

**E-TENDER DOCUMENT**  
**UTTAR PRADESH JAL NIGAM**

**CONSTRUCTION OF FSTP PLANT OF 7 AMRUT TOWN / CITIES OF U.P. (GONDA, FAIZABAD, BAHRAICH, AKBARPUR, SITAPUR, HARDOI & FARUKHABAD) (32 KLD CAPACITY EACH) ON OPEN TECHNOLOGY ALONG WITH BOUNDARY WALL, APPROACH ROAD AND INSTALLATION OF SOLAR PANEL SYSTEM ETC. INCLUDING REQUIRED SURVEY & DESIGN WORK AND HANDING OVER TO RESPECTIVE URBAN LOCAL BODIES**

**UNDER**

**AMRUT PROGRAMME**  
**(Package No.- A)**



**Technical and Financial Evaluation cum Technical Bid**  
**(Pre- Qualification Bid)**

**General Manager**  
Gomti Pollution Control Unit,  
U.P. Jal Nigam,  
Lucknow

**OFFICE OF THE GENERAL MANAGER,  
GOMTI POLLUTION CONTROL UNIT, U.P. JAL NIGAM LUCKNOW  
(E-Mail:- gmgomti01@gmail.com)**

Letter No. 4161 /

M-13

/ 678

Dated: 10.12.2018

**E-PROCUREMENT NOTICE/TENDER NOTICE**

On behalf of the Chairman, U.P. Jal Nigam, undersigned invites online percentage rate e-tender in two bid system from reputed, experienced & eligible tenderers for the work "Faecal Sludge Management Solution for 31 cities of Uttar Pradesh, which comprises of construction of Faecal Sludge Treatment Plant (32 KLD each), collection and transportation of Septage from household, disposal & re-use etc." under AMRUT Programme with following mentioned terms & conditions. Tender document shall be available at e-procurement website <http://etender.up.nic.in> latest by 14.12.2018, 03:00 PM onwards Interested contractors may view & download tender document and upload their tender, duly filled, online latest by 04.01.2019 up to 01:00 P.M., technical & Pre-Qualification part of bid shall be opened on 04.01.2019 at 03:00 P.M., Date of opening of financial bid shall be informed later. Bids submitted manually or by post will not be accepted.

S. No.	Description	Cost of Tender document	Earnest money (Rs In Lakh)	Last date of submission of Tender	Date of Opening of Pre-qualification/ Technical bid	Period of Execution (in months)
1	The scope of works under this project includes Faecal Sludge Management Solution for 31 cities of Uttar Pradesh, which comprises of survey, conditional assessment old existing Septage management system, investigation, design, drawing, construction of Faecal Sludge Treatment Plant (32 KLD each), collection and transportation of Septage from household, disposal & re-use etc including for civil and E/M appurtenants works" under AMRUT Programme.					Execution period is 15 months (including three months trail & run) & Operation and maintenance period for 05 year and successfully handing over to respective Local Body.
(i)	Package No.- A (Name of Cities included in package Gonda, Faizabad, Bahraich, Akbarpur, Sitapur, Hardoi & Farukhabad)	Rs.20,000.00 + 12.00% GST	Rs. 27.35	04.01.2019 upto 01:00 P.M.	04.01.2019 at 03:00 P.M.	
(ii)	Package No.- B (Name of Cities included in package Jhanshi, Lalitpur, Banda, Orai, Shikohabad, Hathras & Aligarh)	Rs.20,000.00 + 12.00% GST	Rs. 27.35	04.01.2019 upto 01:00 P.M.	04.01.2019 at 03:00 P.M.	
(iii)	Package No.- C (Name of Cities included in package Muradabad, Amroha, Chandausi, Pilibhit, Badaun, Shahjhapur, Shamli, Hapur, Baraut & Khurja)	Rs.20,000.00 + 12.00% GST	Rs. 39.10	04.01.2019 upto 01:00 P.M.	04.01.2019 at 03:00 P.M.	
(iv)	Package No.- D (Name of Cities included in package Fatchpur, Mugalsaray, Ajamgarh, MauNath Bhanjan, Jaunpur, Deoria & Basti)	Rs.20,000.00 + 12.00% GST	Rs. 27.35	04.01.2019 upto 01:00 P.M.	04.01.2019 at 03:00 P.M.	

**TERMS & CONDITIONS:**

- (a) The bidders are required to submit cost of bid document (non-reimbursable) in the form of DD payable in favour of Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow & upload the receipt on online portal and submitted the same in the office of Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow within 7 days from the opening of Technical Bid.

*(Handwritten signature)*

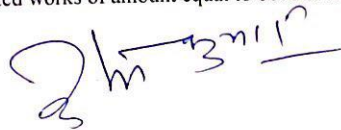
(b) Bid security/EMD submitted in form of Bank Guaranty issued by Nationalized Bank or IDBI Bank, ICICI Bank, HDFC Bank & Axis Bank in favour of Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow and upload the same on online portal for verification.

(c) Notarized power of attorney as per provisions of bid document.

2. The Tenderer's registration with U.P. Jal Nigam, is Optional.
3. The notarized /attested copies of following documents by Gazette officer will also be uploaded with tenders, which shall be subject to verification by U.P. Jal Nigam.
  - (i) No-Objection Certificate from Income Tax Department or receipt of income tax Return/Attested copies of income Tax Assessment order of last three years.
  - (ii) No-Objection Certificate from Sale Tax Department or Clearance Certificate of last financial year in favour of contractor from sale tax department.
  - (iii) Valid Character Certificate Issued by District Magistrate.
  - (iv) Solvency Certificate issued by District Magistrate/Nationalized Bank/Bank enlisted by UPJN.
  - (v) Particular experience certificate of Complete similar works as per Para 14, given below.
  - (vi) Audited last Five Year Balance sheet by CA.
  - (vii) Summary of profit/loss A/c for last five consecutive years attested by CA.
  - (viii) List of ongoing projects with cost on prescribed format given in the tender document.
  - (ix) Income Tax PAN/TAN No. of the contractor/firm.
  - (x) List of Staff/T&P on prescribed format given in the tender document.
  - (xi) GSTIN Registration certificate.
4. The original certificates mentioned in Sr. No. 3 above shall have to be produced in office as and when informed by U.P. Jal Nigam.
5. The U.P. Jal Nigam reserves the right to accept or reject any or all the tenders without assigning any reasons therefore and the decision of the undersigned shall be final & binding and no claim of Bidders shall be consider in this regard.
6. The quantum of work and area can vary on either side up to any extent.
7. The bidders are advised to inspect the site of work before quoting the rates.
8. If a holiday is declared on any of the above dates, the stipulated action will be taken on the next working day at the same time and venue.
9. **A Pre-bid meeting will be held by the undersigned at 11:30 am on date 20.12.2018** in the office of the undersigned to clarify queries of the prospective bidders.
10. **The pre-qualification bid will be electronically opened on 04.01.2019 at 03:00 P.M.** in the presence of bidders or their representatives in the Office of the General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam, Lucknow.
11. Financial bids of only those bidders shall be opened, who will be found eligible in pre-qualification evaluation and technical evaluation of bids. The date and time of opening of financial bids shall be intimated on the e-tendering portal.
12. U.P. Jal Nigam shall not be liable for any delays held due to failure of the e-procurement system. Even though the e-procurement system will attempt to notify the bidders of any updates related to e-bidding process, U.P. Jal Nigam shall not be liable for any information not received by the bidder. It shall be the bidders' responsibility to verify the website for the latest information/updates related to the bidding process.
13. Joint Ventures is allowed with the condition that the equity of lead partner shall be 51% (In JV maximum numbers of partners may be Four).
14. (i) **Experience-** Experience of having successfully completed similar works as given below during last 10 years ending Dt 10.12.2018 at least following no of similar works costing not less than given as below.
  - a. Three Nos. similar completed works of amount each equal to 30% of the work cost.

**Or**
  - Two Nos. similar completed works of amount each equal to 40% of the work cost.

**Or**
  - One Nos. similar completed works of amount equal to 60% of the work cost.



b. Experience for design and construction of 03 No. FSTP of capacity 09.60 KLD.

Or

Experience for design and construction of 02 No. FSTP of capacity 12.80 KLD.

Or

Experience for design and construction of 01 No. FSTP of capacity 19.20 KLD.

- (ii) **Minimum turnover** should be at least as under:  
Average annual financial turnover during the immediate last three consecutive financial years of construction works should be at least 30% of the Estimated cost.
- (iii) **Solvency** :- The solvency amount should be equal to 40% or more of the estimated cost of the work.
- (iv) Net worth of the bidder / firm should be positive on date of bidding.
15. The rates quoted in the tender shall be valid for 120 days from the date of submission of the tender.
16. Bid Security/EMD validity is 180 days.
17. Rates in Schedule 'G' are excluding of GST it will be paid as applicable.
18. For any query's, Firm/Contractor may contact Project Manager, G.P.C. Unit-I, U.P. Jal Nigam, Lucknow (Mob. No. 9415135606).
19. The tender notice can also be seen on U.P. Jal Nigam website [www.upjn.org](http://www.upjn.org).
20. Remaining terms and conditions shall be those as contained in tender document.

(S.K. Gupta)  
General Manager

Endt. No.

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Dated :

Copy to the following for information and necessary action Please:-

1. PS to The Chairman, U.P. Jal Nigam, 6, Rana Pratap Marg, Lucknow.
2. PS to Managing Director, U.P. Jal Nigam, 6, Rana Pratap Marg, Lucknow.
3. PS to F.D., U.P. Jal Nigam, 6, Rana Pratap Marg, Lucknow.
4. Chief Engineer (Nagar), U.P. Jal Nigam, Lucknow.
5. Chief Engineer (Lucknow Zone), U.P. Jal Nigam, Lucknow.
6. Secretary (Management), U.P. Jal Nigam, 6, Rana Pratap Marg, Lucknow along with soft copy (C.D.) & the format with the request to enter on the website.
7. The Public Relation officer, U.P. Jal Nigam, 6, Rana Pratap Marg, Lucknow along with 6 copies of this notice for publishing the same in the news papers as per prevalent norms twice with a gap of a day.
8. District Magistrate, Lucknow/S.S.P., Lucknow.
9. All Chief Engineer's, U.P. Jal Nigam, Lucknow.
10. Superintending Engineer, 23<sup>rd</sup> Circle, U.P. Jal Nigam, Lucknow.
11. Project Manager, Gomti Pollution Control Unit-I/IV/Temp., U.P. Jal Nigam, Lucknow.
12. Office Notice Board.

  
General Manager

# Invitation for Proposals

## INTRODUCTION

### Background

Government of Uttar Pradesh (GoUP) with a goal of achieving total sanitation in line with the vision of Swachha Bharat Mission (Urban). With concerted efforts towards Open Defecation Free (ODF) through provision of individual household toilets as well as community/public toilets. However, sanitation is more than just having access to toilets and better hygienic practices, and it covers the management of faecal sludge and septage from the point of generation to its treatment for reuse or safe disposal. Accordingly, the State of Uttar Pradesh is now gearing to move towards the status of ODF + which is a step ahead of being ODF, it also includes waste water management and treatment of Faecal sludge and septage.

Further, Government of India (GoI) through the Ministry of Housing and Urban Affairs (MoHUA) has launched a National Policy on Faecal Sludge and Septage Management (FSSM) (Attachment A) in 2017 and encouraged States to set up systems towards the safe collection, treatment and disposal of all human waste that is collected from on-site sanitation systems. In accordance with this, to comprehensively establish improved sanitation practices and systems, the GoUP has decided to set up Faecal Sludge and Septage Treatment Plant (the “FSTP”) in the Urban Local Bodies to tackle the health and environmental hazard caused when human excreta is disposed in open areas and water bodies due to lack of treatment facilities. It is to be noted that pollution load of septage is much higher vis-à-vis sewage and needs immediate attention.

To achieve the vision of making urban areas ODF+, the “Authority” has decided to develop and operate/maintain the FSTPs in various ULBs of Uttar Pradesh (the “Project”) and has accordingly decided to carry out the bidding process for selection of a private party to whom the Project may be awarded.

The Selected Bidder, who is either a company incorporated under the Companies Act, 1956 or its substitute thereof or undertakes to incorporate as such prior to execution of the tender, shall be responsible for designing, engineering, procurement, and construction of the Project under and in accordance with the provisions of the tender provided by the Authority as part of the Bidding Documents pursuant thereto.

The Tender sets forth the detailed terms and conditions for award of project to the bidder, including the scope of the Bidder’s services and obligations.

The statements and explanations contained in this document are intended to provide a better understanding to the Bidders about the subject matter and should not be construed or interpreted as limiting in any way or manner the scope of services and obligations of the Bidder set forth in the document or the Authority’s rights to amend, alter, change, supplement or clarify the scope of work, the tender to be awarded pursuant to this document or the terms thereof or herein contained. Consequently, any omissions, conflicts or contradictions in the Bidding Documents are to be noted, interpreted and applied appropriately to give effect to this intent, and no claims on that account shall be entertained by the Authority.

The Authority shall receive Bids in accordance with the terms set forth in this document and other documents to be provided by the Authority, as modified, altered, amended and clarified from time to time by the Authority (collectively the “Bidding Documents”), and all Bids shall be prepared and submitted in accordance with such terms on or before the date specified in Tender Notice.



# U.P. JAL NIGAM

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## E-TENDER

FOR

“Construction of FSTP Plant of 7 town / cities (32 KLD capacities each)  
(Gonda, Faizabad, Bahraich, Akbarpur, Sitapur, Hardoi & Farukhabad)

under AMRUT”

ON

LUMPSUM CUM ITEM-RATE BASIS

Part – I  
(Technical Bid & Conditions of Contract)

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General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam, Lucknow

**INSTRUCTIONS TO BIDDERS (ITB)**

**DEFINITIONS AND INTERPRETATIONS**

The important terms, which shall be used in the contract Documents are defined herein. It shall be applicable to both the singular and plural number and masculine/ feminine in gender.

1. The Contract means the documents forming the tender and acceptance thereof and the formal agreement executed between the Engineer/ competent authority on behalf of the Chairman, U.P. Jal Nigam and the Contractor, together with the documents referred to therein including the specifications, the designs, drawings and instructions issued from time to time by the Engineer-in- Charge and all these documents taken together, shall be deemed to form one contract and shall be complementary to one another.
2. The expression works or work shall, unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional.
3. The Contractor shall mean the individual, firm or company, whether incorporated or not, undertaking/execute the work after signing the agreement with the department and shall include the legal personal representative of such individual or the persons composing such firm or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.
4. CHAIRMAN: Chairman shall mean the Chairman, U.P. Jal Nigam, (Local Authority under Govt. Of Uttar Pradesh) here-in-after called the Chairman.
5. MANAGING DIRECTOR: "Managing Director" or "M.D." means the Managing Director of U.P. Jal Nigam.
6. CHIEF ENGINEER: "The Chief Engineer" shall mean the Chief Engineer (Lko Zone), U.P. Jal Nigam, Lucknow here-in-after called the Chief Engineer.
7. ENGINEER-IN-CHARGE: It shall mean the Officer signing the contract on behalf of U.P. Jal Nigam i.e. General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam, Lucknow.
8. ENGINEER: The term Engineer shall mean the Engineer officer (or any other competent person appointed by the Engineer-in-charge, to act in addition or replacement of the Engineer) who shall supervise the execution of the works and administering the contract and be incharge of the work on behalf of the Engineer-in-charge i.e. Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow hereinafter called the Engineer.
9. SUPERINTENDING ENGINEER: SE/ GM shall mean General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam, Lucknow.
10. EXECUTIVE ENGINEER: The Executive Engineer/ Project Manager shall mean Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow.
11. COMPETENT AUTHORITY: It shall mean the next higher authority signing the contract in U.P. Jal Nigam i.e Chief Engineer/Managing Director/Chairman.
12. ENGINEER'S REPRESENTATIVE: The Engineer's representatives shall mean the Project Engineer (Assistant Engineer), Assistant Project Engineer (Junior Engineer), Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow hereinafter called the Engineer's representatives.
13. Department/Owner: The term department or owner means the U.P. Jal Nigam represented by the Chairman, Managing Director, Chief Engineer, Superintending Engineer or any other officer authorized by the Managing Director.

14. Employer: The term employer means the Engineer in charge.
15. The “Common Schedule of rates” shall mean a printed document containing rate of different items of works pertaining to different Branches of UP Jal Nigam & P.W.D., U.P Irrigation, CPWD and other State Public Health Engineering Departments and approved by the committee on direction of Chief Engineers of these.
16. Completed works shall mean the work completed in all respect as per laid down specifications, approved drawings, approved NIT defect liability period as specified plus operation and maintenance period of work to the entire satisfaction of the Engineer in charge.
17. “Communication between parties are the written and signed letters, notices, reminders, memorandum and instructions recorded in the instruction book or books kept at site.
18. “Days & months” are calendar days and calendar months.
19. “Consignee” means Engineer in charge.
20. The “Site” shall mean the land or other places on, into or through which work is to be executed under the contract or any adjacent land, path or street which may be allowed to be used for the purpose of carrying out the contract.
21. “Schedule of material” shall mean the list of materials, which are to be issued from the Dept. store to the contractor / bidder for genuine use on the work.
22. The “Start date” is the date when contract comes in to existence or the receipt of letter to commence the work by the Engineer-in-charge and as notified in the letter of allotment.
23. “Scope of work” shall mean the items of work to be executed at site of work pertaining to work allotted to the contractor / bidder.
24. The “Works or Work” shall unless the context otherwise requires mean what the contractor /bidder is required to execute and hand over to the UPJN.
25. “UPJN” means Uttar Pradesh Jal Nigam.
26. “Owner or Department” or “Client” means Uttar Pradesh Jal Nigam (UPJN) represented by Managing Director or Chief Engineer (LKO Zone) or his authorized representative.
27. “Sub-Contractor” means any person, firm or company other than the contractor / bidder for execution of any part of the work.
28. “Tender” means the documents issued by UPJN.
29. “Bid” means the documents submitted by contractor / bidder to whom tender has been issued.
30. Applicant / Bidder” means the Firm/ bidder / agency who submits the bid against the invitation for bid.
31. “Award” means the written acceptance of bid by the UPJN, to the successful contractor / bidder.
32. “Department” means the UPJN, Uttar Pradesh. The words department and Superntending Engineer, UPJN, Lucknow and his representative have been used interchangeably at places and mean the same, i.e. the engineer or his representatives.
33. “Consultant” means the consultant appointed by the UPJN for the purpose of providing consultancy services.
34. FSTP means Feacal sludge treatment plant .
35. Planted Drying Beds means PDB.
36. Integrated settler and anaerobic filter means ISAF
37. “Technology Provider” means a person or company providing technical knowhow design, processing etc. on Memorandum of Understanding with main bidder and have required technical eligibility and whose credentials are submitted by the bidder at the time of pre-qualification.
38. “Government” means Government of India / Govt. of Uttar Pradesh.
39. “GOI” means Government of India and “GoUP” means Government of Uttar Pradesh.
40. “Drawings” means the drawings referred to in the list of drawings attached to the tender and any modification of such drawings approved / issued in writing by the Engineer in charge and such other drawings as may from time to time be furnished or approved in writing by the Engineer.



41. The “contract sum” means the sum identified in the contract for the completion of works as per contract.
42. “Contractor / bidder’s equipment” means all appliances or machinery of whatsoever nature, materials or other things intended to form or forming part of the works.
43. “Portion of the work” means a part of the work or section of the work.
44. “Specifications” and “particular specifications” means the regulating guidelines contained in the Uttar Pradesh Jal Nigam/PWD specifications, manual of Sewerage and Sewage Treatment, Manual on Water Supply and Treatment published by the Central Public Health and Environmental Engineering Organization (CPHEEO) under the Ministry of Urban Development, Indian Standard Specifications and codes, all of latest editions and those contained in the tender documents and also those based on good engineering practices.
45. “Time for completion” means the time as stipulated for completion of the works or any section or portion there-of as stated in the contract or as extended under clause and shall be calculated from the date specified in the contract. It will be the date when the contract enters into force for fulfillment of any obligation as per necessary legal, financial or administrative requirements.
46. “Defect liability period” i.e. means the period after actual completion of the work during which the contractor / bidder will carry the full liability to make good to the complete satisfaction of the Engineer in charge, any defects in the completed work or any bad work.
47. “Cost” means the amount which shall be deemed to include all overhead costs whether incurred on or off the site, all taxes, excise duties, royalties etc as applicable on the materials, labour or any other item which is required to complete the works.
48. “Temporary Works” means temporary works of every kind required in or about the execution of works.
49. “Permanent Works” means the permanent works to be executed and maintained in accordance with the contract.
50. “Construction / Working Drawing of a particular component / item / equipment of the FSTP plant means the detailed engineering drawing of that item submitted by the contractor / bidder and approved by the Engineer in charge, UPJN, prior to construction / fabrication / erection of that component and based on which the same shall be carried out.
51. “As-built Drawing of a particular component / item / equipment of the FSTP Plant means the engineering drawing submitted by the contractor / bidder prior to commissioning, showing the actual details on which the construction / fabrication / erection of that particular item has been carried out.
52. Engineer’s representative means Asst. Engineers/ Project Engineers & Junior Engineers/Asst. Project Engineers.

Note :

In interpreting these “Clauses of contract”: singular also means plural, male means female and vice versa.

## INSTRUCTIONS TO THE BIDDERS

**CONSTRUCTION OF FSTP PLANT OF 7 AMRUT TOWN / CITIES OF U.P. (GONDA, FAIZABAD, BAHRAICH, AKBARPUR, SITAPUR, HARDOI & FARUKHABAD) (32 KLD CAPACITY EACH) ON OPEN TECHNOLOGY ALONG WITH BOUNDARY WALL, APPROACH ROAD AND INSTALLATION OF SOLAR PANEL SYSTEM ETC. INCLUDING REQUIRED SURVEY & DESIGN WORK AND HANDING OVER TO RESPECTIVE URBAN LOCAL BODIES**

### The List of Cities / Town for FSTP

S.No.	City / Town	Septage Generated (Cum per day)
1	Akbarpur	32
2	Faizabad	32
3	Baharaich	32
4	Gonda	32
5	Farrukhabad	32
6	Hardoi	32
7	Sitapur	32

### **SECTION-1**

The Owner i.e. UP Jal Nigam (UPJN) invites bids for the construction works (as defined in these documents and referred to as “the project”). Throughout this Bidding Document,

- (a) The successful bidder shall be expected to complete the works by the intended completion date specified in the agreement.
- (b) The terms ‘bid’ and ‘tender’ and their derivatives (bidder/ tenderer, bid/tender, bidding/tendering, etc.) are synonymous

#### **1. Brief Scope of Work**

Works consist of Construction of FSTP plant of 7 AMRUT town / cities of U.P. (Gonda, Faizabad, Bahraich, Akbarpur, Sitapur, Hardoi & Farukhabad) (32 KLD capacity each) on open technology along with construction of boundary wall, approach road and supply & installation of Solar Panel System with backup including required survey & design work and handing over to respective Urban Local Bodies after successful commissioning, 03 months trial-run & stabilization and defect liability period (DLP) of 12 months that will start after completion of trial-run & stabilization period. DLP will concurrent with operation & maintenance. The land area for construction of FSTP is restricted to 8000 Sqm.

