ISO 4064. The meter should be MID approved. Accuracy Class 2 – +/-2% or better over typical operating range and temperatures. 3-Point calibration with calibration certificate must be made available for each unit. Dynamic Range (Q3/Q1) of Minimum of 100:1. The water meter body shall be made of corrosion resistant material like brass, bronze, stainless steel, carbon steel or Engineered plastic. Working pressure shall be of ≤ 16 bars. The meter shall be capable of working with Environmental Temperature of 0 degree C to 50 degree C. The meter should be tamper proof with suitable data protection of calibration and revenue parameters. The smart meter should have advanced diagnostics with active alarm(s) indicated on display, Display with ≥8 digits for main information. Index, menu and status symbols for dedicated information. The measuring units should be m^3 for volume. The Ultrasonic water meter should have inbuilt remote reading capability using point-to-point RF. The meter shall be tampering, Burst, Leakage proof. The water meters shall have the anti – magnetic properties / immunity, as specified in ISO-4064:2005, when tested with 4000 gauss magnet. The AMR system shall remain unaffected with application of 4000 gauss magnet, as specified in ISO-4064:2005. If manufacturer has an ISO 17025 accredited calibration lab, then their calibration certificate should be acceptable and separate TPI (Third Party Inspection) / calibration for Govt. approved laboratories not required and should be waived off.

"Meter Reading device: The hand held unit/ Meter reading device shall read data from minimum 200 meters line of sight/ linear distance. The hand held unit or Meter reading device shall have the sufficient memory (minimum 4000 reading data) for storage of maximum data / reading along with sufficient power back up. The hand held unit/ meter reading device shall be programmed and the meter numbers shall be registered in it, to collect the readings against this number. The device shall show exact physical location of water meter on GPS Map as per location (coordinates) entered into the system after meter installation. The hand held unit/ meter reading device should be adjustable back light, sun light readable, and have colour display and touch screen. The hand held unit/ meter reading device shall have a rechargeable battery and shall be provided with charger facility that allows full charge within 2 (two) hours. The batteries shall allow uninterrupted operation for minimum 5 hours. The Device must be ergonomically designed to be comfortable for meter reading. It should have an integrated RF Modem. Meter Reading device should be able to display all data received from Meter and should display clearly active alarms for each meter. The device should have capability to store full customer and meter information for each meter and should be able to display the statistics of the reading route, including but not limited to read meters, unread meters and the data transfer from the meter-reading device to a computer shall be via GSM/ GPRS.

Meter reading software: The software shall alert the meter reader for unread accounts in that route and select the routes the meter-reading device needs to read meters. The software shall upload routes from the AMR software. It shall give output, at least in the CSV (Comma Separated Value)/txt/xls format and the Route Management software must be capable of running on a standard PC compatible with minimum Pentium processor; in addition, the software must run under Windows XP Professional, Windows 7 Professional and / or latest version of windows operating system. The software shall allow the PC operator to review and edit any account in Route Management/ AMR software database. In addition, the PC operator shall be able to generate routes/ groups as per zones or areas and activity reports and shall alert the meter reader for unread meters in that route. It shall enable the user to select the data for export from the database for transferring to billing system and capable of uploading routes from the reading device through GSM/GPRS. It shall post the reading from the reading device onto appropriate accounts within the database and should be able to display reading data on screen. The software should manage GPS data of AMR Meters.

AMR System: The remote readings of AMR water meter should be obtainable by ‘Walk by/Drive by/Fixed network’ methods. The AMR trans-receivers shall be wireless and have IP 68 protection category i.e. no ingress of water after submerging AMR water meter. All AMR readings shall show the date and time of the reading recorded. The AMR device of the water meter shall be tamper proof. Meter manufacturing company will assure that the frequency is FREE TO USE and necessary documentation with Department of Telecom is available at the time of bidding the tender. The bidder shall submit necessary documents with the proposal. The water meters fitted with AMR shall have the facility to transmit reading in submerged condition & the remote readings should be obtained with water meter in submerged condition and should retrieve required data from every meter without reduction in battery lifetime and/or reading speed. The AMR meters and the AMR module should be of the same brand.

ANNEXURE B- SOIL INVESTIGATION REPORT

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Conclusions and Recommendations

- On the basis of field & laboratory investigation & calculation for bearing capacity values following reference have been drawn.
- The value of allowable b.c to be adopted for design consideration at different depths are as follows

S. No.	Bore Hole location	width of fdn (B) m	Depth from NGL m	Type of Fondation	$(q_a)_{Net}$ t/m^2	PILE CAPPACITY (TON)
1	Bh1	1.5	1.5	ISOLATED	11.9	
2	Bh2	13	2	STRIP/RAFT	6.5	70.38
3	BH3	13	2	STRIP/RAFT	5.0	75.38
4	BH4	13	2	STRIP/RAFT	5.57	83.99
5	BH5	13	2	STRIP/RAFT	6.7	86.38
6	BH6	-	-	-	-	64
7	BH7	-	-	-	-	61.60

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Bibliography:-

1) (IS 1892-1979) : Code of practice for subsurface investigation for foundations

2) (IS: 2131) : Code of practice for Standard Penetration test

3) (IS 2720 part 4) : Methods os test for soils part 4 ,grain size analysis

4) (IS 2720 part 5) : Methods os test for soils part 5 Determination of liquid and plastic limits

5) (IS 2720 part 10) : Methods os test for soils part 10, determination of unconfined compression test.