The scope of work shall include but not limited to the following:

- i. Provide design & drawing of all components including required working survey and field investigations in accordance of details of requirement, specifications and instructions given in tender document, duly vetted by any reputed government/semi government technical institution (as approved by engineer in charge), for approval of engineer in charge.
- ii. Construction of civil engineering works for all the units and all the ancillary structures in accordance to

the design & drawing approved by the engineer.

- iii. Supply, Erection, Testing & Commissioning of all the Mechanical Equipments/ Electrical & instrumentation equipments in accordance to the design & drawing approved by the engineer, and as detailed in tender document.
- iv. Supply, Erection, Testing & Commissioning of all the piping, valves and specials etc., in accordance to the design & drawing approved by the engineer, and as detailed in tender document.
- v. During the operation & maintenance period, the electricity charges will be paid by the contractor however same will be reimbursed by the department but maximum upto guaranteed specified consumption, as assured by contractor in his bid.
- vi. Supply of equipment drawings, Technical specification/Catalogue.
- vii. Supply of as built drawings after completion.

**2. Time Schedule**

S.No.	Description	Completion Time
1.	Construction, Erection, Testing, Commissioning of work including approval design & drawing including three month trial & run	15 Months
2.	Operation and Maintenance period	05 year

- 3. The bidding is to be opened to contractors/construction firms having certified Decentralized Waste Water qualification with requisite work experience & financial capabilities. Pre-Bid meeting will be held with the bidders on 20.12.2018 at 11:30 AM in the office of General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam, Lucknow, Uttar Pradesh.
- 4. Contractors /Bidders are advised to visit and examine the site where the works are to be carried out and its surrounding and obtain for themselves on their own responsibility all information and satisfy himself with prior arrangement as to the conditions prevalent there with respect to execution of works as per the scope of work. No claim, whatsoever on any accounts shall be entertained by the UPJN in any circumstances, even if the site of work is changed or modified.
- 5. Contractor / Bidder is expected to well acquaint themselves with the nature of work, the existing water/sewers mains, communication line, power line, incoming drainage and other utility service lines/obstacles etc. and traffic conditions on the roads, through the alignment, they should include in their rates sufficient allowances to meet unforeseen expenses on these grounds.
- 6. Contractor / Bidder is expected to examine all specifications, instructions, forms, terms & conditions, clauses, UPJN requirements and other information in the Tender documents. Failure to furnish all information as required in the tender document or submission of bid not substantial to the tender documents in every respect will be at the Contractor/Bidder's risk and may result in rejection of the bid.
- 7. The Contractor/Bidder, whose bid is accepted, shall be required to furnish security deposit at the **rate of 10% (ten percent)** of the allotted cost of the work, in the shape of FDR/CDR of any Nationalized Bank or Saving Bank pass book/NSC of Post office, or Bank Guarantee of Nationalized Bank, IDBI Bank, ICICI Bank, HDFC Bank and Axis Bank within 10 days of issue of letter of award. The EMD of the successful contractor/bidder may be treated as part of the security deposit if contractor desires so.
- 8. On acceptance of the tender, the contractor shall either himself remain available at site of work or arrange the availability of an accredited representative, legally authorized in writing at the site of work to receive instructions of the Engineer-In-Charge or his representative and to ensure prompt compliance thereof.
- 9. **Labour cess will be deducted as per prevailing rules by the department.**
- 10. The contractor shall comply with the provision of the Apprentices Act 1961, minimum wages Act 1948, Workmen's compensation Act 1923, contract labour (Regulation and Abolition Act 1970), payment of wages Act 1936 Employer's liability Act 1938, Maternity Benefits Act 1961 and the Industrial Disputes Act 1947as applicable and the rules and regulations and amendments issued there under from time to

time. Failure to do so shall amount to breach of the contract and the Engineer-in-charge may at his discretion to terminate the contract. The contractor shall also be liable for any pecuniary loss liability arising on account of violation by him of the provision of the Act.

11. The Tenderer/Contractor shall bear all costs associated with the preparation and submission of his tender and the department shall in no case be liable for these costs.
12. Each Tenderer/Contractor shall submit only one tender. A Tenderer/Contractor or any partner of bidder firm, who submits or participates in more than one tender, will be disqualified.
13. Unless otherwise stated, the contract shall be for the whole work as described in the “Scope of Work” and the approved drawings. The contractor shall be bound to complete the whole work as described in the scope of works and the approved drawings, including the additional items if any, as per drawings and instructions. The certificate of completion as issued by the Engineer-in-charge shall be the conclusive proof of completion of work.
14. Specific reference in the specification to any material by trade name or catalogue number shall be construed as establishing a standard of quality and the performance. Contractor/Bidders may procure any other product if the specified brand names are not available subject to approval of Engineer-In-charge.
15. Whenever required under Government regulations, it shall be incumbent on the successful Contractor/Bidder to pay stamp duty on the contract agreement, as per ruling on the date of execution of the contract agreement.
16. Contractor/Bidders shall carefully examine the Tender Documents and fully converse themselves about all the conditions and matters, which may in any way, affect the work or the cost thereof. If the Contractor/Bidder finds discrepancies or omission in the specifications or other documents or should he be in doubt as to their meaning, he may urged to submit promptly, written requests, on matters where clarifications or additional information are desired before per-bid meeting. No extension in due date of submission of bids will be allowed on this ground.
17. In case of the open technology, plant will become technology driven plant and in view for transparent & proper bid evaluation at par for different kinds of technology, the lead partner must form memorandum of understanding (MOU) with the technology provider for design/performance guarantee along with the performance credentials of the offered process, its philosophy, process/design with calculations, drawing ,layout, hydraulic flow diagram, Process flow diagram, P & I diagram, O & M Manuals, control Philosophy etc. U.P. Jal Nigam may cross verify the documents in case required. Bid will be disqualified in case of any ambiguity found. If Technology provider is participating in the bid as a sole bidder then he cannot enter in any memorandum of understanding (MOU) with any other bidder. In such case bid shall not be opened.

The MOU shall be submitted on Rs. 100/- non judicial stamp paper duly notarized and signed by respective authorized representatives and should be valid at least up to defect liability period. It should also form a part of the contract agreement.

MOU with proposed technology provider shall be submitted by all the bidders on the format provided in the document. In case technology provider is not required for the proposed technology, bidder shall submit CVs/ Credentials of the designer for proposed works.

18. In case Lump sum work, the Contractor/Bidder shall quote for the entire works on a “single responsibility” basis such that the total lump sum price covers all the Contractor’s obligation mentioned in or to be reasonably inferred from the tender documents in respect of the design, drawings including procurement, delivery, construction, erection and completion of works. This includes all requirements under the Contractor’s responsibilities for testing and commissioning of the work.

19. In case of item rates, the unit rates and prices shall be quoted by the Contractor/Bidder entirely in Indian Rupees. All payments to the successful Contractor/Bidder under the proposed contractor shall be made entirely in Indian Rupees.
20. No interest shall be paid on Earnest Money/Security Deposit.
21. All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signatures.
22. On completion of work, the contractor shall submit five sets (Hard copy), of as built drawings and completion details and soft copy of the drawings on the compact disc (CD).
23. One set of drawings and all other documents relating to the works under contract shall be kept in the site office and made readily available for discussions, examinations of the Engineer or his representatives along with the testing equipment and machinery.
24. As soon the allotment letter is issued to the Contractor/Bidder, he will submit to the Engineer-in-charge his program to complete the works by the time indicated in the contract, in the form of a Bar Chart for review of the Engineer-in-Charge and make suggested modification before his approval of the same. The approved bar chart shall be diligently and strictly followed with a view to complete the works as per schedule. The progress & planning of works shall be reviewed from time to time and he may modify the same depending upon the exigencies of the work and state of the works.
25. Contractor/Bidder is advised to read carefully all chapters and give complete information regarding his proposals, substantiating the same with calculations, drawings literature, with clear reference to any standards adopted (which are not mentioned in the tender), in such manner that there is no ambiguity or nothing is left to chance. All relevant information, so as to make the proposal understandable shall be given. Vague remarks and remarks like “will be given later” are not acceptable. If in the opinion of the Engineer-in-charge, the proposal is grossly incomplete, this will form sufficient reason for complete rejection of the tender on technical grounds.
26. Contractor/Bidder shall note that in case of Lump sum Price Turnkey tender, the Contractor/Bidder shall give rate for complete work and also give unit-wise/sub-unit wise rate just to facilitate schedule of payments. However, his proposal is subject to scrutiny and approval. He shall therefore take utmost precaution to offer very standard equipment manufactured by only reputed manufacturers (wherever the makes are specified in the tender document, the same shall be offered).
27. The Contractor/Bidder shall not be allowed to change the price quoted on his own.
28. All initial defects shall be rectified to the entire satisfaction of the Engineer-in-charge. Damaged or non-working parts shall be replaced at no extra cost to UPJN.
29. **Water for construction & drinking purpose, Electric power, Electric connection or generator set required for the execution of work shall be arranged by the Contractor/Bidder at his own expenses. In general power cut if any is of 4 hours maximum but contractor should consider daily consumption of half an hour per day and subsequent price of diesel price should be included while quoting price Bid.**

30. The Bidder/MOU partners/partner of the firm/any Director of the firm, should not have been terminated/blacklisted/debarred in any State Govt. / Board / Municipal Corporations /Central Govt./Any state Govt. Organization, Urban Local body and/or its undertaking company or its SPV, Asian Development Bank/World Bank or similar international funding agencies organizations due to delay in projects during last five years.

## **2.0 PREPARATION & SUBMISSION OF APPLICATION FOR PRE QUALIFICATION:**

- 2.1 For any other enquiries in details contact Project Manager, Gomti Pollution Control Unit-I, U.P. Jal NIGAM, Lucknow.
- 2.2 All information requested for pre-qualification shall be provided in the English/Hindi language.
- 2.3 The application for pre-qualification shall consist of the forms and documentation specified in the pre-qualification data along with all certificates and attachments to fulfill the eligibility conditions.
- 2.4 Failure to provide information which is essential to evaluate the applicants/bidders qualifications, or failure to provide timely clarification or substantiation of the information supplied may result in disqualification & rejection of the applicant/bidder.
- 2.5 Submission of applications for pre-qualification must be received on e-procurement web site <http://etender.up.nic.in>
- 2.6 If any information in this schedule is found to be incorrect or concealed, the tender will be summarily rejected.
- 2.7 Along with publication in news papers the Notice Inviting Tender (NIT or E-Tender Notice) for the aforesaid project shall also be available on the e-procurement website <https://etender.up.nic.in> and U.P. Jal Nigam's website [www.upjn.org](http://www.upjn.org).
- 2.8 For participating in tenders through the E-Tendering system, it is necessary for bidders to be registered users of the e-procurement website <https://etender.up.nic.in> and the bidders should possess valid class-2 / class-3 digital signature certificates (DSC). Subsequent **clause 3.18 and 3.19 provide** guidance regarding registration and DSC for bidders new to this system.
- 2.9 Bidders shall bear all costs associated with the preparation and submission of their e-bid and U.P. Jal Nigam will, in no case, be responsible or liable for these costs, regardless the conduct or outcome of the E-Tender process.
- 2.10 This e-tender document shall remain available on the web site <https://etender.up.nic.in> from the download/ sale start date and time till the download/sale end date and time of as mentioned in the E-Tender schedule, so as to enable the bidders to view and download the E-Tender Document.
- 2.11 U.P. Jal Nigam requires that bidders observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance to this policy, U.P. Jal Nigam will reject a proposal for award if it determines that the bidder/contractor has been engaged in corrupt or fraudulent practices in competing for the contract under reference.
- 2.12 Bidder shall not be a registered member of Bar Council.
- 2.13 Intending tenderers must have certified Decentralized Waste Water qualification with requisite work experience & financial capabilities. The firm to have prior experience and expertise in developing and/or designing and constructing and operating waste water / septage management /waste to compost / Bio-methanation / DEWATS projects in India. The Bidder should have commissioned at least one project of the above specified in the last 5 (five) years.
- 2.14 The quantities are approximate and can vary to any extent on either side. No extra claim shall be entertained on this account. The contractor will be paid on the basis of the actual measurement of finished item of work, executed by him.

**2.15** The department reserves the right to accept or reject any e-bid or annul the e-bid process or reject all e-bids at any time prior to award of contract, without assigning any reason and without thereby incurring any liability to the affected bidder or bidders.

**2.16 The bidders are advised:-**

- a. To visit the site of work so as to study and ascertain local conditions with particular reference to access road and infrastructure facilities, the market availability of materials and their sources, labour (skilled and unskilled) and layout plan of proposed Sewer Network and all relevant factors which might affect their rate and to quote rates accordingly.
- b. To read carefully the specifications, terms and conditions, work out their own quantities and rates from site conditions before quoting the rates.

**3. PRE-QUALIFICATION AND TENDERING:**

**3.1** The U.P. Jal Nigam reserves the right to :

- (a) Amend the scope of work and value of any contract(s) to be tendered, in that event only those prequalified applicants/bidders who meet the amended requirements will be invited for tendering.
- (b) Reject or accept any application.
- (c) Cancel the pre-qualification process and reject all applicants. The UPJN shall neither be liable nor be under any obligation to inform the applicant/bidder of the grounds for such action like rejection, cancellation or amendments.

**3.2** Applicants/Bidders who have qualified in the pre-qualification criteria will be informed about the UPJN's decision in writing and via e-procurement web site <http://etender.up.nic.in>

**3.3** The financial bid of only those contractors/bidders shall be opened who will qualify the eligibility criteria of pre-qualification as mentioned in pre-qualification document for evaluation of Technical & Financial Capability. The date of opening of financial bid shall be informed via e-procurement web site <http://etender.up.nic.in> and via email to only those contractors who emerge successful in prequalification bid.

**3.4** The pre-qualification bidders who qualify in the P.Q. bid shall be required to participate in the tendering process. In case the bidders who qualify in this P.Q. bid, do not participate in tendering process then their Earnest Money deposited with this P.Q. bid shall be forfeited.

**3.5** At the time of submitting their tenders/bid pre-qualified tenders/bidders shall update the relevant information used for pre-qualification to confirm that they continue to comply with the qualification criteria and verify that the information previously provided is still valid and correct. A tenderer/bidder shall be disqualified if it no longer meets the qualification requirements before, on or after the time of contract of award.

**3.6** Tenders/bidders will be required to provide an earnest money outlined in the notice inviting tender without which his Bid shall not be entertained.

**3.7** The Earnest Money Deposit (EMD) amounting as per NIT in form of **Bank Guaranty** issued by Nationalized Bank or IDBI Bank, ICICI Bank, HDFC Bank & Axis Bank in favour of **Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam Lucknow.**

**3.8** Bidders shall have to pay e-tender document fee of Rs. 22,400.00 including GST (as applicable) in the form of DD payable in favour of Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam Lucknow within 7 days from the opening of Technical Bid.

**3.9** Request letter (as per format annexed).

- (a) Declaration Affidavit of bid validity on non judicial stamp paper of Rs. 100/- duly verified by Notary Public (as per Form 1(c) of Volume-II)
- (b) Declaration Affidavit on non judicial stamp paper of Rs. 100/- duly verified by Notary Public (as per Format-11).

- (c) Declaration Affidavit for fulfilling the terms & conditions of the contract on non judicial stamp paper of Rs. 100/- duly verified by Notary Public (as per Form 1(b) of Volume-II).
  - (d) Declaration of Staff on non judicial stamp paper of Rs. 10/- duly verified by Notary Public (as per Format 5(b)).
  - (e) Declaration of T&P on non judicial stamp paper of Rs. 10/- duly verified by Notary Public (as per Format-6).
- 3.10** Bidders may please note very carefully that e-bids without e-tender document fee and EMD in the prescribed form and above cited documents shall be treated as non-responsive and shall be rejected.
- 3.11** E-tender document fee is non-refundable.
- 3.12** Earnest money of unsuccessful bidders will be returned as promptly as possible after the acceptance of tender, but not later than 180 days after the expiration of the period of bid validity.
- 3.13** Successful bidder's EMD will be adjusted against the security money to be deposited at the time of signing of the agreement. In case, the successful bidder furnishes the required security money in full at the time of signing of the agreement, the earnest money submitted with the bid will be returned when the agreement has been signed.
- 3.14** No interest will be payable by the U.P. Jal Nigam on the Earnest Money or Security Deposit or any other amount withheld/deducted as per terms of the contract.

**3.15 THE TENDER DOCUMENT**

**3.15.1** The e-tender document for the e-tender under reference comprises of following two parts:

**(A) PART-I: Technical & Financial Evaluation cum Technical Bid (Pre-qualification bid):** This part will comprise of:

- (i) **Fee details** – It includes of the cost of tender document and prescribed earnest money in prescribed form. A scanned copy of e-tender document fee and for EMD in PDF format must be uploaded along with Part-I of the e-bid.
- (ii) **Qualification Details** – It includes copies of required documents in PDF format establishing that the bidder is qualified to perform the contract if his/her bid is accepted and the bidder has financial & technical capability necessary to perform the contract and meets the criteria outlined in 'requirements of pre-qualification' and fulfill all the conditions of the contract and elsewhere in the tender.

**(B) PART-II: Financial bid / Price bid Language of e-bid:**

**3.15.2** The e-bid prepared by the bidder, as well as all correspondence and documents relating to the e-bid, exchanged by the bidder and the department shall be written either in English or Hindi language. The correspondence and documents in Hindi must be accompanied by embedded/separate Hindi font files. Only English numerals shall be used in the e-bid. If any other language is used, it shall be accompanied by a translation into English/Hindi language, duly signed and certified by bidder, as the true translation, which will be used for interpreting the information.

**3.15.3 Amendment(s) of e-Tender Document:**

- (i) At any time prior to the deadline for submission of e-bid, the department may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the e-tender document by amendment(s). For such amendment(s) written 'Addendum/Corrigendum(s)' shall be issued copy of which shall be simultaneously uploaded on the e-procurement website <https://etender.up.nic.in>. All such Addendum/corrigendum(s) shall become an integral part of e-tender document. The relevant clause(s) of the e-tender document shall be treated as amended accordingly.
- (ii) It shall be the sole responsibility of the prospective bidders to check the website <http://etender.up.nic.in> regularly for amendment(s), if any, in the e-tender document, failing which the responsibility of any error arising out of such negligence shall rest with the bidder.



- (iii) In order to allow prospective bidders a reasonable time to take the amendment(s) into account in preparing their e-bids, U. P. Jal Nigam, at its discretion, may extend the deadline for the submission of e-bids. Such extension(s) shall be uploaded on the e-procurement website <http://etender.up.nic.in>.

**3.15.4 Bid Validity period:** e-bid shall remain valid for 120 days after the actual date of opening of Technical & Financial Evaluation Cum Technical bid. In case, however, the day upto which the bid is to remain valid happens to be a public holiday/is declared public holiday for Govt. offices, the bid shall remain valid for acceptance till the next working day. In exceptional circumstances, the department may solicit the bidder's consent to an extension of the period of e-bid validity. The request and the response thereto shall be made in writing. A bidder may refuse the request without forfeiting his/her e-bid security (EMD). A bidder granting the request will not be required nor permitted to modify his/her e-bid.

**3.15.5 Forfeiture of EMD:** Earnest money deposit shall be forfeited

- (i) If the bidder (a) withdraws his/her e-bid during the period of e-bid validity as specified above or (b) does not accept the correction of errors or (c) modifies its e-bid price during the period of e-bid validity.
- (ii) In case of a successful bidder, if the bidder fails to sign the contract with the department.

### **3.16 PREPARATION & SUBMISSION OF BID:**

**3.16.1** The tender/bid submission module of e-procurement website <https://etender.up.nic.in> shall enable the bidders to submit their duly filled e-bids online in response to this e-tender from the bid submission start date and time till the bid submission end date and time stipulated in the e-tender schedule.

**3.16.2** Bidders may please note very carefully that till such time that a fresh agreement is drawn up embodying the agreed conditions, the conditions given in this tender document shall govern the contract.

**3.16.3** Bidders are required to examine carefully site conditions, all instructions, forms, terms & conditions and specifications in the e-tender document and prepare the tender in accordance with requirements thereof. Failure to furnish all information as per the e-tender document or submission of e-bid not responsive to the e-tender document in every respect will be at the bidder's risk and shall result in rejection of the said e-bid.

**3.16.4** A bid deviating in any respect from the condition etc. specified in this tender document or found to be containing terms/conditions other than those in tender documents, shall be taken as a conditional bid and shall be liable for rejection.

**3.16.5 Format of e-bid:** The bidder shall prepare one electronic copy of the Technical & Financial evaluation cum Technical bid e-bids (comprises of Vol-I and VOL-II) and financial e-bid (Vol-III) each separately.

**3.16.6** Any corrections in the documents/bank instruments, if required at all, shall be countersigned by the bidder/bank official.

**3.16.7** The documents designated to be uploaded shall be physically signed at all places indicated.

**3.16.8 Signing of e-bid:** The e-bid document shall be digitally signed, at the time of loading, by the bidder or a person or persons duly authorized to bind the bidder to the contract. All the pages/documents of the e-bid that are to be uploaded shall be digitally signed by the person authorized to sign the e-bid. The individual, physically and digitally signing the tenders and/or other documents, should be either:

- (i) The sole proprietor of the firm or constituted attorney of such sole proprietor.
- (ii) Constituted attorney of the firm, if it is a company under the meaning of Company Law, a scanned copy of the power of attorney should be attached.

- (iii) Managing Director/President/Chairman/Company Secretary in case of a Limited Co. having authorization for committing the company from its Board of Director or as is required under Company Law.
  - (iv) President or Secretary in case of registered co-operative society having such power through Law/Bylaws or by special resolution. Scanned copy of the sole proprietorship declaration/power of attorney/ authorization / resolution / bylaws, as the case may be, must be submitted with Part-I of e-bid. This document shall not be more than one year old as on date of opening of Technical & Financial evaluation cum Technical bid. It should also contain address and mobile number of authorized person.
- 3.17** For participating in e-bid through the e-tendering system it is necessary for the bidders to be the registered users of the e-procurement website <https://etender.up.nic.in>. The bidders must obtain a User Login ID and Password by registering themselves with U.P. Electronics Corporation Ltd., 10, Ashok Marg, Lucknow, if they have not done so previously for registration.
- 3.18** In addition to the normal registration, the bidder has to register with his/her digital signature certificate (DSC) in the e-tendering system and subsequently he/she will be allowed to carry out his/her e-bid submission activities. Registering the digital signature certificate (DSC) is a one-time activity. Before proceeding to register his/her DSC, the bidder should first log on to the e-tendering system using the user login option on the homepage with the login ID and Password with which he/she has registered.
- 3.19** For successful registration of DSC on e-procurement website <https://etender.up.nic.in> the bidder must ensure that he/she should possess Class-2/Class-3 DSC issued by any certifying authorities approved by Controller of Certifying Authorities, Government of India, as the e-procurement website <https://etender.up.nic.in> is presently accepting DSC issued by these authorities only. The bidder can obtain user login ID and perform DSC registration exercise above even before e-bid submission date starts. The department shall not be held responsible if the bidder tries to submit his/her e-bid at the moment before end date of submission but could not submit due to DSC registration problem.
- 3.20** The bidder can search for active tenders through "search active tenders" link, select tender in which he/she is interested in and then move it to 'My Tenders' folder using the options available in the e-bid submission menu. After selecting the tender, for which the bidder intends to e-bid, from "My tenders" folder, the bidder can place his/her e-bid by clicking "pay offline" option available at the end of the view tender details form. Before this, the bidder should download the e-tender document and price schedule/bill of quantity (BOQ) and study them carefully. The bidder should keep all the documents ready as per the requirements of e-tender document in the PDF format.
- 3.21** After clicking the 'pay offline' option, the bidder will be redirected to terms and conditions page. The bidder should read the terms & condition before proceeding to fill in the tender fee and EMD offline payment details. After entering and saving the tender fee and EMD details form so that "bid document preparation and submission" window appears to upload the documents as per technical (fee details, qualification details, e-bid form and technical specification details) and financial (e-bid form and price schedule/BOQ) schedules/packets given in the tender details. The details of the demand draft or any other accepted instrument which is to be physically sent in original before opening of technical e-bid, should tally with the details available in the scanned copy and the date entered during e-bid submission time otherwise the e-bid submitted will not be accepted.
- 3.22** Next the bidder should upload the technical e-bid documents for fee details (e-tender fee and EMD), Qualification details. Before uploading, the bidder has to select the relevant digital signature certificate. He/she may be prompted to enter the digital signature certificate password (PIN), if necessary. For uploading, the bidder should click "browse" button against each document label in technical and financial schedules/packets and then upload the relevant PDF files already prepared and stored in the bidder's computer. The required documents for each document label of technical (fee details, qualification details, e-bid form and technical specification details) and financial (e-bid form

and price schedule/BOQ) schedules/packets can be clubbed together to make single different files for each label.

- 3.23** The bidder should click "Encrypt" next for successfully encrypting and uploading of required documents. During the above process, the e-bid documents are digitally signed using the DSC of the bidder and then the documents are encrypted/locked electronically with the DSC's of the bid openers to ensure that the ebid documents are protected, stored and opened by concerned bid openers only.
- 3.24** After successful submission of e-bid document, a page giving the summary of e-bid submission will be displayed confirming end of e-bid submission process. The bidder can take a printout of the bid summary using the "print" option available in the window as an acknowledgement for future reference.
- 3.25** The bidders are strongly advised to undergo training regarding submitting of e-tenders at U.P. Electronics Corporation Ltd., 10, Ashok Marg, Lucknow at any working day, which is free of cost. The training given to them regarding submitting of e-tenders is to be followed strictly while submitting their bids. Notwithstanding the contents of relevant paragraphs regarding bid submission / withdrawal, training given by U.P. Electronics Corporation Ltd., regarding submission/withdrawal/ re-submission of e-tenders will be final. Responsibility of having adequate knowledge of the process and latest changes incorporated, if any, rests with the bidder and the department shall not, in any manner, be responsible for any error or non-submission/withdrawal of a bid on this account.
- 3.26** Deadline for submission of e-bid: e-Bid (Part-I & Part-II Financial Bid) must be submitted/uploaded by bidders at e-procurement website <https://etender.up.nic.in> not later than the time specified on the prescribed date. The server time displayed in the Bid management window on the e-procurement website <https://etender.up.nic.in> will be the time by which the e- bid submission activity will be allowed till the permissible date and time scheduled in the e-tender. Once the e-bid submission date and time is over, the bidder cannot submit his /her e-bid. The department may, at its discretion, extend this deadline for submission of e-bid by amending the e-bid document, in which case all rights and obligations of the department and bidders previously subject to the deadline will thereafter be subject to the deadline as extended. Bidders are advised to start bid submission process well in advance so that they can submit their bids in time. Delay in submission of bid due to any reason during e-bid submission process, shall be responsibility of the bidder.
- 3.27** The land area for construction of FSTP is redistricted to 8000 Sqm.
- 3.28 Withdrawal and Resubmission of e-bid:**
- 3.28.1** At any point of time, a bidder can withdraw his/her e-bid submitted online before the bid submission end date and time. For withdrawing the bidder should first log in using his/her login ID and Password and subsequently by his/her digital signature certificate on the e-procurement website <https://etender.up.nic.in>. The bidder should then select "My bids" option in the bid submission menu. The page listing all the bids submitted by the bidder will be displayed. Click "View" to see the details of the bid to be withdrawn. After selecting the "bid withdrawal" option the bidder has to click "Yes" to the message "Do you want to withdraw this bid?" displayed in the bid information window for the selected bid. The bidder also has to enter the bid withdrawing reasons and upload the letter giving the reasons for withdrawing before clicking the "Submit" button. The bidder has to confirm again by pressing "OK" button before finally withdrawing his/her selected e-bid.
- 3.28.2** No e-bid may be withdrawn after the deadline for submission of e-bids during the period of e-bid validity. If a bidder desires to withdraw his tender before the expiry of the validity period, the department may agree to allow such withdrawal but in such a case the earnest money shall be forfeited. If the department does not allow such withdrawal and accepts the tender and the bidder fails to perform his part of the contract, the earnest money deposited shall be forfeited besides other consequences for breach of the contract.
- 3.28.3** The bidder can re-submit his/her e-bid as when required till the e-bid submission end date and time. The e-bid submitted earlier will be replaced by the new one. The earnest money details submitted

by the bidder earlier will be used for the revised tender and the new bid summary generated after the successful submission of the revised tender will be considered for evaluation purpose. For resubmission, the bidder should first log in using his/her login ID and Password and subsequently by his/her digital signature certificate on the e-procurement website <https://etender.up.nic.in>. The bidder should then select "My bids" option in the bid submission menu. The page listing all the bids submitted by the bidder will be displayed. Click "View" to see the detail of the e-bid to be resubmitted. After selecting the "bid resubmission" option, click "Encrypt & upload" to upload the revised e-bids documents.

- 3.28.4** The bidders can submit their revised e-bids as many times as required by uploading their e-bid documents within the scheduled date & time for submission of e-bids.
- 3.28.5** No e-bid can be resubmitted subsequently after the deadline for submission of e-bids. No request for consideration of any alteration in finally submitted offer shall be entertained.
- 3.28.6** In case of any change in Cash assets, Technical staff, Tools & Plants or change in partners, or constitution of a Company, address of communication or telephone nos. etc. after submission of documents the same shall be intimated to the Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam Lucknow immediately.

### **3.29 OPENING OF TECHNICAL & FINANCIAL EVALUATION CUM TECHNICAL BIDS**

- (1) Process of e-bid opening shall take place in the Office of the General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam Lucknow on the date of opening of Technical & Financial evaluation cum Technical bids (Pre-qualification bids) stipulated in the e-tender schedule, in presence of the bidders' representatives who chose to be present.
- (2) In the event of the specified date of e-bid opening being declared a holiday for the department, the e-bids shall be opened at the appointed time and place on the next working day.
- (3) The bidders' representatives who are present shall sign a register evidencing their attendance.
- (4) The bidders' names and the presence or absence of requisite e-tender document fee receipt and EMD in the prescribed format and other required documents as detailed above, will be announced at the opening.
- (5) Thereafter the department will open all Technical & Financial evaluation cum Technical (prequalification) e-bids through E-Tender procurement solution (e-procurement website <https://etender.up.nic.in>) in the presence of bidders' representatives in General Manager, Gomti Pollution Control Unit, U.P. Jal Nigam Lucknow.
- (6) Technical & Financial evaluation cum Technical (Pre-qualification) e-bids of only those bidders', whose e-tender document fee, EMD and other required documents are found in order, shall be accepted.
- (7) The department will prepare minutes of Technical & Financial evaluation cum Technical (prequalification) e-bid opening.

**3.30 Clarification of e-Bid:** During evaluation of e-bid, the department may, at its discretion, ask the bidder for a clarification of his/her e-bid. The request for clarification shall be in writing. An appropriate reply within the stipulated time shall be obligatory for the bidder.

**3.31 Evaluation Criteria:** The department will examine all accepted Technical & Financial evaluation cum Technical e-bids to determine they are complete, whether they meet all the conditions of the contract, whether all the required documents have been furnished as detailed in tender document, whether the documents have been properly physically and digitally signed as required, and whether the e-bids are generally in order. Any e-bid or e-bids not fulfilling these requirements shall be rejected.

- 1. It shall be the discretion of the department to decide as to whether an e-bid fulfils the evaluation

criterion mentioned in this e-tender or not. Decision of the department on matter of technical & financial evaluation results will be final and binding to all participants. No enquiry/clarification shall be entertained on the evaluation results neither the department will remain bound to provide any such clarifications on such results.

2. The bidders are advised not to mix financial bid documents with the PDF documents uploaded for technical bid. The e-bids of those bidders who have uploaded financial bid document with the prequalification (technical) bid or kept it in envelope of EMD will be out rightly rejected.

### **3.32 OPENING OF FINANCIAL E-BID**

- 3.32.1 After evaluation of Technical & Financial evaluation cum Technical (pre-qualification) e-bid, through the evaluation committee, the department shall notify those bidders whose technical e-bids were considered non responsive to the conditions of the contract and not meeting the technical specifications and qualification requirements indicating that their financial e-bids will not be opened. The Department will simultaneously notify the bidders, whose technical e-bids were considered acceptable to the department. The notification may be sent by e-mail provided by bidder.
- 3.32.2 The date, time and place for the opening of financial bids will be uploaded on the e-procurement website <https://etender.up.nic.in> and communicated to the technically qualified bidders through e-mail provided by the bidder.
- 3.32.3 The financial e-bids of technically qualified bidders shall be opened in the presence of bidders'/their representatives who choose attend. The name of bidders, price quoted will be announced at the meeting.
- 3.32.4 The department will prepare the minutes of the financial e-bid opening.
- 3.32.5 A substantially responsive bid is one which conforms to all the terms conditions and specification of the bidding documents, without material deviation or reservation. A material deviation or reservation is one:-
  - a) Which effects in any substantial way of 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.
- 3.32.6 If a 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 non-conforming deviation or reservation.

### **4. Role & Responsibilities of the Bidder**

The role and responsibilities of the Bidder are as detailed hereunder:

- a) To use proven technologies only. The treatment and disposal of septage & faecal sludge shall be in compliance with CPHEEO standards, norms notified under Environment (Protection) Act, 1986, Pollution Control Board norms, the Solid Waste Management Rules, 2016 notified by Ministry of Environment, Forest and Climate Change (MoEF & CC) of GoI, all the rules and regulations specified in the Air (Prevention and Control) Pollution Act 1981, Water (Prevention and Control of Pollution) Act, 1974 and Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2016 and their amendments issued thereof from time to time and as applicable to the Project;
- b) The FSTPs shall be designed and operated to meet the norms notified by MoEF & CC of GoI vide Notification G.S.R.1265 (E) dated 13thOctober 2017. The liquid emissions emanating from the facility shall meet the Central Pollution Control Board (CPCB) norms and the good industry practices; as amended from time to time.

- c) The dried solid waste/ compost emanating from the facility shall meet the standards prescribed under Fertilizer Control Order notified by GoI/ GoUP;

**5- ELIGIBILITY:**

**(1) TECHNICAL: Experience for construction work:**

The bidder should have experience and expertise in developing and/or designing and constructing and/or operating Decentralized waste water / septage management/ septage co-treatment/ waste to compost / Bio-methanation/ DEWATS projects in India. The Bidder should have either commissioned at least one project of the above specified in the last 10 (ten) years.

In case of Consortium, the criteria can be complied by any one Member or jointly by all the members of the Consortium for the project. To claim design and construction experience /operations experience, the entity claiming the experience/ work order should have been appointed/ hired directly by the relevant government for execution/ operations. Copies of orders/ contract and/or Certificates, issued by Government Organizations/ Municipal Corporations / equivalent to be submitted.

.....  
.....  
.....

- 2. Experience-** Experience of having successfully completed similar works as given below during last 10 years ending Dt 10.12.2018 at least following no of similar works costing not less than given as below.

- a. Three Nos. similar completed works of amount each equal to 30% of the work cost.

**Or**

Two Nos. similar completed works of amount each equal to 40% of the work cost.

**Or**

One Nos. similar completed works of amount equal to 60% of the work cost.

- b. Experience for design and construction of 03 No. FSTP of capacity 09.60 KLD.

**Or**

Experience for design and construction of 02 No. FSTP of capacity 12.80 KLD.

**Or**

Experience for design and construction of 01 No. FSTP of capacity 19.20 KLD.

**(2) FINANCIAL:**

- 1. Minimum turnover** should be at least as under :

Average annual financial turnover during the immediate last three consecutive financial years of construction works should be at least 30% of the Estimated cost.

**2.1 Profit / Loss :** Summary of Profit / Loss A/c for last five consecutive year attested by CA.

**2.2 Solvency :-** The solvency amount should be equal to 40% or more of the estimated cost of the work.

**2.1 Audited Balance Sheet:** The bidder shall submit the Audited Balance Sheet for last 3 years. The UPJN shall have access to the bidder's Auditor/ bank to make inquiries as and when required.

**(3) OTHERS:**

**3.1 Profile of Company:** Constitution of Company and Article of Association, Nature of works being undertaken.

**3.2 Personnel Capabilities:** The bidder shall supply general information on the management structure

of the firm, and shall make provision for suitably qualified personnel to fill the key positions listed in the BDS.

**3.3 Critical Equipment:** The Bidder should demonstrate the availability (either owned or leased) of the key and critical equipment for works as specified in the BDS.

**3.4 Litigation History:** The bidder shall provide accurate and correct information on any running/ current litigation(s) or the past litigation(s) or the arbitration(s) resulting from the completed and / or under execution contracts by the bidder over a period of last five (5) years. A consistent history of litigations against the bidder shall result in failure of the bidder to bid for the said contract.

- a) In case the Bidder is a Consortium, the members thereof should furnish a Power of Attorney in favor of any member, which member shall thereafter be identified as the Lead Member, in the Joint Venture Agreement in the Application Form (2) at Appendix signed by the members of the Consortium.
- b) Where the Bidder is a Consortium entity, it shall be required to comply with the following additional requirements:
  1. number of members in a Consortium shall not be more than 3 (three).
  2. the Bid should contain the information required for each member of the Consortium;
  3. Joint Venture is allowed with the condition that the equity of lead partner shall be 51% (in JV maximum numbers of partners may be Four).
  4. the Bid should include a brief description of the roles and responsibilities of individual members, particularly with reference to financial, technical and/or other obligations;
  5. an individual Bidder cannot at the same time be a member of a Consortium bidding for the tender. Further, a member of a particular Bidder Consortium cannot be member of any other Bidder Consortium bidding for the tender;
  6. members of the Consortium shall enter into a binding Joint Bidding Agreement, substantially in the form specified at Application Form (2) (the "Joint Venture Agreement"), for the purpose of submitting a Bid. The Joint Bidding Agreement, to be submitted shall, inter alia:
    - i. convey the intent for the purpose of domiciling the Project and no other purpose, with shareholding/ commitments in accordance with this tender, which would enter into the Agreement and subsequently perform all the obligations in terms of the Agreement, in case the Project is awarded to the Consortium;
    - ii. clearly outline the proposed roles and responsibilities, if any, of each member;
    - iii. subject to approval from the Lenders and the Authority, after the trial run period has finished, non-lead Member of the Consortium can exit the JV, subject to the approval of the Lead Members.
    - iv. include a statement to the effect that all members of the Consortium shall be liable jointly and

severally for all obligations of the RFP in relation to the Project until the Financial Close of the Project is achieved in accordance with the Agreement; and

- v. Except as provided under this document and the Bidding Documents, there shall not be any amendment to the Joint Bidding Agreement without the prior written consent of the Authority.
- c) Any entity which has been barred by the Central/State Government, or any entity controlled by it, from participating in any project, and the bar subsists as on the date of the Bid, would not be eligible to submit a Bid either individually or a member of a Consortium.
- d) A Bidder including any Consortium Member or Associate should, in the last 3 (three) years, have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Bidder, Consortium Member or Associate, as the case may be, nor has been expelled from any project or contract by any public entity nor have had any contract terminated any public entity for breach by such Bidder, Consortium Member or Associate.
- e) Authority would place sole reliance on the certification provided by the Bidder in this regard in its letter comprising the Technical Bid.
- f) In computing the Net Worth and Technical Capacity of the Bidder / Consortium Members, the Technical Capacity and Net Worth of their respective Associates would also be eligible as detailed hereunder:
- g) For the purposes of this document, Associate means, in relation to the Bidder/Consortium Member, a person who controls, is controlled by, or is under the common control with such Bidder/Consortium Member (the "Associate"). As used in this definition, the expression "control" means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power of direct the management and policies of such person by operation of law.
- i. If any services, functions or responsibilities not specifically described in this document are inherent, necessary or customary part of the deliverables or services and are required for proper performance or provision of the deliverables or services in accordance with this document, they shall be deemed to be included within the scope of the deliverables or services, as if such services, functions or responsibilities were specifically required and described in this document and shall be provided by the Bidder.



## 1. Performance/ Effluent Discharge Criteria:

The Bidder is responsible for ensuring compliance with the treatment and discharge norms in order to reuse treated wastes as a fertilizer or soil conditioner in agriculture.

SN	Parameter	Concentration not to exceed (mg/kg) dry basis, except for pH and carbon to nitrogen ratio)
	BOD	30
	COD	100
	TSS	50
	Arsenic	10
	Cadmium	5
	Chromium	50
	Copper	300
	Lead	100
	Mercury	0.15
	Nickel	50
	Zinc	1000
	C/N ratio	20-40
	PH	5.5-8.5

*(FCO) as per SWM Rules, 2016 and Dept. of Fertilizers.*

Dewatered septage to be used as a fertilizer it should satisfy the following criteria of Class A Bio-solids of US EPA (CEPT, 2015).

- Faecal coliform density < 1000 MPN/g total dry solids
- Salmonella sp. Density < 3 MPN/ 4 g of total dry solids
- Helminth egg concentration of < 1/g total solids (WHO, 2006)
- E coli of 1000/g total solids (WHO, 2006).

*\* All values in mg/l except for pH and Fecal Coliform.*

## **SECTION-2- THE BIDDING DOCUMENTS:**

### **2.1- Content of Bidding Documents:**

**(2.1.1)** The bidding document (Part 1 Technical Bid) consist of:

- (a) The Bid Data Sheet
- (b) Forms of Technical Bid (Qualification Bid) as under:

- Annex A      Form of Clarification Questions
  
- FORM (1)      Letter of Application
- FORM (2)      Joint Venture Agreement
- FORM (2A)     General Experience Record
- FORM (3)      Particular Experience Record
- FORM (3A)     Details of Contract of Similar Nature & Complexity
- FORM (3B)     Client Certificate Regarding Performance of Contractor
- FORM (4)      Summary Sheet (Current Contract Commitments / Works in Progress)
- FORM(5)      Personnel Capabilities
- FORM(5A)     Candidate Summary
- FORM(6)      Equipment Capabilities
- FORM (7)      Solvency
- FORM (7A)     Financial Capabilities (Annual Turnover)
- FORM (8)      Litigation History
- FORM (9)      Affidavit Pro-forma

**(2.1.2)** The bidding document (Part 2 Technical-Financial Bid) consist of

- (i) Annex B to the Bidding Documents – The contract (the “Draft Contract”) consisting of:
  - a. Form of Contract;
  - b. General Conditions of Contract
  - c. Appendices to the General Conditions, including the
    - 1. Scope of Work & Technical Specifications Appendix;
    - 2. Drawing Appendix
- (ii) Addenda to the documents listed in Instruction to Bidders as above, if any are issued by the owner/ authority.

### **General Terms**

- (1) The documents listed as above are collectively the “Bidding Documents”. The bidding document is available online on the website <https://etender.up.nic.in/nicgep/app> The bid can be downloaded free of cost, however, the bidder is required to submit demand draft towards the cost of the bid document in favor of the name as specified in BDS.
- (2) Each bidder shall examine all instructions, terms and conditions, forms, specifications and other information contained in the bidding documents. If the bidder,
  - (a) Fails to provide all documentation and information required by the bidding documents; or
  - (b) Submits a bid which is not substantially responsive to the terms and conditions of the Bidding Documents,Such action is at the Bidder’s risk and the owner may determine that the Bid is non-responsive

to the Bidding Documents and may reject it.

## **2.2- Clarification of Bidding Documents:**

- (1) The electronic bidding system provides for online clarification. A responsive bidder requiring any clarification may notify online to the authorized official during the clarification stage.
- (2) All such queries and requests for clarification shall be submitted online no later than the date specified in BDS (Bid Data Sheet), using the Form for Clarification Questions contained in the Bidding Documents.
- (3) The owner/ authority will respond to any request for clarification or modification of the bidding documents that it receives on the Form for Clarification Questions no later than the date set out in the timetable in the Bid Data Sheet. If similar or repeated queries are made by Bidders, the owner may list those queries as one query and respond to such query only once.
- (4) Description of clarification sought and the response of the authority inviting the bid will be uploaded on the website <https://etender.up.nic.in/nicgep/app> for information of the public or other bidders without identifying the source of request for clarification.