6) (IS 2720 part 11) : Methods os test for soils part 10, determination of unconfined compression test, determination of shear strength parameters of soil specimen tested in unconsolidated undrained triaxial compression without the measurement of pore water pressure (amendment 3) Reaffirmed 1990 CED 23

7) (IS 2720 part 15) : Methods os test for soils part 15, Determination of consolidation properties.

8) (IS 2720 part 13) : Methods of test for soils part 13, Direct Shear Test.

9) (IS 6403 -1981) : Code of practice for determination of bearing capacity of shallow foundations .

10) Settlement Consideration : (IS: 8009 (Part-I)-1976 Reaffirmed 2003),

SOIL INVESTIGATION REPORT.

DETERMINATION OF THE CORRECTED N-VALUES

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BH – 1 NEAR JP HOTEL

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
1.5	15	2.497399	1.466	22
3.0	16	4.950852	1.237	20
4.5	14	6.827983	1.129	16
6.0	13	9.470416	1.020	13
7.5	13	13.13605	0.911	12
9.0	14	16.67484	0.831	12
10.5	15	18.74268	0.792	12
12	13	23.8471	0.711	9
13.5	14	24.01186	0.709	10
15	16	26.23531	0.679	11

SOIL INVESTIGATION REPORT.

BH – 2 (JLAHAH ROAD TAJ GANJ Jalthal agra)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
1.5	9	2.393689	1.480	13
3.0	8	4.735208	1.252	10
4.5	11	7.668161	1.091	12
6.0	12	9.577809	1.016	12
7.5	14	12.90207	0.917	13
9.0	15	14.7541	0.872	13
10.5	17	16.19469	0.841	14
12	15	20.39854	0.763	11
13.5	20	21.50442	0.746	15
15	24	30.16591	0.633	15

BH – 3 (SBV Agra)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
1.5	10	2.328864	1.489	15
3.0	5	5.031619	1.231	6
4.5	9	7.500658	1.098	10
6.0	12	8.93046	1.040	12
7.5	16	13.99356	0.889	14
9.0	17	14.67138	0.874	15
10.5	15	17.31237	0.818	12
12	17	17.80491	0.809	14
13.5	15	22.50794	0.730	11
15	14	30.16591	0.633	9

SOIL INVESTIGATION REPORT

BH NO -4 (EWS Park)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
1.5	13	2.251023	1.500	20
3.0	12	4.546207	1.265	15
4.5	13	7.206068	1.111	14
6.0	7	9.793952	1.009	7
7.5	8	12.9802	0.915	7
9.0	10	14.44864	0.879	9
10.5	9	15.28511	0.860	8
12	15	20.8913	0.755	11
13.5	11	22.13115	0.736	8
15	15	31.58172	0.617	9

SOIL INVESTIGATION REPORT

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BH NO -5 (PRIMARY SCHOOL)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
1.5	9	2.225032	1.504	14
3.0	8	4.492267	1.269	10
4.5	11	7.332133	1.106	12
6.0	12	10.67194	0.980	12
7.5	14	12.66818	0.923	13
9.0	15	14.42014	0.879	13
10.5	17	16.478	0.835	14
12	15	21.87718	0.740	11
13.5	20	21.50442	0.746	15
15	24	30.87214	0.625	15

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SOIL INVESTIGATION REPORT

BH NO -6 (Teela Bajaar)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
1.5	11	2.199084	1.508	17
3.0	10	4.681105	1.256	13
4.5	17	7.626438	1.092	19
6.0	21	9.36221	1.024	22
7.5	25	13.52584	0.901	23
9.0	16	14.67138	0.874	14
10.5	20	16.38387	0.837	17
12	17	21.1378	0.751	13
13.5	19	21.25364	0.750	14
15	50	30.69577	0.627	31

SOIL INVESTIGATION REPORT

BH NO -6 (Teela Bajaar)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
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3.0	10	4.681105	1.256	13
4.5	17	7.626438	1.092	19
6.0	21	9.36221	1.024	22
7.5	25	13.52584	0.901	23
9.0	16	14.67138	0.874	14
10.5	20	16.38387	0.837	17
12	17	21.1378	0.751	13
13.5	19	21.25364	0.750	14
15	50	30.69577	0.627	31

SOIL INVESTIGATION REPORT

BH NO -6 (Teela Bajaar)

Depth below NGL (m)	Observed N-value (N)	Overburden pressure t/m^2	Correction factor C_N	Corrected N-value N_C
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3.0	10	4.681105	1.256	13
4.5	17	7.626438	1.092	19
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7.5	25	13.52584	0.901	23
9.0	16	14.67138	0.874	14
10.5	20	16.38387	0.837	17
12	17	21.1378	0.751	13
13.5	19	21.25364	0.750	14
15	50	30.69577	0.627	31