## **2.3- Information Provided by the Owner/Bidder Due Diligence:**

- (1) Each Bidder is solely responsible for conducting its own independent research, due diligence, and any other work or investigations and for seeking any other independent advice necessary for the preparation of Bids, negotiations of agreements, and the subsequent delivery of all services to be provided by the Bidder that has been successful in the bidding process (the “Successful Bidder”).
- (2) No representation or warranty, express or implied, is made and no responsibility of any kind is accepted by the owner/ authority or its advisors, employees, consultants or agents, for the completeness or accuracy of any information contained in the Bidding Documents or the response to Clarification Questions Document, or provided during the bidding process or during the term of the contract. All Bidders shall, prior to submitting their Bid, review all requirements with respect to corporate registration and all other requirements that apply to companies that wish to conduct business in the Owner’s country. The Bidders are solely responsible for all matters to their legal capacity to operate in the jurisdiction to which this bidding process applies.
- (3) Each Bidder is solely responsible for conducting its own independent research, due diligence, and any other work or investigations and for seeking any other independent advice necessary for the preparation of Bids, negotiations of agreements, and the subsequent delivery of all services to be provided by the Bidder that has been successful in the bidding process (the “Successful Bidder”).
- (4) No representation or warranty, express or implied, is made and no responsibility of any kind is accepted by the owner/ authority or its advisors, employees, consultants or agents, for the completeness or accuracy of any information contained in the Bidding Documents or the response to Clarification Questions Document, or provided during the bidding process or during the term of the contract. All Bidders shall, prior to submitting their Bid, review all requirements with respect to corporate registration and all other requirements that apply to companies that wish to conduct business in the Owner’s country. The Bidders are solely responsible for all matters to their legal capacity to operate in the jurisdiction to which this bidding process applies.

## **FORMS REQUIRED TO BE FILLED AND SUBMITTED BY THE BIDDER**

- Annex A      Form of Clarificaion Questions
  
- FORM (1)      Letter of Application
  
- FORM (2)      Joint Venture Agreement
- FORM (2A)     General Experience Record
  
- FORM (3)      Particular Experience Record
  
- FORM (3A)     Details of Contract of Similar Nature & Complexity
  
- FORM (3B)     Client Certificate Regarding Performance of Contractor
  
- FORM (4)      Summary Sheet (Current Contract Commitments / Works in Progress)
  
- FORM(5)      Personnel Capabilities
- FORM(5A)     Candidate Summary
  
- FORM(6)      Equipment Capabilities
  
- FORM (7)      Solvency
  
- FORM (7A)     Financial Capabilities (Annual Turnover)
  
- FORM (8)      Litigation History
  
- FORM (9)      Affidavit Pro-forma

**Form for Clarification Questions**

**Bidder's Name:**.....

**Bidder's Address:** ..... **Date**

**Submitted:** .....

<b>Item No.</b>	<b>Section Reference</b>	<b>Page No.</b>	<b>Section or article no.</b>	<b>Question/Query/Clarification/Comment</b>

**LETTER OF APPLICATION**

(Letterhead of the Contractor/ bidder including full postal address, telephone no. fax no. telex no. and e-mail address)

To,

Date .....

General Manager, Gomti  
Pollution Control Unit,  
U.P. Jal Nigam,  
Lucknow.

Dear Sir,

Being duly authorized to represent and act on behalf of..... and having reviewed and fully understood all the pre-qualification information provided, the undersigned hereby apply to be pre-qualified by yourselves (UPJN) as a Firm/ Consortium/ Corporate Houses for the following contract.

Sl. No.	Contract Name

2. Attached to this letter are copies of original documents defining.
  - a) The Firm/ Consortium/ Corporate Houses' legal status.
  - b) Its principal place of business, and
  - c) Its place of incorporation (for Contractor/ bidders which are corporations) or its place of registration (for Contractor/ bidders which are partnerships or individually owned firms)
  - d) Technical & Financial Evaluation documents as defined.
  
3. You (UPJN) and/ or your (UPJN's) authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents and information submitted in connection with this application, and to seek clarification(s) from our banker(s) and client(s) regarding any financial and technical aspects. This Letter of Application also serve as authorization for any individual or authorized representative of any institution referred to in the supporting information, to provide such information deemed necessary and as requested by yourselves to verify statements and information provided in this application, such as the resources, experience and competence of the Firm/ Consortium/ Corporate Houses.
  
4. You (UPJN) and your (UPJN's) authorized representative may contact the following persons for further information.

General and Managerial Inquiries	
Contact –1	Telephone- 1
Contact – 2	Telephone –2

Personal Inquiries	
Contact –1	Telephone- 1
Contact – 2	Telephone –2
Technical Inquiries	
Contact –1	Telephone- 1
Contact – 2	Telephone –2

Financial Inquiries	
Contact –1	Telephone- 1
Contact – 2	Telephone –2

5. This application is made in the full understanding that
  - a) Tenders/ bids by pre-qualification Contractor/ bidders will be subject to verification of all information submitted for pre-qualification at the time of tendering/ bidding.
  - b) You (UPJN) reserves the right to:
    - Amend the scope of work and value of any contracts tendered under this project in bidders who meet the revised requirements, and
    - Reject or accept any application, cancel the pre-qualification process, and reject all applications, and
  - c) You (UPJN) shall not be liable for any such actions and shall be under no obligation to inform the Firm/ Consortium/ Corporate Houses of the grounds for such actions.
6. Appended to this application, we give details of the participation of each party, including capital contribution and profit/loss agreements, in the joint venture or association. We also specify the financial commitment in terms of the percentage of the value of the (each) contract, and the responsibilities for execution of (each) contract.
7. We confirm that if we bid, that bid, as well as any resulting contract, will be:
8. Signed so as to legally bind all partners, jointly and separately All the statements made and information supplied in the form 1 to 7 and accompanying statements are true and correct.
9. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail.

Signed	Signed
Name	Name
For and on behalf of (name of Applicant)	For and on behalf of (name of partner)

	Signed  Name  For and on behalf of (name of partner)	Signed  Name  For and on behalf of (name of partner)
	Signed  Name  For and on behalf of (name of partner)	Signed  Name  For and on behalf of (name of partner)
	Signed  Name  For and on behalf of (name of Applicant)	Signed  Name  For and on behalf of (name of partner)

*Contractors are advised to submit only required testimonials and certificates with their applications.*

**Signature of authorized signatory with  
Name designation, date & company seal**



**APPLICATION FORM (2)**  
**Joint Venture Agreement**

To

**Project Manager**  
Gomti Pollution Control Unit-I,  
U.P. Jal Nigam, Lucknow

1. The undersigned of this declaration of cooperation are by means of attached Powers of Attorney legally authorized to act with regard .....  
.....**Distt. (U.P.)**  
**for the UP Jal Nigam** ----- Name of work /s  
.....and on behalf of their organizations.

They hereby declare:

1. that they will legalize a Joint Venture Agreement in case that a Contract for the ..... Name of work /s.....is awarded to their group;
2. that they have nominated \_\_\_\_\_ [*name of the lead partner*] as the Sponsor Firm of the group for the purpose of this Bid;
3. that they authorized Mr./Ms. \_\_\_\_\_ [*name of the person who is authorized to act as the Representative on behalf of the Joint Venture*] to act as the Bidder's Representative in the name and on behalf of their group.
4. that all partners of the Joint Venture shall be liable jointly and severally, in the ratio of their share, for the execution of the Contract;
5. that this Joint Venture is an association constituted for the purpose of the execution of the ..... Name of work /s.....  
..... under this Contract;
6. that if the Employer accepts the Bid of this Joint Venture, it shall not be modified in its composition or constitution until the completion of Contract without the prior consent of the Employer;
7. that while the lead partner shall remain overall responsible for successful implementation of the total contract, each partner's share of the responsibility, stated as percentage of the total contract amount, shall be as follows:

Name of Partner	Primarily Responsible to complete components of Contract (as percentage of the contract amount)
1. Lead Partner	
2. Partner	

3. Partner	
Total	

- 8- That if during currency of the work joint venture/ consortium dissolves, the U.P. JAL NIGAM shall have full right to forfeit the security money, payments due with U.P.JAL NIGAM and retain the equipments, T&P, scaffolding, shuttering etc. for completion of the balance work as per provision of the agreements.

Note: The above mentioned responsibility shall not absolve the total responsibility to complete the Contract as a member of the joint Venture.

*Give names and positions of the proposed Joint Venture Representatives, as well as organization's names and addresses:*

1	Name:	Signature:
	Position:	Date:
	Representative of: (Organisation's Name)	

2	Name:	Signature:
	Position:	Date:
	Representative of: (Organisation's Name)	

3	Name:	Signature:
	Position:	Date:
	Representative of: (Organisation's Name)	

## APPLICATION FORM (2A)

### General Experience Record

Name of Firm / Corporate Houses
---------------------------------

All individual firms are request to complete the information in this form. The information supplied should be the annual turnover of the contractor, in terms of the amounts billed to clients for each year for last three years of work in progress or complete.

Annual Turnover Data (Supply and Execution)	
Year	Turnover (in Rs. Lac)
2016-2017	
2015-2016	
2014-2015	

**Signature of authorized signatory with Name  
designation, date & company seal**

## **APPLICATION FORM (3)**

### **Particular Experience Record**

Name of Firm / Corporate Houses
---------------------------------

To pre-qualify, the contractor shall be required to pass the specified requirements set forth in this form, as set out in the pre-qualification data.

A separate page, using the format of Form (3A), the contractor is requested to list all contracts of similar nature and complexity as the contract for which the contractor wishes to qualify, and undertaken during the last 5 years. The information is to be summarized, using Form (3A) for each contract completed and its time of completion on under execution by the contractor.

The amounts and periods should be consistent with those specified in the Qualifying Requirements specified in the Pre-qualification Data.

**Signature of authorized signatory with  
Name designation, date & company seal**

**APPLICATION FORM (3A)**  
**Details of Contracts of Similar Nature & Complexity**

Name of Firm / Corporate Houses
---------------------------------

*Use a separate sheet for each contract*

1. Reference of Contract agreement	
Name of Contract	
2. Name of Employer/ client	
3. Address of Employer/ client	
4. Nature of work and special features relevant to the contract for which the contractor wishes to pre qualify	
5. Contract role (check one )	
6. Value of the Total contract / Sub contract	
7a. Date of start as per contract	
7b. Date of start (actual )	
8a. Date of completion as per contract	
8b. Date of completion (actual )	
9. Contract/ Sub contract duration	-----Years                      -----Months
10. Specified requirements	
11. For contractors, indicating approximate amount and nature of substantial work undertaken by sub contract, if any	

All applicants should insert any specific contractual criteria required for particular operations.

Signature of bidder

## APPLICATION FORM (3B)

### Client Certificate Regarding Performance of Contractor

Name of Address of the Client .....

.....

Details of Works executed by Shri / M/s.....

.....

1	Name of work (brief particulars)	
2	Agreement No. and Date	
3	Date of commencement of work	
4	Stipulated date of completion	
5	Actual Date of completion	
6	Details of compensation of levied for delay, if any	
7	Tendered amount	
8	Gross amount of the work completed	
9	Name and address of the authority under whom works executed	
10	Whether the contractor employed qualified Engineer / Overseer during execution of work?	
11	(i) Quality of work (indicate grading) (ii) Amount of work paid on reduced rate basis if any	
12	(i) did the contractor go for arbitration ? (ii) If yes, total amount of claim (iii) Total amount awarded	
13	Comments on the capabilities of the contractor (a) Technical Proficiency (b) Financial soundness (c) Mobilization of adequate T&P (d) Mobilization of manpower (e) General behavior	Out standing/ V. Good /Good/ Poor Out standing/ V. Good /Good/ Poor Out standing/ V. Good /Good/ Poor Out standing/ V. Good /Good/ Poor Out standing/ V. Good /Good/ Poor

**Note :** All columns should be filled in properly.

Signature of the Reporting Officer with  
Official Seal

## APPLICATION FORM (4)

### Summary Sheet

#### Current Contract Commitments / Works in Progress

Name of Firm / Corporate Houses
---------------------------------

Contractor to an application should provide information on the current commitments under all contracts that have been awarded or for which a letter of intent and acceptance has been received or for contracts approaching completion but for which an unqualified full completion certificate has yet to be issued.

Name of Contract	Address of the client	Total Value of Contract	Value of outstanding work as on 31.03.2017	Value of outstanding work to be completed in next two years from 31.03.2017	Estimated completion period	Date of Start of work as per contract
1.						
2.						
3.						
4.						
5.						
6.						
7.						

**Signature of authorized signatory with  
Name designation, date & company seal**

## APPLICATION FORM (5)

### Personnel Capabilities

Name of Firm / Corporate Houses
---------------------------------

1. Title of Position Name of prime candidate	
2. Title of Position Name of prime candidate	
3. Title of Position Name of prime candidate	
4. Title of Position Name of prime candidate	
5. Title of Position Name of prime candidate	
6. Title of Position Name of prime candidate	

**Signature of authorized signatory with  
Name designation, date & company seal**



## APPLICATION FORM (5A)

### Candidates Summary

Name of Firm / Corporate Houses							
Position	Prime Candidate						
Candidate Information	1. Name of the Candidate						
	2. Professional qualification						
Present Employment	1. Name of Employer						
	2. Address of Employer						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Telephone</td> <td style="width: 50%;">Contact (Manager/ Personnel office)</td> </tr> <tr> <td>Fax</td> <td>Telex</td> </tr> <tr> <td>Job Title of candidate</td> <td>Years with present Employer</td> </tr> </table>	Telephone	Contact (Manager/ Personnel office)	Fax	Telex	Job Title of candidate	Years with present Employer
Telephone	Contact (Manager/ Personnel office)						
Fax	Telex						
Job Title of candidate	Years with present Employer						

Summarize professional experience over the last 10 years; in reverse chronological order indicate particular technical and managerial experience relevant to the Project.

From	To	Company/ Project/ Position/ Relevant technical and management experience

**Signature of authorized signatory with  
Name designation, date & company seal**

## APPLICATION FORM (6)

### Equipment Capabilities

Name of Prime Firm / Corporate Houses
---------------------------------------

The Contactor shall provide adequate information to demonstrate that it has the capability to meet the requirements for all items of equipment listed in the Pre-qualification Data. A separate Form (6) shall be prepared for each item of equipment, or for alternative equipment proposed by the Applicant / Contactor.

Item of Equipment	
Equipment Information	<ol style="list-style-type: none"> <li>1. Name of Manufacturer</li> <li>2. Model and power rating</li> <li>3. Capacity</li> <li>4. Year of Manufacture</li> <li>5. Current Location</li> </ol>
Available for this contract	
Source	Indicate source of equipment Owned / Rented / Leased / Specially Manufactured

Omit the following information for equipment owned by the applicant / Prime contractor or sub-contractor.

Owner	<ol style="list-style-type: none"> <li>1. Name of owner</li> <li>2. Address of owner</li> </ol>  <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Telephone</td> <td style="width: 50%; text-align: center;">Contact Name and Title</td> </tr> <tr> <td style="text-align: center;">Fax</td> <td style="text-align: center;">Telex</td> </tr> </table>	Telephone	Contact Name and Title	Fax	Telex
Telephone	Contact Name and Title				
Fax	Telex				
Agreement	Details of rental/ lease/ manufacture agreement specific to the Project				

**Signature of authorized signatory with  
Name designation, date & company seal**

## APPLICATION FORM (7)

### Solvency

Name of contractor

1. Amount of Solvency : Rs.  
(Attach Document Proof)
2. Current Net Worth : Rs.  
(CA certificate is required)

**Signature of authorized signatory with  
Name designation, date & company seal**

.

**APPLICATION FORM  
(7A)**

**Financial Capabilities**

Name of Contractor
--------------------

Contractors should provide financial information to demonstrate that they meet the requirements stated in the Pre-qualification Data, contractors must complete this form. If necessary, use separate sheets to provide complete banker information. Copy of the audited balance sheets should be attached.

Banker	Name of Banker
	Address of Banker
	Telephone <span style="float: right;">Contact Name and Title</span>
	Fax <span style="float: right;">Telex</span>

Summarize assets and liabilities for the previous five years. Based upon known commitments, summarize project assets and liabilities for the next two years, unless the withholding of such information is justified by the contractor to the satisfaction of the UPJN. Attach the certificate from the CA/ Valuer.

Financial Information	Actual previous five years					Projected next two years	
	Year 1 2016-17	Year 2 2015-16	Year 3 2014-15	Year 4 2013-14	Year 5 2012-13	Year 6 2017-18	Year 7 2018-19
1. Total Assets							
2. Current Assets							
3. Total Liabilities							
4. Current Liabilities							
5. Profit before Taxes							
6. Profit After Taxes							

Specify proposed sources of financing to meet the cash flow demands of the Project, net of current commitments specified in the Pre-qualification Data.

Source of Financing	Amount
1.	
2.	
3.	
4.	

Attach audited financial statements for the last five years (for the individual contractor)

Firms owned by individuals, and partnerships, may submit their balance sheets certified by an accountant, and supported by copies of tax returns, if the laws of their countries of origin do not require audits.

**Signature of authorized signatory with  
Name designation, date & company seal**



## शपथ पत्र

मैं .....पुत्र श्री .....

निवासी (स्थायी पता) .....

.....(अस्थायी पता) .....

का निवासी हूँ। मैं शपथपूर्वक निम्न घोषणा करता हूँ :-

राजपत्रित  
अधिकारी द्वारा  
प्रमाणित पासपोर्ट  
साइज का  
नवीनतम फोटोग्राफ  
चस्पा किया जाए

1. मैं उ० प्र० जल निगम का ए श्रेणी का पंजीकृत ठेकेदार हूँ/नहीं हूँ। (उ०प्र० जल निगम द्वारा निर्गत श्रेणी सम्बन्धी प्रमाण पत्र संलग्न किया जाये) मेरे पास पर्याप्त चल और अचल सम्पत्ति है और व्यवसायिक रूप से मैं (उ०प्र० जल निगम) के कार्यों को पूरा करने के लिए सक्षम और समर्थ हूँ। मेरे पास आवश्यक मशीनें और उपकरण आदि भी हैं तथा मुझे इस कार्य का पर्याप्त अनुभव है।
2. उ० प्र० जल निगम गोरखपुर द्वारा जो अमृत कार्यक्रम के अन्तर्गत गोरखपुर सीवरेज योजना जोन ए-1 दक्षिणी भाग (लोअर पार्ट) के कार्य कराने की निविदा निर्गत की गयी है, विभाग द्वारा निर्धारित प्रारूप पर निविदा भर रहा हूँ।
3. मेरे द्वारा दिये जा रहे प्रमाण पत्र, चरित्र प्रमाण पत्र, हैसियत प्रमाण पत्र, आयकर प्रमाण पत्र, व्यापार कर प्रमाण पत्र, बीड सिक्वोरिटी प्रमाण पत्र, बीड कैपिसिटी प्रमाण पत्र, जमानत धनराशि आदि का प्रमाण पत्र तथा अन्य सुसंगत अभिलेख आदि मूल रूप में निविदा पत्र के साथ संलग्न कर दिये गये हैं।
4. मेरा पैन नं० ..... है। (आयकर विभाग द्वारा प्रदत्त प्रमाण पत्र संलग्न किया जाये)
5. मेरे विरुद्ध अपराधिक मुकद्दमों का विवरण निम्न प्रकार है। यहीं पूरा विवरण दिया जाए।  
अ. मुकद्दमा नम्बर : .....  
ब. धारार्ये : .....  
स. थाना : .....  
द. जनपद : .....  
य. न्यायालय (जहाँ मुकद्दमा चल रहा है)
6. मैं उ० प्र० जल निगम अथवा केन्द्र / किसी राज्य सरकार के अन्य विभागों अथवा इसके **undertaking** द्वारा ब्लैक लिस्टेड ठेकेदार की श्रेणी में नहीं आता हूँ। मैं अपराधिक गतिविधियों, माफिया तथा गैंगस्टर गतिविधियों और संगठित अपराध करने की गतिविधियों और असामाजिक कार्यों आदि में लिप्त नहीं हूँ। मैं माफिया और अपराधी नहीं हूँ। मेरा चाल-चलन, कार्य तथा आचरण उत्तम है।
7. मेरे विरुद्ध देश / प्रदेश अथवा जनपद में कोई भी मुकद्दमा दर्ज नहीं है।
8. यदि ठेका प्राप्त करने के पचास (50) दिनों के बाद मेरे विरुद्ध माफिया गतिविधियों/असामाजिक गतिविधियों व संगठित अपराधिक गतिविधियों में लिप्त होने के बारे में कोई शिकायत प्रमाणित पायी जाती है तो सक्षम अधिकारी को यह अधिकार होगा कि वह मेरा ठेका/अनुबन्ध निरस्त कर दें, इस पर मुझे कोई आपत्ति नहीं होगी। मेरे द्वारा यदि विभाग/राज्य सरकार के विरुद्ध कोई अपराधिक कृत्य किया जाता है अथवा सरकारी धन का गबन किया जाता है तो सक्षम अधिकारी को यह अधिकार होगा कि वह मेरे विरुद्ध अपराधिक मुकद्दमा नियमों के अन्तर्गत दर्ज करायें।
9. मैं अनुबन्ध की शर्तों के अनुसार समय से पूरी गुणवत्ता के साथ तथा निर्धारित विधि-विधानों के अनुरूप कार्य पूरा करूंगा और विभाग को पूरा सहयोग प्रदान करूंगा।
10. मेरा कार्य एवं आचरण उत्तम है।

11. मैं शपथपूर्वक घोषणा करता हूँ कि मेरा स्थायी पता और अस्थाई पता निम्न प्रकार है।  
 अ. स्थायी पता (दूरभाष सहित) : .....  
 ब. अस्थायी पता (दूरभाष सहित) : .....
12. मैं शपथपूर्वक घोषणा करता हूँ कि मैं उपरोक्त पते पर रहता हूँ तथा विभाग द्वारा प्रदान किये गये कार्य के पूरा होने तक मेरे किसी पते में सामान्यतः कोई परिवर्तन नहीं होगा यदि अपरिहार्य परिस्थितियों में किसी पते में परिवर्तन होता है तो इसकी सूचना मैं तत्काल सम्बन्धित प्राधिकृत अधिकारी और जिला मजिस्ट्रेट/कलेक्टर को दूँगा।
13. मैं यह भी घोषणा करता हूँ कि विभाग के जिस कार्य के लिए मेरे द्वारा ठेका लिया जा रहा है उसके सापेक्ष चल एवं अचल सम्पत्ति की हैसियत प्रमाण पत्र जिला मजिस्ट्रेट/कलेक्टर (जनपद का नाम लिखा जाये).....द्वारा प्राप्त करके मूल रूप में संलग्न किया जा रहा है तथा कार्य अपूर्ण / निर्धारित विधियों के अनुरूप पूर्ण न करने पर विभाग द्वारा आवश्यकतानुसार चल एवं अचल सम्पत्ति से वसूली की जा सकती है। यह भी घोषणा करता हूँ कि इस हैसियत प्रमाण पत्र का उपयोग अन्य कार्यों के लिए नहीं किया जायेगा।
14. मैं अपनी पूर्ण जानकारी में पूरे हो-हवास में, स्वस्थ चित्त से पूरी सत्यनिष्ठा से तथा स्वेच्छा से यह शपथ पत्र लिख कर दे रहा हूँ। ईश्वर मेरी मदद करें।

दिनांक :

शपथी का पूरा हस्ताक्षर .....

पूरा नाम :

पता :

- नोट: 1. यह स्वघोषणा पत्र रू0 100/- (रू. एक सौ) के स्टाम्प पेपर पर नोटरी द्वारा साक्ष्यो की उपस्थिति में सत्यापित कराते हुए दिया जायेगा।
2. असत्य शपथ-पत्र देना एक संगीन और संज्ञेय अपराध है।
3. सम्बन्धित व्यक्ति द्वारा पासपोर्ट साइज का अपना फोटोग्राफ, जो राजपत्रित अधिकारी द्वारा प्रमाणित हो शपथ पत्र के ऊपर निर्धारित स्थान पर चस्पा किया जायेगा।



# UTTAR PRADESH JAL NIGAM

FOR

“Construction of FSTP Plant of 31 town/cities of U.P. (32 KLD capacities each)”

UNDER

**AMRUT**

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**FORM OF AGREEMENT- FORM -III**

[To be filled in at the time of agreement by successful bidder on Rs. 100.00 Non Judicial Stamp Paper]

THIS INDENTURE made on the day of 2018 between .....  
(hereinafter called the Contractor) which expression shall, where the context so admits or implies be deemed to include his heirs, executors and administrators of the one part, AND the Chairman , U.P. Jal Nigam (hereinafter called the Chairman) which expression shall, where the context so admits or implies, include his successors and assigns of the other part. WHEREAS the said Chairman required the execution of certain works for.....

..... (hereinafter called the said work which said works are more particularly described in the drawing and specifications hereto annexed AND ALSO requires the provisions of the necessary material therefore and have caused the necessary drawings and specifications and schedule of rates to be prepared and the contractor has delivered to the said Chairman to accept such tender subject to the provisions and conditions hereto attached. NOW THIS INDENTURE WITNESSETH as follows:

In consideration of the covenant, for the payment by and on behalf of the said Government hereinafter contained, the contractor hereby covenants with the Chairman that he will supply all necessary material, labour, T&P etc. and execute and complete the work in a thoroughly sound and workmanlike manner, afterwards maintain the same for the requisite period, stated specifications and schedule of rates hereto attached, signed by the contractor, and as explained in the said drawing hereto attached, and in accordance, in every respect, with the requirements, stipulations hereto attached.

In consideration of the covenants by the contractor hereinafter called the said Chairman hereby covenant with the contractor to pay to him for the execution, completion and maintenance of the work as afore said according to the rates given in the schedule of rates hereto attached, and at the times and in the manner and subject to the additions and deductions set out, and declared in the said conditions hereto attached.

IT IS HEREBY AGREED AND DECLARED that all the provisions of the said conditions, drawings, specifications and schedule of rates marked.

and

hereto attached shall be as binding upon the Contractor and upon the said Chairman as if the same had been repeated herein and shall be read as part of these presents.

In witness where of the parties hereto have affixed their signature  
the .....day.....2018

Witness:

Signature & Seal of Contractor

Signed on behalf of the Chairman by

Witness:

Designation of Officer  
(U.P. JAL NIGAM)

Witness:

# UTTAR PRADESH JAL NIGAM

Construction of FSTP Plant of 31 town /cities of U.P. (32 KLD capacities each)

UNDER

AMRUT

## GENERAL IMPORTANT NOTES

### **1. The tenderers are advised:-**

- A. To visit the site so as to ascertain the local conditions, market availability of materials and quote rates accordingly.
  - B. To quote the rates on percentage above or below w.r.t. given approved rate strictly as per the language of Schedule-G / BOQ and tenderers should not quote or write any condition which is not required in Schedule-G or anywhere in the document because tenders with condition shall be rejected.
  - C. To read carefully the specifications, terms and conditions, work out their own quantities and rates from the drawing and site conditions before quoting the rates.
  - D. To well acquaint themselves with the nature of work, the underground water table, the existing water / sewer lines /electrical lines or cable/telephone lines or cable/data cable, irrigation minors, road, rail crossing & felling of trees including them if necessary and incoming drainage water flows through the alignment and should include in their rates sufficient allowances to meet all expenses to divert the flow of existing arrangements cable etc., strengthen the existing surface and sub-surface utilities which may get open during execution or any damages to water supply, sewer lines cables or any other structure during execution of work, as no claim shall be entertained on this ground after wards.
  - E. To quote the rates item wise for every item (As given in Schedule-G / BOQ) on percentage plus / minus basis w.r.t. given approved rate on Turn Key basis including design, supply of all materials, labour, T&P and expert personnel required for proper completion of work, whether clearly mentioned herewith or not. No extra claims shall be entertained on this account.
2. The quantities are approximate and can vary to any extent on either side. No extra claim shall be entertained on this account. The contractor will be paid on the basis of the actual measurement of finished item of work, executed by him.
  3. Tenders with absurd rates are liable for rejection without assigning any reason.
  4. (a) No payment will be made for marking the layout, construction of level pillars and removal of debris from the alignment and cutting grass etc. for the proper execution of work.  
  
(b) Also, the contractor should include in his rates for diversion of drains, sewers, electrical/telephone/data cables, minors, diversion of traffic, display of caution boards, arrangement of caution lights in the night, marking of level pillars etc. reinstatement of water pipe line, cleaning of side drain filled by excavated earth etc, as mentioned elsewhere, for which no extra payment shall be made to the Contractor. The contractor should also make all arrangement for the safety of Public and Private property for convenience of public at the time of execution of work. The contractor shall be responsible for damage done to any telephone cable and water/sewer pipe line etc and will pay to concerned department, the damage & repair

charges for the same. If shifting of telephone/electric, cable or water/sewer line etc. is necessary, he should inform the department well in advance. The correspondence (letters) shall be issued by U.P. Jal Nigam but contractor shall be responsible for early & timely approval in writing from the concerned department /company. The fees shall be payable by U.P. JAL NIGAM (not the claims by department for damage done to their property during execution of works. No extension of time shall be admissible for unreasonable delay in seeking permission from the concerned department/ company).

- 5.** Alignment/route of any part of proposed work may be changed during execution of work as per requirement of work. The department in this regard will entertain no extra claim.
- 6.** Payment shall be made as per Schedule G (BOQ) / payment schedule after proper testing and commissioning as per satisfaction of Engineer in charge.
- 7.** U.P. Jal Nigam/L.S.G.E.D/P.W.D./CPWD/MoEF specifications, relevant I.S. codes, shall be followed during execution of work/recording measurements and making payment.
- 8.** Stamp duty charge shall be borne by the tenderer as applicable at the time of award of the contract.

## **DEFINITIONS AND INTERPRETATIONS**

- 1.1 **TERMS:** The important terms which shall be used in the contract documents are defined herein. The terms shall have the meanings described which shall be applicable to both the singular and plural thereof and where applicable masculine or feminine in gender.
- 1.2 **ADDENDA AND CORRIGENDUM:** Written or graphic notices issued prior to submission of the tender which modify or interpret the contract documents.
- 1.3 **TENDER/BID:** The offer or proposal of the tenderer submitted in the prescribed form setting forth the prices for the work to be performed and the details thereof.
- 1.4 **TENDERER/BIDDER:** Any person, firm, corporation or organization submitting a tender for the works.
- 1.5 **OWNER:** The term owner means the U.P. Jal Nigam represented by the Chairman, Managing Director, the Chief Engineer, the General Manager or any other officer authorized by the Managing Director.
- 1.6 **EMPLOYER:** The term Employer means the General Manager, Gomti Pollution Control Unit, **U.P. Jal Nigam Lucknow.**
- 1.7 **ENGINEER:** The term Engineer shall mean the Project Manager /Executive Engineer appointed by the owner to undertake the duties and powers, assigned to the Engineer by these specifications acting directly or through his authorized representatives. The term Engineer is referred to throughout the contract documents, as if singular in number, and means the Engineer or his authorized representative including the Engineers, employees, agents and consultants.
- 1.8 **ENGINEER'S REPRESENTATIVE:** Engineer's representative means any Project Engineer /Assistant Engineer/Junior Engineer/ Assistant Project Engineer appointed from time to time by the owner or. Engineer to perform the duties as set forth whose authority shall be notified in writing to the contractor by the Engineer.
- 1.9 **CONSULTANT:** The firm or persons whose expertise has been sought by the owner to help and direct the works or parts thereof.
- 1.10 **CONTRACTOR:** The Contractor is the person, firm, corporation, or organization identified as such in contract Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term contractor or his authorized representative applies to both.
- 1.11 **SUB-CONTRACTOR:** The Sub-Contractor in any form is not allowed.
- 1.12 **SUPPLIER:** The supplier is the person, firm, corporation named in the contract as a supplier for supply of material, equipment etc. whom has been contracted for supply of material, equipment etc. with the consent of the Engineer and legal successors in title to such person, firm, corporation but not any assignee of any such person, firm, corporation.
- 1.13 **PROJECT:** The project is the total contract work designed for or by the owner of which the work performed or constructed under the contract document may be whole or part thereof.
- 1.14 **CONTRACT DOCUMENT:** The Contract Document consists of the Contract Agreement, the notices/instruction and terms issued to Tenderers in the Instructions to Tenderer for the submission of Tenders, the Contractor's Tender, the Tender Security, the Notice of Award, the Notice of proceed, the General Conditions of Contract, the Specifications, the Performance

Bond, the Drawings, all Addenda and Corrigendum and all communications between the owner or Engineer and the tenderer.

- 1.15 CONTRACT PRICE:** The total money payable to the Contractor under the Contract Documents, before award is termed as cost of Contract for submission of Earnest Money/Security Deposit. But the actual Contract price will be the cost of Contract at the time of award plus cost of any variation during the execution, as agreed upon.
- 1.16 CONTRACT TIME:** The number of consecutive calendar months for satisfactory completion of the work including trial run period, if any, as stated in the executed Contract Agreement.
- 1.17 DRAWINGS:** The Drawings or exact reproduction which show the scope and character of the work to be executed and which have been approved by the owner, and are appended to, in the contract Documents. The terms Drawing and Plan have the same meaning as the term Drawings unless otherwise stated or specified.
- 1.18 WORKS:** The expression “works” or “work” where used in these conditions shall, unless thereby something in the subject or context repugnant to such construction, be construed to mean the work or the works contracted to be executed under or in virtue, of the contract, whether temporary or permanent and whether original, altered, substituted or additional.
- 1.19 TEMPORARY WORKS:** Temporary works means all temporary works of every kind required for the performance of the contract.
- 1.18 STANDARDS:** It refers to Indian-Standards issued by the Bureau of Indian Standards. All materials and workmanship which form part of this project shall conform to the relevant up to date amendment or in its absence any other Standards, as the Engineer may approve or direct. Equipment, materials or workmanship, having not included in I.S. Specifications can be according to other standards which ensures equivalent, if not higher quality and which are acceptable by the owner before award of the work or during execution of the work.
- 1.19 SPECIFICATIONS:** The specifications cover the general terms, conditions and requirement of the contract and the materials supplied thereof and the workmanship required from the Contractor. The specifications form part of the Contract and are supplementary to the General conditions of contract.
- 1.20 CONTRACTOR’S EQUIPMENT:** Contractor’s equipment means all equipments, appliances or things of what-so- ever nature required for executions, completions or maintenance of works, or temporary works, but does not include materials and other things intended to form the permanent work or the part thereof.
- 1.21 NOTICE OF AWARD:** The written notice by the owner to the Contractor that the Contractor is the successful Tenderer and that upon compliance with the conditions precedent to be fulfilled by the Contractor within the stated time, the owner will execute the Contractor Agreement.
- 1.22 NOTICE TO PROCEED:** The written notice by the Engineer to the Contractor authorizing him to proceed with the work and establishing the date of commencement of the work.
- 1.23 SAMPLES:** Samples are physical examples furnished by the contractor to illustrate materials, equipment or workmanship and to establish standards by which the work will be judged at adjudication and as the work progresses.
- 1.24 SURETY:** The term surety refers to the banks that join with the contractor in assuming the liability for the faithful performance of the works and for the fulfillment of all obligations pertaining to the works in accordance with the contract documents by issuing the Bonds

required by the contract documents, which Bonds are legally enforceable.

- 1.25 BONDS:** Tender and performance Bonds i.e. Earnest Money Deposit and other instruments of security furnished by the tender/contractor and his surety in accordance with the Contract Document, being legally valid in India and payable on demand to the owner.
- 1.26 VARIATION ORDER:** A written order to the Contractor signed by the owner or the Engineer ordering and authorizing an additions, deletion or revision in the works, or an adjustment in the Contract price or the Contract Time.
- 2.1 INTERPRETATIONS:** The word imparting the singular only shall also include the plural and vice versa unless it is repugnant to the context.
- 2.2** The Contract Documents are complementary and what is called for by one, is as binding as if called for by all. Any work that may be reasonably inferred from the Drawings or specifications as being required to produce the intended result be provided by the Contractor whether or not it is specifically called for. The contractor shall furnish and pay for all labor, supervisions, materials, equipment, transportation, construction equipment and machinery, tools, appliance, water fuel, power, energy, light, heat utilities, telephone and communications, temporary sanitary facilities, storage, services and incidentals of any nature, whatsoever necessary for the satisfactory and acceptable execution, testing, initial operation and completion of the work in accordance with the contract documents, ready for use, occupancy or operation by the Engineer.
- 2.3** Wherever the term ‘specification’ is used apart from specified standard specifications, it shall mean the specifications or plan prepared for a particular item as instructions to the contractor for executing that item of work
- 2.4** If the owner or the Engineer decides that the contract documents require changes, Corrections, clarifications or interpretation prior to the receipt of tenders , an appropriate ‘Addendum’ will be issued.
- 2.5** The owner, the Engineer and their officers, employees and agents will not be responsible for any changes, instructions, clarifications, interpretations, or other information pertaining to the contract documents given to tenderers during the Tender period in any manner other than in a written Addendum.
- 2.6** Written ‘clarifications’ or ‘interpretations’ necessary for the proper execution or progress of the work, in the form of drawings or otherwise, will be issued with reasonable promptness by the Engineer and in accordance with schedule agreed upon. Such clarifications or interpretation shall be consistent with or reasonably inferable from the intent of Contract Document and shall become a part thereof. Where there is a discrepancy between the Drawing and the specifications, such discrepancies should be promptly reported to Engineer and the Contractor shall obtain the Engineer’s interpretation which shall be binding on the Contractor.
- 2.7** The following procedure should then be followed to arrive at the correct ‘schedule of prices’ and grand totals.
- (i) In case of difference between the rates, if written in figures and words, the rate in words shall apply.
  - (ii) In case the totals (in part or grand total) as struck by the contractor are found to be incorrect arithmetically, the same shall be corrected taking the unit rates of the items correct and multiplying them by the corresponding quantities.
- 2.8** Signed drawings alone shall NOT BE DEEMED TO BE in order for work unless it is entered in the agreement or schedule of drawings under proper attestation of the Contractor and the

Engineer or unless it has been sent to the Contractor by the Engineer with a covering letter conforming that the drawing is an authority for work in the Contract.

- 2.9** Reference in the contract documents to any materials, item of equivalent, or type of construction by manufactures, name, make, catalogue, number or other proprietary identification shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Tender shall be based on the products or types of construction so referred to and contract documents. Where the works contractor and approved by a competent authority on behalf of the owner, such specifications with design and drawing shall form part of the accepted tender.
- 2.10** 'Addenda and Corrigendum' issued by the owner shall form a part of the contract document, and full consideration shall be given to all addenda and corrigendum in preparation of tenders. Tenderer shall verify the number of Addenda and corrigendum issued, if any, and acknowledge the receipt of all Addenda and corrigendum to the owner. Failure to be aware of such information, which may affect the requirements of the Tender, will cause the Tender to be rejected.
- 2.11** The Intending Tenderers, in their own interest, they are advised to see 'the site of work' with particular reference to access, road and infrastructure facilities. They are to make a careful study with regard to availability of materials and their sources, labor (skilled and unskilled) and all relevant factors as might affect their rate. A tenderer who submits a tender will be deemed to have inspected the site and made proper study of all relevant factors.



**CONDITIONS OF**  
**CONTRACT**  
**(PART-I)**

**1. INTRODUCTION:**

In these conditions and in the specifications which are here to attached the term. “**The CHIEF ENGINEER**” shall mean the **Chief Engineer,(Lucknow. Zone) U.P. Jal Nigam Lucknow** “**The GENERAL MANAGER** “shall mean the , **GENERAL MANAGER, Gomti Pollution Control Unit, U.P. Jal Nigam, Lucknow** “**The PROJECT MANAGER**” shall mean the **Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam, Lucknow** herein after called the Engineer. “**WORKS or WORK**” where used in these conditions and specifications shall unless there be something either in the subject or context repugnant to such construction be construed and taken to mean “**Work**” by or by virtue of the contract contracted to be executed whether temporary or permanent and whether original, altered substituted or additional.

**2. TIME FOR COMPLETION OF WORK:**

The complete work as specified herein shall be completed in all respects, passed to the satisfaction of Engineer and tested as per latest U.P. Jal Nigam / U.P PWD / U.P. Irrigation Department or I.S. specification / codes and provisions on the subject **within 15 (fifteen)** calendar months and 03 (three) months Trial Run and Stabilization period from the date of written order to the contractor for commencement of the work.

Execution period is 15 months including three months trail & run and Operation & Maintenance period for 05 year and successfully handing over to respective Local Body.

**The defect liability period is 12 (twelve) months after Trial Run and Stabilization period and concurrent with Operation & Maintenance period.**

**Operation & Maintenance period is 05 years.**

**3 CONTRACTOR’S LIABILITY TO PAY COMPENSATION:**

3.01 The works shall through-out the stipulated period of the contract be proceeded with all the due diligence (time being deemed to be the essence of the contract) and the contractor shall pay as compensation an amount equal to one percent for every day that works remain un commenced, or unfinished after the stipulated date of the contract. And further to ensure proportionate progress during the execution of the work the contractor shall be bound to complete one fourth of the whole of the works before one fourth of the stipulated time under this contract has elapsed, one half of the works before one half of such time has elapsed and three fourth of such work before three fourth of time has elapsed. In the event of the contractor failing to comply with this condition he shall be liable to pay compensation as mentioned in this clause. PROVIDE ALWAYS that the entire amount of compensation to be paid under the provision of the clause shall not exceed ten percent of the cost of works.

**4. RIGHT OF BREACH OF CONTRACT:**

In any case in which any clause or clauses of these conditions the contractor shall have rendered himself liable to pay compensation amounting to the whole of the security

deposit (Whether deducted in one sum or deducted by installment) the Engineer on behalf of the Chairman of Uttar Pradesh Jal Nigam shall have power to adopt any of the following clauses as he may deem best suited in the interest of Government:

- (a) To rescind the contract (of which rescission notice in writing to the contractor under the hand of the Engineer shall be conclusive evidence) and in which case the security deposit of the contractor together with such sum or sums due to him under the contract shall stand forfeited and be absolutely at the disposal of the Engineer.
- (b) Determine the contract and call in other contract or, or employ daily labor to dismantle bad work if necessary (the bad work to be certified by the Engineer whose decision shall be final) and to renew and complete the said works and pay the cost of such contractor for daily labor and price of materials required for such dismantling, renewing and completion out of the said security deposit or such sum or sums as may be due to the contractor under this contract, and if such cost be more than the amount made up the security money and the sum or sums due to the contractor under this contract the difference between it and the sum made up by the security money and the balance due to the contractor as aforesaid shall be a debt due from the said contractor.

In the event of either of the above courses being adopted by the Engineer, 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 agreements, or made any advance on account of, or with a view to the execution of the work or the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work therefore actually performed under this contract, unless and until the Engineer shall have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

**5. NON-EXERCISE OF CONTRACTOR LIABILITY TO PAY COMPENSATION:**

In any case in which any of the powers confirmed upon the Engineer by clause 4 thereof shall have become exercisable and the same shall not constitute a waiver of any of the conditions hereof, and such power shall not withstand by exercisable in the event of any future case of default by the contractor for which by any clause or clauses 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 Engineer putting in force either of the powers (a) or (b) vested in him under the preceding clause, he may, if he so desires, take possession of all or any tools, plant, materials and store in or upon the site thereof or belonging to the contractor or procured by him intended to be used for the execution of the work or any part thereof paying or allowing for the same in account at prevailing market rates, such rates to be certified by the Engineer whose certificates thereof shall be final otherwise the Engineer may issue notice in writing to the contractor or his other authorized agents to remove such tools, plants, materials or stores from the premises (within a time to be specified in such notice, and) in the even of the contractor failing to comply with any such requisition, the 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 the Engineer as the expenses of any such removal, and the amount of the proceeds and expense of any such sale shall be final and conclusive against the contractor.

**6. EXTENSION OF TIME:**

If the contractor shall desire an extension of time for completion of the work on the ground of his having been unavoidably hindered in its execution, he shall apply in writing on prescribed format to the Engineer within seven days after the date of hindrance on

account of which he desires such extension as aforesaid, and the Engineer shall, if in his opinion has been brought for on reasonable grounds shall decide for such extension of time, if any, as may, in his opinion, be necessary and proper.

**7. ENGINEER CERTIFICATE OF COMPLETION:**

On completion of work the contractor shall be furnished with a certificate by the Engineer of such completion, but no such certificate shall be given nor shall the work be considered to be complete until the works shall have been measured up by the Engineer whose measurement shall be binding and conclusive against the contract and the contractor shall have to remove from the premises on which the work has been executed all SCAFFOLDING, surplus materials and rubbish and cleaning off all dirt and debris in, upon or about the premises of which he may have had possession for the purpose of the executing the said works. If the contractor fails to comply with the requirement of this clause as to removal of scaffolding, surplus materials and rubbish and cleaning off all dirt and debris on or before the date fixed for the completion of the work the Engineer may at the expense of the contractor remove such scaffolding, surplus materials and rubbish and dispose of the same as he think fit and clean off such dirt and debris as aforesaid and the contractor shall forth with pay the amount of all expense so incurred and 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 after deducting the aforesaid expenses.

**8. PAYMENTS:**

On measurement of the works done for the convenience of the contractor, interim payment shall ordinarily be made monthly but final payment shall not be made until the whole of the work shall have been completed and a certificate for the completion of the work given. PROVIDED ALWAYS that the Engineer may refuse to advance such payments if in his opinion the progress of the "Works" or the conduct of the contractor is not satisfactory or the contractor has in any other way done or neglected to do anything so as to make it doubtful whether the works will be completed by him in accordance with the contract. But all such interim payments shall be regarded as payments by way of advance against the final payments only and not as payments for works actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskillful work to be removed and taken away or re-constructed or re-erected or be considered as an admission of the due performance of the contract or any part thereof in any respect of the accruing of any claim, nor shall it conclude, determine or affect in any way the powers of the Engineer under these conditions or any of the account or otherwise, or in any other way vary or affect this contract. The final bill shall be submitted by the contractor within one month of the date fixed, for completion of the work otherwise the Engineer's certificate of the measurements (due notice having been given beforehand to the contractor of the date of such measurement) and of the total amount payable for the works accordingly shall be final and binding on all parties.

**9. BILL TO BE SUBMITTED ON PRESCRIBED FORM:**

The contractor shall submit all bills on the prescribed forms to be had on application at the office of the Engineer and the charges in the bill shall always be entered at the rates given in the Schedule of Rates hereto attached or in the case of an extra work ordered in pursuance of these conditions and not mentioned or provided for in the tender at the rates hereinafter to be approved by the competent authority on the basis of schedule of rates of U.P Jal Nigam.

**10. STORES SUPPLIED BY GOVERNMENT:**

No material shall be supplied by the department. All the construction material such as pipes, MH cover, Foot steps, Cement, Steel, Bricks, Sand and Stone grit, etc. shall be arranged by the contractor at his own cost. But the material should be ISI marked and shall

be shop tested by the E/I at the cost of contractor and other material shall also be tested at the cost of contractor as desired by E/I.

11. **MATERIALS AND PLANT OF CONTRACTOR:**

All materials brought by the contractor upon the site of the works shall be deemed to be the property of the owner and shall not on any account be removed from the site of the works during the execution of the works and shall at all times be open to inspection by the Engineer. The Engineer on the completion of the works or upon the stoppage of the works as provided for in clause 14 of this contract shall have an option of taking over any such unused materials at prevailing market rates, with the provision that the price allowed to the contractor shall not exceed the amount originally paid by him for the same, as he (the Engineer) shall desire upon giving a notice in writing under his signature and **within fifteen days** of the completion of the works to that effect, and all materials not so taken over by the Engineer shall have no claim for compensation on account of any such materials as aforesaid which are not so taken over by the said Engineer, unused by him (the contractor) or for any wastage in or damage to any such materials.

12. **WORKS TO BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATIONS:**

The contractor shall execute the whole and every part of the work in a most substantial and workmanlike manner both as regards materials and otherwise in every respect in strict accordance with the specification. The contractor shall also confirm exactly, fully and faithfully to the drawing and instructions in writing relating to the work signed by the Engineer.

13. **ALTERATION IN SPECIFICATIONS OF DRAWINGS:**

The Engineer shall have powers, to make any alterations in, or additions to the original specifications, drawings and instructions that may be 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 which may be given to him in writing signed by the Engineer and such alteration shall not invalidate this 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 respect on which he agreed to do the main work. The rates for the additional or extra works shall be minimum of the following:

- (i) The rates derived from the tendered rates for same item of the contract.
- (ii) The rates derived from the U.P. Jal Nigam Schedule of rates of the year for the district in which the work was actually done

If the additional work includes any class of work for which rate can not be derived as above then such class of work shall be carried out at rates to be agreed upon between the Engineer and contractor in writing prior to the work being taken in hand. The time for the completion of the work shall be extended if supplied for by the contractor in writing in the proportion that the additional work bears to the original contract work and the certificate of the Engineer shall be conclusive as to such extension.

PROVIDED ALWAYS that if the contractor shall commence work or incur expenditure in regard there to before the rates shall have been determined as lastly therein-before mentioned, then and in such case he shall only be entitled or be paid in respect of the rates as aforesaid according to such rate or rates as shall be fixed by the Engineer. In the event of a dispute the decision of the Chief Engineer shall be final.

14. **NO COMPENSATION FOR ALTERATION IN OR REDUCTION OF WORK TO BE CARRIED OUT:**

If any time after the commencement of the works the Chairman of U.P. Jal Nigam/ owner through the Executive Engineer shall for any reason what-so-ever not require the works there of as specified in this contract to be carried out, the Engineer shall give notice in writing of the fact to the contractor and upon the receipt of such notice in writing the works under this contract shall cease and the contractor shall have no claim to any payment or compensation what-so-ever on account of any profit or advantage, which he might have derived from the execution of the works in full but which he did not derive in consequence of the full amount of the works not having been carried out neither shall he has any claim for compensation by reason of any alterations having been made in the original specifications, drawings and instructions which shall involve any curtailment of the work as originally contemplated.

**15. ACTION AND COMPENSATION PAYABLE IN CASE OF BAD WORK:**

If it shall appear to the Engineer or his subordinate in charge of the work that any work or part has been executed with imperfect or unskilled workmanship or with materials of any inferior description or that any materials or articles provided by the contractor for the execution of the works are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract the contractor shall on demand in writing from the Engineer specifying the work, materials or articles complained of, forth-with rectify, remove demolish and reconstruct the work so specified, in whole or in part as the case may require, or as the case may be, remove the materials, or articles so specified and provide other proper and suitable materials or articles at his own proper charge and cost, and in the event of his failing to do so within a period to be specified by the Engineer in his demand aforesaid, then the contractor shall be liable to pay compensation at the rate of one percent or such smaller amount as the Chief engineer(whose decision in writing shall be final) may decide on the amount of the cost of the whole work for every day not exceeding ten days, while his failure to do so shall continue, and incase of any such failure the Engineer may rectify remove, demolish and reconstruct the works, or remove and replace with others, the material or articles complained of as the case may be at the risk and expense in all respects of the contractor and such expenses may be deducted from such sum as may be due to the contractor or may become due to him and from his security deposit. A certificate by the Engineer as to the amount of the expenses incurred shall be final and binding upon the contractor.

**16. WORK TO BE OPEN TO INSPECTION:**

All works under or in course of execution or executed in pursuance of this contract shall at all times be open to the inspection of the Engineer or his subordinate and the contractor shall all times during the usual working hours and at all other times of which reasonable notice of the intention of the Engineer or his subordinate to visit the works shall have been given to the contractor, either him- self be present to perceive on' instructions or have a responsible agent duly accredited in writing , present for that purpose. Orders given to the contractor's agent shall be considered to have the same force as if they have been given to the contractor directly and will be considered as binding on the contractor.

**17. NOTICE TO BE GIVEN BEFORE WORK IS COVERED UP:**

The contractor shall give not less than five days notice in writing to the Engineer, or his duly authorized person for recording the measurement of any work, in order that the same may be measured, and correct dimensions there of be taken before the same is so cover up or place beyond the reach of measurement. 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 contractor's expenses and no payment or allowance shall be made for such work or the materials with which the same was executed.

**18. CONTRACTOR LIABLE FOR DAMAGE DONE AND IMPERFECTIONS:**

If the contractor or his work people or servants shall break, deface, injure or destroy any part of a building in which they may be working or any building, road, fence, enclosure or grassland or cultivated ground continuous to the premises on which the work or any part of it is being executed, or if any damage shall happen to the work while in progress from any cause what-so-ever or any imperfections become apparent in it within **12** months after the final certificate of its completion shall have been given by the Engineer as aforesaid, the contractor shall make the same good at his own expense or in default the Engineer may correct the same and made good by other workman and deduct the expense (for which the certificate of the Engineer shall be final) from any sums that may be then or at any time thereafter may become due to the contractor or from his security deposit.

**19. CONTRACTOR TO SUPPLY LABOUR, PLANT, LADDERS, SCAFFOLDINGS:**

The contractor shall supply at his own cost all labor, skilled and un-skilled and all things necessary (except such special things, if any, as may in accordance with the specifications be supplied from the Engineer's stores) such as plants, tools, appliance, implements, ladders, cordage, tackle, scaffolding, shoring, strutting, pumps, boilers, fuel oils, packing, derricks, boring tools, winches and power as well as all other apparatus and temporary works requisite for the proper execution of the work, whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in those conditions or not which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer as to any matter as of which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage here to for and from the works. The contractor shall also supply without charge the requisite number of persons and things necessary for the purpose of setting out the works, and counting, weighing and assisting in the measurement and examination at any time and from time to time, the work done, or materials, supplied by him. Failing his doing so the same may be provided by the Engineer at the expense and risk of the contractor and the expense (of which the certificate of the Engineer shall be final) may be deducted from any money due to contractor under this contract or from his security deposit. The contractor shall also provide at his own expense all necessary fencing and lights required to protect the public from accident and shall assume all liability for and indemnify the Owner against all actions or suits arising out of or in connection with the carrying out the works whether such actions are brought by members of the public neighboring owners or workman employed on the works save only actions for permanent interference with easements to which the site may be subject at law or inequity or otherwise arising out of Owner's title to the site. The contractor shall carrying out the works other legal enactments applicable to them and If shifting of telephone, cable or water line etc. is necessary, he should inform the department well in advance. The correspondence (letters) shall be issued by U.P. JAL NIGAM but contractor shall be responsible for early & timely approval in writing from the concerned department /company. The fees shall be payable by U.P. JAL NIGAM (not the claims by department for damage done to their property during execution of works. No extension of time shall be admissible for unreasonable delay in seeking permission from the concerned department/ company). The contractor shall be responsible for the adequacy, strength and safety of all shoring, strutting, curbing, bonding, brick work, masonry, concrete, permanent or temporary, appliances, matters and things furnished by him for the purpose of this contract.

**20. WORKS NOT TO BE SUBLET WITHOUT SANCTION:**

This contract or any part hereof shall not be assigned or sublet without the written approval of the Owner and if the contractor shall assign or sublet his contractor attempt to do so or become insolvent or commence any insolvency proceeding or make any

composition with his creditors or, attempt to do so, or if any bribe, gratuity, gift, loan, perquisite, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given, promised or offered by the contractor or any of his servants or agents to any public officer or person in the employ of Jal Nigam in any way relating to his office of employment or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Owner may there upon by notice in writing rescind the contract and the security deposit shall there upon stand forfeited and be absolutely at the disposal of the said Chairman and the same consequences shall ensure as if the contract had been rescinded under clause 4 here of, and in addition the contractor shall not be entitled to recover or be paid for any work that has already been performed under this contract.

**21. SUM PAYABLE BY WAY OF COMPENSATION:**

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

**22. WORKS TO BE UNDER DIRECTION OF ENGINEER:**

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

**23. DECISION OF OWNER TO BE FINAL:**

Except where otherwise specified in this contract, the decision of the Owner shall be final, conclusive and binding on parties to the contract upon all question relating to the meaning of the specifications, drawings and instructions herein mentioned aforesaid and as to the quality of workmanship or materials used on the work, or as to any other question, claim right matter or thing, what-so-ever, in any way dressing out of or relating to the contract 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 the sooner determination there of the contract.

**24. ACTION WHERE NO SPECIFICATION:**

In the case of any class of work of which there is not mentioned in the specification such work shall be carried out in all respects in accordance with the instructions and requirements of the Engineer.

**25. CONTRACTOR TO EMPLOY COMPETENT AGENTS AND FOREMAN:**

During the execution of the works and until the work is taken over by the order of the Engineer, the contractor shall employ competent agents and such foremen as may be necessary for the proper execution of the "Works" (said when work carried on day and night there shall be a foreman in charge of each shift) who shall be engaged constantly on the works to ensure proper management and efficient control.

**26. RECEIPT OF AND POWER AS TO SECURITY MONEY:**

27.1 The Chairman has received from the contractor the sum of Rs 10% amount of contract value the receipt of which is hereby acknowledged. This said sum shall be held as security for the due performance of all the conditions and stipulations of this contract and the Engineer is empowered to deduct from time to time from each security money, all or any sum or sums which may become due from the contractor as liquidated damages for the breach of any or all the covenants or provisions of

this contract the security money or such balance there of as may be left after making the deductions of or mentioned will be returned to the contractor after Twelve months defects liability period after the final certificate of the completion of the works shall have been given by the Engineer and after the Engineer shall have satisfied himself that all the terms of the contract have been duly and faithfully carried out by the contractor.

- 27.2 Fixed Deposit Receipts or Bank guarantee of any Nationalized Bank shall also be accepted as security provided that all such fixed deposit receipt must be pledged in the name of the **Project Manager, Gomti Pollution Control Unit-I, U.P. Jal Nigam Lucknow** and that they will be accepted as security on the conditions that Jal Nigam will hold the deposit at the risk of the depositor and will not be liable in the event of the loss of the security due to failure of the bank or to any other cause and that the loss will fall on the depositor who will have to deposit fresh security.

**27. COMPENSATION TO WORKMEN:**

- 28.1 In every case which by virtue of the provisions of section 12, sub-section (1) of the workmen's compensation Act, 1923 Jal Nigam is obliged to pay compensation to a workman employed by the contractor or by any sub contractor from him in the execution of the said work. U.P. Jal Nigam will recover from the contractor the amount of the compensation so paid, and without prejudice to the rights of Government under section 12, sub-section (2) of the said Act, U.P. Jal Nigam shall be at liberty to recover such amount or any part there of by deducting it either from the security money deposited by the contractor or to his credit under clause 27 of these conditions or from any other sum due by Jal Nigam to the contractor whether under this contract or otherwise.
- 28.2 Jal Nigam shall not be bound to contest any claim made against it under section 12, sub-section(1) of the said Act, except on the written request of the contractor and upon his giving to Jal Nigam full security for all costs for which Jal Nigam might become liable in consequence of contesting the claim.



## **CONDITIONS OF CONTRACT**

### **(PART-II)**

#### **1.1 SCOPE OF WORK**

The scope of work under the contract shall be as mentioned elsewhere in the contract document.

#### **1.2 EXECUTION OF CONTRACT AGREEMENT:**

The contract Agreement and such other contract Documents as practicable shall be suitably identified as agreed by the parties and signed by the Engineer and the Contractor. The Engineer shall keep with him an executed copy of the Contract Agreement. The contractor shall be supplied true copy of Contract Agreement along with a set of drawings duly attested for which he will pay to the owner @ Rs. 5000/- each set. Additional copies of drawings will be at cost of reproduction and handling i.e @ Rs. 200/- each drawing.

#### **1.3 CONTRACT DOCUMENTS AND MATTERS TO BE TREATED AS CONFIDENTIAL:**

All documents, correspondence, decisions and other matter concerning to the contract shall be considered confidential and of restricted nature by the contractor and he shall not divulge or allow access there to of any kind to any unauthorized person of any kind.

#### **1.4 PROGRAMME AND PROGRESS SCHEDULE:**

Simultaneously with the execution of the Contract Agreement, the contractor shall submit to the Engineer for his approval a program showing, in such forms as pert chart as well as Bar Chart, the order of procedure in which he proposes to carryout works including the design, manufacture, delivery; and approval by the Engineer of such program shall not relieve the contractor of any of his duties or responsibilities under the Contract. The program and schedule shall conform to the work and the contract time, and shall be subject to such revisions the Engineer may require for his approval. Each updated and revised schedule shall be submitted to the Engineer for approval simultaneously with Contractor's application for the same time period, and shall be subject to such revisions, the Engineer may require for his approval. The Engineer's approval of progress schedule may be a condition for progressive payments.

**1.5** No change or revision shall be made in the list of staff accepted by the Owner nor shall any, supplier, person or organization name not in the accepted list, be employed on or for the work without the approval of the Owner.

**1.05** The design & drawings submitted by the contractor shall be fully responsive to the design criteria applicable, IS specifications, Manual of CPHEEO or other specifications in force. The drawings shall be complete in all respect. Non responsive designs and drawings shall be to the credit of the contractor. Time taken in checking by Engineer or his authorized representative shall be solely credible to contractors account. Time consumed in approval of designs & drawings shall be either be absorbed by contractor in execution schedule or extension of time shall be awarded as per the provisions of the contract agreement.

#### **2.1 TIME LIMITS:**

All time limits stated in the Contract Documents are the essence of the Contract Agreement.

**2.2** The contractor shall construct and complete the works including final clean up-final inspection and final acceptance of the works within the Contract time of 24 months from the date of order to proceed (including 4 months trial & run).

**3.00 EXTENSION OF TIME:** (As per clause 6 of condition of contract-part-I)

**4.00 DELAYS AND COMPENSATION:** (As per clause 3 of condition of contract-part-I)

**5.0 SITE CONDITION AND LAYOUT:**

The contractor should apprise himself of the actual site conditions and land available for construction, before submitting his offer. The offer should be comprehensive to include all odds that may arise because of site condition. The contractor has to accommodate his activity for construction within the land made available.

**5.01** The contractor shall promptly notify the Engineer in writing of any subsurface or latent physical conditions at the site differing substantially from those indicated in the Contract Documents or any unusual nature differing from those ordinarily encountered and generally recognized as inherent in construction character provided for in the contract documents. The Engineer will investigate those conditions and obtain such additional tests and surveys as he may deem necessary. If the Engineer finds that the conditions differ significantly from those indicated in the Contract Documents or from those inherent in the construction, a variation order may be issued to incorporate the necessary revisions unless otherwise provided in the contract documents.

**5.2 SURVEYS AND MEASUREMENTS:**

The Contractor shall carefully preserve all survey as also setting, reference points, bench marks and monuments and important land marks. Should any stakes, points or benches be removed or destroyed by any act of the Contractor or his employees, they may be reset at the Contractor's expense. Any expense incurred in replacing permanent monuments which the contractor may have failed to preserve shall be borne by the Contractor unless the removal of the monuments is required by the Contract Documents. The Contractor shall 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 of materials.

**5.3 LINES AND GRADES, SETTING STAKES:**

The Contractor shall give at least three working days notice, in writing when he will require the services of the Engineer or his authorized representative for laying out a portion of the work. Elevations shown for the various part of the work refer to the Data Bench Mark which will be established by the Engineer near the site. The Engineer will establish the necessary base lines at convenient location for the construction of the work. The base line for pipe line construction will be parallel to and offset from the position of the pipe line/ road alignment. From the established base line and grades if any, the Contractor shall extend the necessary lines and grades for construction of the work and shall be responsible for the correctness of the same.

**5.4 PREPARATION:**

Prior to any request for base line and grade stakes, the Contractor shall have all utility lines located and marked in the field and shall have all rights of way cleared, graded and ready for construction activities.

**5.5 LAYOUT AND LEVEL PILLARS:**

The centre of all the works shall be laid out at site accurately with the steel tape as per dimensions given in the plan and in accordance with the direction and satisfaction of the Engineer or his representative. Level pillars one brick thick shall be made in Ist class Brick work (Min. 1:6 Cement Mortar) with 150 mm deep foundation up to the plinth level including the thickness of D.P.C. if any. The top of the pillar shall be plastered in 1:4 cement, fine sand mortar and the centre line marked thereon. These pillars shall be built on both side of wall, on the center line of the walls. The Contractor shall be responsible to maintain these pillars during the execution of the work or till these are ordered to be removed by the Engineer. The cost involved in the construction of the pillars will be considered in the overall tendered rate of the work and no extra payment shall be made for this work.

**5.6 CONTRACTOR'S VERIFICATION:**

Where, in the construction drawings, levels have been shown or referred to these are deemed to be with reference to the mean sea level (M.S.L.) only unless specified. The contractor will establish at the work site substantial bench marks and connect these to a datum/bench mark as made available in the area. The bench marks so established will be properly protected all through the construction period up to the completion of the work. The contractor will then carry out necessary surveys and levelling, covering his work, in verification of the survey data on the working drawings furnished by the Engineer, and he will be responsible for establishing the correct line and drawings. In case of material discrepancies come to the notice, he will seek further instructions and decision in writing from the Engineer and comply the same. The contractor will not commence any construction work unless and until this requirement has been complied with.

**5.7** If any error has erupted in the work due to non observation of this clause, the contractor will be responsible for the error and bear the cost of corrective work.

**5.8** The Contractor shall be allowed to work according to his program on working days as well as holidays and nights but for working on holidays, Sunday as well as at night, timely information will have to be given at least two days in advance. However, the casting of all C.C/R.C.C. work and jointing of pipes shall have to be done strictly in the presence of Engineer or his authorized representative.

**6.00 LOSS OR DAMAGE AND INDEMNITY AGREEMENT:**

The Contractor shall be responsible during the progress as well as maintenance for any liability imposed by law for any damage to work or any part thereof or to any of the materials or other things used in performing the work or for injury to any person or persons or for any property damaged in or outside the work limit. The Contractor shall indemnify and hold the Owner and the Engineer harmless against any and all liability claims, loss or injury, including costs, expenses and attorney fees incurred on the account of same arising from any allegation, whether groundless or not of damage or injury to any person or property resulting from the performance of the work or from any material uses in work or from any condition of the work or work site, or from any cause whatsoever during the progress and maintenance of the work.

**7.1 SUPERVISION AND SUPERINTENDENCE:**

Contractor's Supervision: The Contractor shall supervise and direct the works efficiently and with his best skill and attention. He shall be solely responsible for means, methods, Techniques, Procedures and sequences of construction. The contractor shall co-ordinate all parts of the work and shall be responsible to see that the finished works comply full with the contract documents, and such instructions and variation orders as the Engineer may issue during the progress of works.

**7.2 AGENTS:**

The Contractor shall keep on the work at all times during its progress a competent resident Agent having adequate experience in the similar works to the full satisfaction of Engineer. He shall not be replaced without ten (10) days written notice and without equivalent replacement except under extra-ordinary circumstances. The Agent shall be Contractor's representative at the site and shall have the authority to act on behalf of the Contractor. An order or direction given by the Owner/Engineer not otherwise required to be given in writing will be given or confirmed in writing shall have to be compiled by him`.

**7.3** The contractor shall furnish such plant and equipment as may be necessary to perform the works in a manner satisfactory to the Owner/Engineer and in accordance with the Contract but within the requirements prescribed by the laws, ordinances, codes, rules and regulations. Failing this, the same may be provided by the Engineer at the expenses of the contractor under the Contract or from his performance Bond or proceed of sale thereof or a sufficient portion thereof. Construction equipment or machinery that any time produces unsatisfactory results shall promptly be repaired or replaced by the contractor as and when it is required and/or the Engineer

may require.

**8.00 CARE AT SITE:**

The Contractor shall be permitted to use without any charge the site and lands specified in drawings for execution of works, labor and staff colonies, site office and workshop and stores and for related activities. The Contractor shall not commence operations on such land except with the prior approval of the Engineer. If these lands are not adequate the Contractor will have to make his own arrangements.

**8.01** The Contractor shall not demolish, remove or alter any of the structures, trees or other facilities on the site without prior approval of the Engineer.

**8.2** All rubbish shall be burnt or removed from the site as it accumulates. All surface and soil drains shall be kept clean sound and working order. All the areas of Contractor's operations shall be cleared before returning them to the Engineer. The Contractor shall make good any damage or alteration made to the area or property or land handed over to him before they are returned.

**8.3 OVERLOADING:**

No part of the work new or existing structures scaffolding, shoring, sheeting, construction machinery and equipment or other permanent and temporary facilities shall be loaded in

any manner or subjected to stress or pressure that could endanger any of them. The contractor shall bear the cost of damages caused by padding or abnormal stress of pressure.

**8.4 PUBLIC CONVENIENCE:**

The contractor shall at all times so conduct his operations as to ensure the least possible obstruction and inconvenience to traffic and the general public and the residents in the vicinity of the work, to protect persons and property and to preserve and to access to drive ways, houses and buildings. The contractor shall have undertaken the works in such a way that he can properly perform with due regard to the right of the public and shall not create any public nuisance. No road street or highway shall be closed to the public except with the permission and in accordance with the requirements of the proper authorities.

**8.5 PROTECTION:**

The contractor shall take all precautions and furnish details of precautions to prevent human injuries or losses to all employees and workman on the work due to gases or any other injuries and all other persons who may be affected thereby, all the work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care custody or control, of the contractor or any of his sub contractors, and other improvements and property at the site or where work is to be performed including buildings, trees and plants, pole line, fences, guard rails, guide posts, culvert, signs structure, conduits, pipe lines, electrical, data & telephone cables and improvements within or adjacent to street, right of way, or easement, except those items required to be removed by the contractor in the contract documents. The contractor's protection shall include all the safety precautions and other necessary form of protection and notification to the Engineer of the utilities and adjacent property.

**8.6 FENCING & WATCHING:**

Contractor shall have to provide fencing/barricading in a good and sufficient manner to all excavation work and materials at site, so as to prevent accident by night as well as by day. He shall also be responsible for providing light in a proper and sufficient manner during night in the portion of the work which is open or under construction and shall always maintain sufficient number of watchmen on duty when his workers are not actually working and shall make his rates sufficiently comprehensive to meet such expenditure. In the event of any accident due to his negligence for not taking due precaution, he shall be fully responsible and indemnify the Government or any other person or persons and shall bear all the damages,

compensation and costs that may arise or may be awarded by the court of law.

**8.7 PUMPING DURING CONSTRUCTION:**

The Contractor shall provide all appliances, pumps, engines, machinery, suction and delivery pipes, fasteners, fuel, electricity, petrol or diesel to run plants, lubricants, cotton waste etc. and all labor, skilled and unskilled necessary for dealing with all springs, flood water, or drainage encountered during the construction of the work and the contractor shall make his rates sufficiently comprehensive to cover the cost of such works.

**8.8 CONSTRUCTION OF TEMPORARY BRIDGES AND DIVERSION OF DRAINS:**

- 1- The Contractor shall provide at his own cost all temporary bridges across the trenches or excavation at the places where considered necessary by the Engineer. He shall further provide suitable gang way for his own work at his own cost.
- 2- The Contractor shall also provide as required temporary diversions and reinstatement of all roads and drains (open or closed) at site of works that may have to be diverted or cut during execution of the works as per terms and conditions of Contract documents.
- 3- The Contractor shall protect adjoining site against structural, decorative and other damages that could be caused by the execution of such works and make good at his cost any such damages.

**8.8 UTILITIES AND SUBSTRUCTURES:**

The indication of the type and approximate location of existing utilities and substructures in the contract documents represents a diligent search of known records, but the accuracy and completeness of such indications are not warranted by the owner or the Engineer and utility structures and services not so indicated may exist. Before commencing any excavation, the contractor shall investigate, determine the actual locations and protect the indicated utilities and structures, shall determine the existence, position and ownership of other utilities and substructures on the site or before the works to be performed by communication with such owners search of records, or otherwise, and shall protect all such utilities and sub-structures.

**8.9 TEMPORARY UTILITY INTERRUPTIONS:**

If the temporary interruption of existing utility services is necessary for the execution of the works the contractor shall make all arrangements with the utility owners and pay all fees and charges levied by them for the interruptions, and shall notify the affected users at least twenty four (24) hours in advance of the probable duration of interruption unless such notice is given by the appropriate utility owner.

**9.1 LABOUR, MATERIALS AND EQUIPMENT:**

**9.2 LABOUR:**

The contractor shall at all times enforce strict discipline and good order among his employees and those of any sub-contractor, and shall not employ on the works anyone who is not skilled and experienced in the assigned task. The agent, other staff and foreman shall be conversant in the English language, besides Hindi / Devnagri language.

**9.2** The contractor shall furnish information to the Engineer on various categories of labor employed by him in such form and at such intervals as may be specified. No contractor shall employ any person who is under the age of 18 years.

**9.3** The contractor shall in respect of labor employed by him comply with the provisions of various labor laws, rules and regulations as applicable to them in regard to all matters provided therein and shall indemnify the owner in respect of all claims. Notwithstanding anything contained herein, the Engineer may at his discretion take such actions as may be necessary for compliance of the various labor laws, rules and regulations and recover

the cost thereof from the Contractor.

- 9.4** In the event of the Contractor committing a default or breach of any provisions of labour laws, rules and regulations, the Contractor shall without prejudice to any other liability under the Acts pay the owner a sum not exceeding Rupees One Hundred (Rs. 100.00) per day for each day of default subject to a maximum of one percent of the contract value.

**10.00 WATER SUPPLY AND SANITATION:**

The Contractor shall, having regard to local conditions, provide on the site, to the satisfaction of the Engineer's Representative, an adequate supply of drinking and other water for the use of the Contractor staff and work people, and proper sanitation shall be arranged by the Contractor to make the camping site conducive to hygienic living.

- 10.1** In the event of any outbreak of illness of an epidemic nature, the contractor shall comply with and carry out such regulations, order and requirement as may be made by the Government of Uttar Pradesh / India or the local authorities for the purpose of dealing with and overcoming the same.

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

**10.03 WORKMANSHIP:**

The quality of workmanship produced by skilled, knowledgeable, and experienced workmen, machines and artisans is required for the work. Particular attention shall be given to the appearance and finish of exposed work. The decision of the Engineer with regard to the quality and adequacy of workmanship shall be final and binding.

**11.1 MATERIALS AND EQUIPMENTS:**

All materials and equipment incorporated in the work shall be new. Materials and equipment not covered by detailed requirement in the Contract Documents shall be of the best commercial quality & suitable for the purpose intended, and approved by the Engineer prior to use in the work. The Contractor shall provide proper storage facilities and exercise such measures as will ensure the preservation of the required quality and fitness of all materials and equipment. Materials or equipment not conforming to these requirements of the document shall be rejected and immediately removed from the site of the work at the risk and cost of the contractor.

- 11.2** During the progress of work or before starting of the works, the Contractor shall have to carry out such test or tests, at his own cost which in the opinion of the Engineer are necessary to determine as to the quality of materials brought at site of works comply with the detailed specification requirements. The contractor must keep the record of all such test at site of work and show to the Engineer as and when asked to do so.

Similarly the necessary tests for cement mortar, concrete etc. used for construction from time to time shall have to be got done by the Contractor at his own cost & record of the test results maintained regularly as specified earlier.

In addition the testing of materials /items of work such as cement mortar, plaster, cement concrete, RCC etc. shall also be got done by the U.P.JAL NIGAM itself. If the test results don't conform to the I.S requirements, the whole lot of materials/works shall be rejected and the expenses incurred in getting such tests conducted shall be borne by the Contractor.

- 11.02** All construction material shall be supplied by the contractor.

**12.00 SUBSTITUTION ANDEQUALS:**

The material item, equipment, or type of Construction indicating the make and manufacture's name of such propriety identification, is specified for establishing a standard of quality. If the Contractor wishes to furnish or use a proposed substitute or equal material,

item or equipment or type of construction, he shall make written application to the Engineer for approval, certifying in writing that the proposed substitute or equal will perform adequately the duties/output imposed by the general design and will be suited to the same use and capable of performing the same function as that specified and stating all variations in costs pertaining to the application. No proposed substitute or equal shall be ordered or installed without the written approval of the Engineer, which shall be final and binding and this can not be disputed in any manner.

- 12.01** The Contractor, at his expense, shall remove the unauthorized materials or equipment if installed without the Engineer's approval and install only those required by the Contract Documents or as directed by the Engineer.

**USE OF APPROVED SUBSTITUTION OR EQUALS:**

The Contractor's use of approved substitutions or equals shall not relieve the Contractor from compliance with the Contract Documents. The Contractor shall bear all extra expenses resulting from providing or using approved substitutions or equals where they affect the adjoining or related work, including the expenses of required engineering redesigning, drafting and permits where necessary, whether the Engineer's approval is given after receipt of Tenders.

**13.00 LAWS AND REGULATIONS:**

The Contract Documents shall be governed by the Laws and bye-laws of India, the State of Uttar Pradesh, and of the local bodies in the Project area. **Lucknow** courts alone shall have the jurisdiction over all matters, arising out of the contract agreement.

- 13.1** The Contractor is expected to be aware of all laws, ordinance, codes, rules, and regulations in any manner affecting those employed on the works or the materials used in the works or in any way affecting the conduct of the works and of all orders and decrees of bodies or tribunal is having any jurisdiction or authority over the work. He shall at all times himself give all notice and observe and comply with, and shall require all his agents, employees, sub-Contractors to observe and comply with all such applicable laws, ordinances, rules, regulations, order and decrees in effect or which may become effective before completion and acceptance of the works and shall protect and indemnify the owner and the Engineer against any claim or liability arising from or based upon the violation or any such law, ordinance, codes, rules, regulations, orders of decrees, whether by himself or his employees or his sub-Contractors.

- 13.2** If the contractor observes that any requirement of the contract document is at variance with such laws, ordinances, codes, rules, regulations, order decrease he shall promptly notify the owner in writing and shall not proceed with any work affected by such variance without the owner's written instructions.

**13.3 PERMITS, FEES AND TAXES:**

Unless otherwise provided in the contract documents the contractor shall secure and pay for all permits, governmental fees and licenses necessary for the execution and completion of the works. The contractor shall pay all trade tax, local tax, income tax, octroi, royalty, GST as the case may be and other taxes required by law including all taxes on property used in connection with the work and the clearance certificates in respect of all such taxes if required shall be shown to the Engineer. Also, after award of work, no statutory variations announced by Central / State Govt. will be applicable.

**13.4 DUTIES AND TAXES:**

All duties and taxes including the stamp duty, license fee etc. levied by the Government of India or Concerned State Government or local bodies are payable by the contractor for all items included in the tender schedule. Income Tax @ **2%** (Plus surcharge, if any thereon) or as applicable from time to time on gross value of the work done shall be deducted from all the bills of the contractor. Certificate showing the details of such deductions shall be issued to the

Contractor as and when desired by him.

- 13.05** The rates quoted by the contractor shall be deemed to be inclusive of all types of taxes excluding GST on all the materials & services that he will have to purchase for performance of this contract. No exemption forms will be issued for the same. Certificate showing the details of such deductions shall be issued by the Department to the contractor as and when desired by him.

**13.06 SALES TAX CLEARANCE CERTIFICATE:**

If the contractor is a sales tax assessee, he should produce a valid sales tax clearance certificate before the payment of the final bill otherwise the final payment to the contractor will be with-held. If the Contractor is not liable to Trade Tax Assessment a Certificate to this effect from the competent Trade Tax Authority shall be produced before payment of the final bill, otherwise the final payment to the Contractor shall be remain withheld till such certificate is produced.

**14.1 OWNER'S/ENGINEER STATUS:**

**14.2 AUTHORITY OF THE OWNER:**

The owner shall have the authority to enforce compliance with the Contract Documents. On all question relating to quantities, the acceptability of materials, equipment or works, the adequacy of the performance of the work, and the interpretation of the Drawings and Specifications, the decision of the owner is final and binding and shall be precedent to any payment under the Contract Agreement unless otherwise provided in the Contract Documents. The owner shall have the authority to stop the work or any part there of as may be necessary to ensure the proper execution of the works to disapprove of or reject work which is defective, to require the uncovering and inspection or testing of the work, to require reexamination of the works, to issue interpretations and clarifications and to order changes or alterations in the works.

**14.3 FUNCTIONS OF THE ENGINEER:**

The whole of the works shall be under the direction of the Engineer, whose decision shall be final, conclusive and binding on all parties to the contract, on all questions relating to the construction and meaning of plants, working drawings, sections and specifications connected with the works.

- 14.3** The Engineer shall have the power of authority from the time to and at all times to make and issue such further instructions and directions as may appear to him necessary or proper for the guidance of the contractor and the good and sufficient execution of the works according to the terms of the specifications. And the contractor shall receive, execute, obey and be bound by the same, according to the true intent and meaning there of as fully and effectually as though the same had accompanied or had been mentioned or referred to in the specifications.

- 14.4** The Engineer may also alter or vary the levels or positions of any of the works contemplated by the specifications or may omit with or without the substitution of any other works, in lieu thereof, or may order any work or any portion of work executed or partially executed to be removed, changed or altered, and if need be, order that other works shall be substituted instead thereof and the difference of expense occasioned by any such diminution or alteration so ordered and directed shall be deducted from or added to the amount of this contract. The time of completion of works shall, in the even of any deviation, resulting in additional cost over the contract sum being ordered, be extended reasonably by the Engineer. The Engineer's decisions in this case shall be final and conclusively and shall not involve any challenges in the court of law.

**14.05 DUTIES OF THE ENGINEER'S REPRESENTATIVE:**

The duties of the representative of the Engineer are to check, inspect and continuously supervise the work and to test any material to be used or workmanship employed in connection with the works. He shall furnish the drawings and information to the contractor,



approve the contractor's drawings subject of post-facto approval and signature of the Engineer, recommend and approve the interim certificates, and taking over certificates after thorough checking and inspection, and recommend extra works required and extensions of time.

**14.06** Engineer's representative is entitled to issue approval for or acceptance of any work or material or failure to disapprove any work of material by the representative of the Engineer & thereafter to disapprove such work or material and to order removal or modification thereof. If the contractor is dissatisfied with any decision of the representative of the Engineer, he can refer the matter to the Engineer who shall there upon confirm his decision.

**14.06 DECISION OF CHIEF ENGINEER TO BE FINAL:**

Except where otherwise specified, the decision of the Chief Engineer shall be final, conclusive and binding on parties to the contract upon all questions relating to the meaning of the specifications, drawings, and instructions herein before mentioned and as the quality of workmanship or materials used on the work, or as to any other question, claim, right, matter or thing, whatsoever, in any way arising out of or relating to the contract, drawings, specifications, estimates, instructions, orders, or these conditions, or otherwise concerning the work of the execution or failure to execute the same, whether arising during the progress of the work or after the completion or sooner determination there of the contractor.

**15.1 VARIATION:**

The Engineer-in-charge shall make any variation in the form of quality or quantity of the works or any part thereof he may in his opinion be necessary and for that purpose, or if for any other reason it shall in his opinion be desirable, he shall have power to order his contractor to do and the contractor shall do, any or all of the following:

- a) Increase or decrease the quantity of any work included in the contract.
- b) Omit any such work.
- c) Change the character or quality or kind of any such work.
- d) Change the levels, lines, position and dimensions of any part of the work.
- e) Execute additional work of any kind necessary for the completion of the work.
- f) Change any specified sequence, method or timing of construction of any part of the works and no such variation shall in any way validate or invalidate the contract, but the value, if any, of such variation shall be taken into account in ascertaining the amount of the contract price.

**15.1** No such variations shall be made by the contractor without an order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this clause, but it is result of the quantities exceeding or being less than those stated in the bill of quantities. Provided also that if for any reason the Engineer-in-charge shall consider it desirable to give any such order and any confirmation in writing of such verbal order given by the Engineer-in-charge, whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of this clause.

**15.2** Provided further that if the contractor within seven days confirm in writing to the Engineer-in-charge and such confirmation shall not be contradicted in writing within fourteen days by the Engineer-in-charge, it shall be deemed to be an order in writing by the Engineer-in-charge.

**15.3** All extra or additional work done or substituted work in place of work omitted by order of the Engineer-in-charge, shall be valued at the rates and prices set out in the contract. If the contract does not contain any rates or prices applicable to the extra or additional work, then the rates as per current rules in UPJN / PWD / CPWD/ Central allied Engineering Deptt. Schedule of rates at quoted premium alone shall be paid. If rates of such items are not available in any of these schedules, the rates will be agreed upon as per current market rates or to be worked out on the basis of day work schedule in the contract with 10% profit for overhead charges payable to the contractor.

**15.4** The contractor shall send to the Engineer-in-charge's Representative once in every month an account giving particulars, as full and detailed as possible of all claims for any additional payment to which the contractor may consider himself entitled and of all extra or additional work ordered by the Engineer-in-charge which he was executed during the preceding month. No claim of payment for any such work shall be considered which has not been included in such particulars.

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

**16.1** **ACCESS, INSPECTION AND TESTS:**

**16.2** **ACCESS TO THE WORK AND RECORD:**

The owner, the Engineer, the Engineer's representative and the representative of the Central/State Govt. or other public body or authority having jurisdiction of the project shall have, at all times and for any purpose, immediate access to the works and the premises used by the contractor for the works and shall have access to the places where materials or equipments are being fabricated, manufactured or produced for the works. To the extent requested by the Engineer, the contractor shall furnish access to the purchase orders and records, invoices, bills of lading, payroll records, and other documents and records pertaining to the work, or shall furnish access to the purchase orders and records, invoices, bills lading, payroll records, and other documents and record pertaining to the work, or shall furnish certified true copies thereof.

**16.3** **NOTICE FOR COVERED WORK:**

The contractor shall give not less than three days notice in writing to the Engineer or his authorized representative of the completed work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions there of taken before the same is so covered up.

**16.03** If any work is 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 contractor's 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.

**16.04** **INSPECTION:**

All works shall be performed and constructed under the supervision and inspection of the Engineer or his representative. Any work performed or constructed in the absence of Engineer's representative without the Engineer's permission shall be considered defective and is subject to rejection. The Contractor shall give written notice to the owner at least two (2) working days in advance of the performance of any part of the works requiring specialist inspection and shall state the probable duration of the required specialist inspection.

**16.05** The Engineer's Representative is authorized to suspend any part or all of the works, by notice to the Contractor confirmed in writing when any question arises as to whether the materials or equipment being installed or the methods or workmanship being used comply with the Contract until such question is decided by the Engineer.

**16.06** **TESTING:**

All works, materials and equipment to be performed and constructed by the Contractor in compliance with the Contract and standards laid there in shall be tested as required. The

Contractor shall give the Engineer timely written notice of the dates and times when testing is to be performed at the site or the place of manufacture or fabrication. All tests are subject to the observation and approval of the Engineer or any agency appointed by the engineer and shall be performed as directed by the Engineer unless otherwise provided in the Contract. Materials required to be tested prior to installation shall not be installed until the Engineer has approved the test results.

**17.00 RE-EXAMINATION OF WORK:**

If the Engineer, at any time prior to the final acceptance of the work, orders re-examination of work completed including, the uncovering, removing, exposing, dismantling, inspecting, or testing of work covered by such order. If the work so re-examination is defective the Contractor shall correct or remove and replace it with defect-free and conforming to the specification laid down in the Contract Documents and shall bear the cost of the satisfactory reconstruction of the work.

**18.1 GUARANTEES AND WARRANTIES:**

**18.2 CONTRACTORS GUARANTEE:**

The Contractor shall warranty and guarantee the entire work and parts thereof, including that performed and constructed by others employed directly or indirectly on and for the work, against faulty or defective materials equipment or workmanship for a period as stipulated in Contract Bond for the construction as well as maintenance of the works after issue of acceptance.

**18.3 MAINTENANCE AND DEFECTS:**

The period of maintenance shall mean the defect liability of 12 months. After four months test & trial run period which is to start after completion of the work, duly certified by Engineer. The Contractor shall remain liable for any of the works or part thereof or equipment and fittings supplied which in the opinion of the Engineer fail to comply with the requirements of the Contract are in any way unsatisfactory or defective, Fair, wear and tear expected.

**18.3** To the intent that the works and each part thereof shall at or as soon as possible practicable after the expiration of the relevant period of defect liabilities will be taken over on the satisfaction of the Engineer, and as soon as may be practicable after such date and shall execute all such work of repair, amendment, reconstruction, rectification and making good of defects or within fourteen (14) days after its expiration be required of the Contractor in writing by the Engineer as a result of an inspection made or on behalf of the Engineer prior to the expiration of the period of defects liabilities. All such work shall be carried out by the Contractor at his own expense, if the necessity, thereof, shall in the opinion of the Engineer, be due to the use of materials or workmanship not in accordance with the Contract Documents or to the neglect or obligation expressed or implied on the Contractor's part under the Contract.

**18.4** If the Contractor shall fail to do any such work as aforesaid required by the Engineer, the Engineer shall be entitled to carry out such work by his own workmen or any other agency and if such work is done which the Contractor from the Contractor have carried out at the Contractor's own cost the Engineer shall be entitled to recover from the Contractor the cost thereof and deduct the same from the claim that become due to the Contractor. Notwithstanding the aforesaid, if the Contractor remains in default one calendar month after the Engineer has given written instructions, he will deduct the cost plus overhead expenses of such works as have been necessary to rectify the Contractor's default and balance (from the claim due to him and retention money or any other money) if any, shall be disbursed to the Contractor.

**19.1 Mobilization Advance:**

Mobilization advance not exceeding 10% of the cost of contract work at 8% simple interest may be given, if requested by the contractor in writing within one month of the order to commence the work. Such advance shall be in two installments each of 5% of contract value or to be determined by the Engineer-in-Charge at his sole discretion. The first installment of such advance shall be released

by the Engineer-in-charge to the contractor on a request made by the contractor to the Engineer in-Charge in this behalf after signing the contract bond and receiving the date of start of work. The second and subsequent installments shall be released by the Engineer- in- Charge only after the contractor furnishes a proof of the 70% of satisfactory utilization of the earlier installment to the entire satisfaction of the Engineer-in-Charge and after start of work at site physically. Before any installment of advance is released, the contractor shall execute a Bank Guarantee Bond from Nationalized banks/ICICI bank/IDBI bank/ AXIS bank for the amount equal to 110% of the amount of advance and valid for the contract period. This Bank Guarantee (B.G) from Scheduled commercial public sector Bank as mentioned above for the amount equal to 110% of the balance amount of advance) shall be kept renewed from time to time to cover the balance amount and likely period of complete recovery. Bank Guarantee may be given in more than One (Maximum 5) parts but equal to 110% of mobilization advance in total and in this case, B.G. will be released for the amount for which recovery has been made. Performa of Bank Guarantee for Mobilization advance given as annexure –III in this volume and for Undertaking from contractor to furnish BG, annexure - V

**19.2 PROGRESSIVE (RUNNING) PAYMENTS:**

Advance payment, progressive payment and final payment would mean as follow:-

- (i) Advance payment, means a payment made on a running account to a Contractor for work done by him but not measured.
- (ii) Progressive payment means a disbursement of any kind on running account, not being the final payment.
- (iii) Final payment means the last payment on a running account, made to a Contractor on the completion or determination of his Contract and in full settlement of the Contract.
- (iv) No payment of work shall be made to the Contractor without proper testing required for the particular.

**19.3** Unless otherwise provided in the Contract agreement or subsequently agreed to by the parties, progressive payments will be made generally monthly on submission of a bill by the Contractor in the prescribed form in an account according to the value of work performed less the aggregate of previous progressive payment and less the retention money and security money as required. All such progressive payments shall be regarded as payments by way of advance against the final payment. However, the payment for the work done at various stages of the work. The Contractor or his authorized representative shall be present at the time of recording of each set of measurements and sign the measurement book or level field book in token of their acceptance.

**19.03** If for any reason, the Contractor or his authorized agent is not available and the work is suspended by the Engineer to avoid recording of measurements during the absence of the Contractor or his representative, the Engineer will not entertain any claim from the Contractor for any loss incurred by him on this account.

**19.4** All payments shall be made by cashless mode i.e. R.T.G.S. / N.E.F.T.. If any Contractor desires payment by bank draft, the bank charges will be borne by the Contractor.

**19.5 RECEIPT FOR PAYMENTS:**

Receipts for payment made on account of any work when executed by a firm should also be signed by all the partners except where the Contractors are described in the tender as a firm in which case the receipt shall be signed in the name of the firm by one of the partners or by some other persons having authority to give effectual receipts for the firm.

**19.6 RIGHT TO WITHHOLD:**

The Engineer may refuse to approve any such payment, because of subsequently discovered evidence as the results of subsequently inspections or tests, nullify and such payment previously approved and paid to such extent as may be necessary in the opinion of the Engineer to protect Engineer from loss because (a) the work is defective (b) third party claims have been

filed on there are reasonable evidence indicating probable or of such claims (c) of the Contractor's failure to make payment properly to sub-Contractors or for labor, materials or equipment (d) of damage to another Contractor or to the property of others caused by the Contractor, (e) of Contract price. (f) of reasonable indication that the work will not be completed within the contract time, (g) of the Contractor's neglect or unsatisfactory proceeding of the work including failure to cleaning (h) the revisions of law that enable or require the owner to withhold such payments in whole or in part.(i) The Contractor owes a liability or a sum on other Contracts with U.P. Jal Nigam.

**19.7** When the grounds for withholding payments are removed, payments will be made for amounts withheld to the extent the Contractor is entitled to payment.

**19.8 SCHEDULE OF PAYMENT:**

**19.8.1** On completion of work as specified in the contract document, furnished in volum-3 as per payment schedule.

**19.8.2** The security money shall be refunded after successful completion of work **in two phases as under:**

50 % of security deposit will be refunded on the expiry of defect liability period, after completion of work.

Next 50 % of security deposit will be refunded after expiry of 12 months after completion of defect liability period of work of this tender document.

**20.00 ACCEPTANCE OF WORK:**

Upon written notice from the Contractor that the entire work required by the Contract Documents is completed and that all submission required of him are made, and after the Contractor has delivered the Bonds, certificates of inspection release and other document etc. all as or by law, Engineer will make a final inspection and will notify the Contractor in writing of any particulars in which this inspection reveals that the work is defective, and will also notify the Contractor in writing of any deficiencies in the submissions and other documents required from him. The Contractor promptly shall make such correction as are necessary to remedy all defects or deficiencies. After Contractor has completed any such corrections to the satisfaction of the Engineer, the Engineer will issue a written final Acceptance of the work and file any notice of completion required by the law or otherwise.

**20.01** After issuance of the Engineer's written final Acceptance the Contractor may submit his final acceptance following the procedure for progressive payments. The final less the Retention Money as provided for shall not become due unless the application is accompanied by such supporting data as the Engineer may require, together with the complete and legally effective release or waives satisfactory to the Engineer of all liens arising out of the Contract Documents and the labor and services performed and the material and equipment furnished there under. If any such lien remains unsatisfied after all payments are made, the Contractor or his surety shall pay to the Engineer all money. The Engineer may be compelled to pay in discharging such lien, including all costs and reasonable attorney's fees.

**20.2 WAIVER OF CLAIMS:**

The making and acceptance of final payment shall constitute (a) a waiver of all claims by the Engineer against the Contractor except those arising from unsettled liens, from faulty or defective work appearing after final acceptance of the work by the Engineer, from failure of the work to comply with the requirements of the Contract Documents, or from the terms of any special guarantees or warranties required by the Contract Document and

(b) a waiver of all claims by the Contractor against the Engineer except those previously made

in writing and still unsettled. However, any payment, final or otherwise shall not release the Contractor or his sureties from any obligations under the Contract Document of the performance bond.

**20.3 CONTRACTOR'S PAYMENT TO ENGINEER:**

The Contractor shall pay to the Engineer all money so required of him under the provisions of the Contract Document. If any such payments are required prior to final payments, an appropriate variation order will be issued and the amount of such payment may be withheld from payments due to the Contractor. If the payments then or there after due from the Contractor, or if the amount of such payment due to the Engineer is determined after the making of the final payment, the difference in the amount of the payments of the amount so determined shall be paid by the Contractor to the Engineer.

**20.04** The obligation of the Contractor to pay the money due to the Engineer from him shall specifically bind the Contractor's sureties, assignees, executors, administrators and heirs, to his obligations to pay the Engineer.

**20.05 CERTIFICATE OF SATISFACTORY PERFORMANCE:**

If the Contractor shall have made good all defects and any unsatisfactory features repaired, amended and reconstructed as required by the Engineer and the works have been completed and maintained in accordance with the terms and conditions of the Contract, the Engineer shall issue to the Contractor the certificate of satisfactory performance.

**21.00 MEASUREMENTS:**

The Engineer shall, except as otherwise stated therein, determine by measurement, the value in accordance with the Contract, for work done.

**21.1** All items having a financial value shall be entered in a measurement book, level book etc. as prescribed by the Engineer so that a complete record is obtained of all works performed under the Contract.

**21.2** Measurements shall be taken jointly by the Engineer or his authorized representative and by the Contractor or his authorized representative. Before taking measurements of any work the Engineer or the person deputed by him for the purpose, shall give reasonable notice to the Contractor. If the Contractor fails to attend or send an authorized representative for measurement after such notice or fails to countersign or record the objection within a week from the date of measurements taken of by the Engineer or by the person deputed by him, these shall be taken to be correct measurements of the work and shall be binding on the contractor.

**22.00 SUSPENSION AND TERMINATION:**

If at any time after the execution of the Contract Documents, the Engineer shall for any reason whatsoever (other than fault on the part of the Contractor for which the Engineer is entitled to rescind or determine the Contract) desires that the whole or 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 the Contractor, a notice, in writing of such desire and upon the receipt of such notice, the Contractor shall forth-with 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 decision 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 or in pursuance of any notice as aforesaid, on account of any suspension, stoppage or curtailment.

**22.1** Where the total suspension period of work ordered as aforesaid continued for a continuous period exceeding 90 (Ninety) days, the Contractor shall be at liberty to withdraw from the contractual obligations under the Contract by giving ten (10) days prior notice in writing to the Engineer of

such intention and requiring the Engineer to record the final measurements of the work already done and 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 unexecuted work under this contract.

**22.2** On receipt of such notice, the Engineer shall proceed to complete the measurements and make such payment as may be finally due to the Contractor within a period of 120 days from the receipt of such notice in respect of the work already done by the Contractor. Such payments shall not in any manner prejudice the right of the Contractor to any further compensation under the remaining provisions in this clause.

**22.3** It shall be open to the Contractor, within ninety (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 the continued suspension of work 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 and require the owner to take over on payment such material at the rates determined by the Engineer. The Engineer shall thereafter take over the material 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 specification approved by the Engineer.

**22.04 SUSPENSION / TERMINATION OF CONTRACT AGREEMENT:**

If the Contractor abandons the work, or if he dies or becomes insane or is imprisoned or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or similar law, or if he persistently fails to supply sufficiently skilled superintendence and workmen or suitable materials or equipment or if he persistently fails to make prompt payments to sub-contractors or for labor, materials or equipment if he disregards law, ordinance, rules, regulations or orders or any public body having jurisdiction, or if he disregards the authority of the owner, or the contract Documents including requirements of the progress schedule, or if he fails promptly to comply with the requirements of any variation order, or if he assigns this contract Agreement otherwise than as herein provided, or if the owner/Engineer at any time is of the opinion that the performance of the work is unnecessarily or unreasonably delayed or that the contractor is willfully violating any of the provisions of the Contract Documents or is executing the same in bad faith, or if the work is not fully completed within the contract time and any authorized extensions thereof or if the owner/Engineer is of the opinion that the work can not be completed for the unpaid balance of the contract price or will not be completed within the contract time, or if the contractor otherwise violates any provisions of the contract documents, then the Engineer may, without prejudice to any other right of remedy and by means of written notice to the Contractor and his surety, instruct thereto discontinue all work or any part thereof under the contract Agreement or terminate the contract.

**22.5** The Contractor under a written instruction to discontinue shall not resume any of the work except by written notice from the Engineer. In either such case the Engineer may take possession of the work & project and of all materials, equipment, plant, tools, supplies, construction machinery and equipment and property to every kind thereon owned and furnished by the Contractor for the purpose of the work, and finish the work by whatever method, the Engineer may deem expedient.

**22.6** In the event of aforesaid parts the Contractor shall not be entitled to receive any further payment after the date of said written notice from the Engineer unless instructed in writing by the Engineer to resume any part of the work, or until the work is completed by the Engineer, through alternative agency. If the unpaid balance of the contract price exceeds the direct and indirect costs to the owner for finishing, the work, including compensation for additional administrative, consultant, professional, testing and inspection services, such excess will be paid to the Contractor. If such cost to the Engineer exceed the unpaid balance, the Contractor shall pay the difference to the owner.

**22.7** The Engineer may require the Contractor to remove such materials, equipment's plants, tools, construction, machinery, property etc. from the premises within a time specified. In the event the Contractor fails to comply with any such instructions, the Engineer may remove them at the contractor's expenses, or sell them by auction or private sale at risk and account of the Contractor in all respects and the certificate of the Engineer as to expenses of any such removal and the amount of the proceeds and the expense of any sales amount of the proceeds and expense of any such sales shall be final and conclusive against the Contractor.

**23.00 TERMINATION FOR CONVENIENCE:**

The owner is entitled to terminate this contract in whole or in part, at any time for his own convenience after giving thirty (30) days prior notice to the Contractor, with a copy to the Engineer. The notice of termination shall specify that termination is for the owner's convenience, the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

**23.1** In the event of such termination, the Contractor shall, with all reasonable dispatch, remove from the site all constructional plant etc. The Contractor shall be paid by the owner in so far as such amounts or items which are not already covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract.

**23.2** Provided always that against any payments due from the Owner, the Owner shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of plant and materials and any other sums which at the date of termination were recoverable by the owner from the Contractor.

**24.1 MISCELLANEOUS PROVISIONS:**

**24.2 SUCCESSOR AND ASSIGNS:**

The Engineer and the Contractor each binds himself his partner, successors, assign and legal representative to the owner party hereto and the partners, successors, assigns and legal representatives of such other party in respect to all convenience, agreements and obligations contained in the contract Agreement; they shall not assign the contract Agreement or subject it as a whole without the written consent of the other, nor shall the contractor assign any money due or to become due to him hereunder without the previous written consent of the Engineer.

**24.3 WRITTEN NOTICE:**

Written notice shall be deemed to have been duly served or delivered in person to individual or the member of the firm or to the officer of the corporation for whom it was intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice. The address given in Contractor's Tender or which is found in Contract Documents, is hereby designated as the place to which all notice, letter and other communications to the Contractor shall be mailed or delivered, except in case the said address has been subsequently changed by the Contractor by notifying the Engineer in writing under registered post. This shall not preclude the service of any notice, letter or other communication upon the Contractor personally on getting a formal receipt.

**24.4 ORAL AGREEMENT:**

No oral order, objection, claim or notice by any party to the other shall effect or modify any of the terms or obligations contained in any of the Contract Documents, and none of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by definitely agreed waiver or modification there of in writing, and no other evidence shall be introduced in any proceeding of any other waiver or modification.

**24.5 CLEANING UP:**

The Contractor shall at all times during the work keep the site and premises, adjoining



property and public property free from accumulations of waste materials, rubbish and other debris, resulting from the works, and at the completion of the work shall remove all waste-materials, rubbish and debris from and about the site and premises as well as all tools, construction equipment's and machinery and surplus materials and shall leave the site and premises clean, tidy and ready for occupancy by the Engineer. The Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents. Paved walkways, parking areas and roadways shall be swept and broomed clean.

**24.05** Cleaning up operations shall include the removal and disposal of earth that tenders surplus after filling of resulting excavations with sound compacted earth as directed and approved by the Engineer. No waste material shall be buried or disposed off on the owner's property unless so approved in writing by the owner. Before the Contractor applied for final inspection and acceptance of the work, all items of work shall be complete, ready to operate and in a clean condition as determined by the Engineer.

**24.6 OWNER'S RIGHT TO CLEAN UP:**

If the Contractor fails to satisfactorily clean up or if a dispute arises between the Contractor and any separate Contractor as to their responsibility for cleaning up, the Engineer may clean up and charge the cost thereof to the Contractor for his failure, or to the several Contractors as the owner shall determine to be just.

**24.7 CERTIFICATE:**

Each certificate required under the Contract Documents shall be signed by the individual, officer or agent lawfully authorized to execute the certificate and such authority shall be cited in the certificate by title, description, or other acceptable evidence.

**24.8 SPECIAL RISKS:**

If during the currency of contract, there shall be an out break of war (whether war is declared or not), a major epidemic, earthquake or similar occurrence in any part of the world beyond the control of either party to the contract, which either financially or otherwise materially affects the execution of the contract, the owner shall unless and until the contract is terminated under the provisions of this article, use his best endeavors to complete the execution of the work, provided always that the owner shall be entitled by any time after the onset of such special risk to terminate the contract by giving the written notice, to the Contractor and upon such notice being given, this contract shall terminate but without prejudice to the rights of either party in respect of antecedent breach thereof.

**24.9 FOSSILS ETC:**

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

**24.10 VEHICLE, SITE OFFICE & DATA ENTRY OPERATOR:**

On acceptance of the tender the contractor shall provide temporary site office and one four wheeler vehicle on each site(including driver, fuel etc.). The site office should be of portable material and shall have sufficient furniture & fixtures. All relevant I.S. codes and Manuals should be kept in by the contractor. Other requirements of the site office should be as per description mentioned in this document elsewhere.

**24.11 Technical Staff:-**

The Prime Contractor / bidder shall provide suitably qualified personnel to fill up the senior positions required during the execution of the job as given under. The selected bidder have to

make these persons available at site during construction.

Sr. No.	Position	Total years of Experience	Total years of experience in similar works	Minimum qualification	No. of persons
1	<b>Project Manager</b>	5	2 to 5	Degree/ Diploma (Civil)	1
2	<b>Project Engineer At each site</b>	5	2 to 5	Degree/ Diploma (Civil)	1
3	<b>Foreman at each site</b>	5	2 to 5	ITI	1
4	<b>Supervisor at each site</b>	3	1 to 3		1

**25.1 TESTS ON COMPLETION:**

**25.2 NOTICE OF TESTS:**

The Contractor shall give to the Engineer twenty one (21) days notice in writing of the date after which he will be ready to make the tests on completion; unless otherwise agreed the tests shall take place within seven (7) consecutive days after the said date on such day or days as the Engineer shall notify the Contractor in writing.

**25.3 ARRANGEMENT OF WATER FOR TESTING:**

The Contractor shall have to arrange water for testing of sewer line and appurtenant works at his own cost. No extra payment for the above shall be made by the U.P.JAL NIGAM.

**25.4 DELAYED TESTS:**

If in the opinion of Engineer the tests are being unduly delayed he may, by notice in writing, call upon the Contractor to make such test within 21 days from the receipt of the said notice, and the Contractor shall make the said tests on such days within the said 21 days as the Contractor may have done as if he had given notice to the Engineer. If the Contractor fails to make such tests within the time aforesaid, the Engineer may himself proceed to make the tests. All tests so made by the Engineer shall be at the risk and cost of the Contractor.

**25.5 REPEAT TEST:**

If any portion of the works does not satisfy the norms of the tests, tests of the said portion shall, if required by the Engineer or the Contractor, be repeated within a reasonable time upon the same terms and conditions, and that all reasonable expenses to which the Engineer may be put by the repetition of the tests shall be deducted from the Contractor's sum.

**25.6 CONSEQUENCES OF FAILURE TO PASS TESTS ON COMPLETION:**

If the works or any Section there or shall fail to pass the tests on the repetition there of under Clause 25.03, the Engineer shall be entitled:

- (a) To order a further repetition of the tests under the conditions of sub-clause 25.03
- (b) To reject the work or Section there if the results of the tests fail to meet the performance guarantees.

(c) Not to issue a taking over Certificate.

**26.00 TAKING OVER CERTIFICATE:**

As soon as the works have been completed in accordance with the Contract (except in minor respect that do not affect their use for the purpose for which they are intended and cover the obligations of the Contractor for the purpose) and the works are adjudged true to specification after these have passed the Tests on completion of execution and thereafter completion of maintenance period, with all defects whatsoever are removed by the Contractor, the Engineer shall issue certificate to the Contractor, therein called a taking- over certificate.

**26.1** In taking over certificate the Engineer shall certify the date on which the works have been so completed and have passed in said tests, and the Engineer shall be deemed to have taken over the works on the date so certified where upon title to and risk or loss or damage to the works shall have relevance to the owner only.

**26.2** The taking over certificate will be issued on completion of the entire work for the purpose as intended in the Tender Document. No partial taking-over certificate will be issued.

**26.03 USE-BEFORE TAKING OVER:**

If by reason of any default on the part of the Contractor a Taking-over certificate has not been issued in respect of works within one month after the time of completion and maintenance is over, the Employer shall take over physically the work in public interest pending a formal issue of a Taking-over certificate.

**26.04** The Contractor shall take full responsibility for the care of the works or any section or portions there of the works before taking over the same shall be made good and at the sole cost of the Contractor and to the satisfaction of the Engineer. The Contractor shall also be liable for any loss or damage to the works occasioned by him or by any subcontractor in the course of any operations carried out by him for the purpose of completing any outstanding work or removing the defects as pointed out.

**26.05 DAMAGE TO WORKS CAUSED BY EXPECTED RISK:**

In the event of loss or damage to the material / works arising from or occasioned by all possible risks, which the Contractor is expected to visualize on being aware of the site conditions, it will be made good by the Contractor at his cost. Such cost shall include in the contract price.

**27.1 INSURANCE OF LABORERS:**

The Contractor should get the laborers duly insured before the commencement of the work for any accident which may occur during the execution of the work. The department will not be responsible for such type of losses.

a. In every case in which by virtue of the provisions of section 12. Sub section (1) of the Workmen's Compensation Act. 1923 U.P. Jal Nigam is obliged to pay compensation to a workman employed by the Contractor or by subcontractor from him in the execution of the said work, U.P. Jal Nigam will recover from the Contractor the amount of the compensation so paid and without prejudice to the rights of U.P. Jal Nigam under section 12.sub-section (2) of the said Act. U.P. Jal Nigam shall be at liberty to recover such amount or any part thereof by deducting it either from the security money deposited by the Contractor or to his credit under Clause 27 of these conditions or from any other sum due to be paid to the Contractor whether under this contract or other wise.

b. U.P. Jal Nigam shall not be bound to contest any claim made against it under section 12, sub-section (1) of the said Act. except on the written request of the Contractor and upon his giving to U.P. Jal Nigam full security for all costs which Jal Nigam might become liable in consequence of contesting the claim.

- 27.1** The Contractor without limiting his obligations shall insure the works to the full replacement cost. This insurance shall be in the joint names of the Contractor and the Engineer. Any amount not insured or nor recovered from the insurers shall be borne by the Contractor.
- 27.2** The Contractor indemnify the department against all losses and claims in respect of death or injury to any person or any loss or damage to any property which may arise out of execution completion of works and remedying of any defects. The Contractor shall also indemnify the department against all claims proceedings, damages, costs. Charge and expenses whatsoever in respect thereof.
- 27.3** Amount of insurance shall be for at least Rs. 5.0 lac per occurrence against liabilities for death or injury to any person or as per latest Government rules whichever is maximum, or loss or damage to any property.
- 27.4** The department shall not be liable in respect of any damages or compensation payable to any workman of the Contractor. The Contractor shall provide the insurance policies in the joint names of the Contractor and the Engineer at the time of start of work at site.
- 27.5** If the Contractor fails to keep enforce any of the insurances required under this contract or fails to provide the policies to the Engineer within the period prescribed the department may pay any premium as may be necessary for that purpose and shall deduct the amount so paid from the claims due to the Contractor.

**28.00 CONDITION FOR ARBITRATION CLAUSE:**

In case of any dispute, difference or question which may at any time arise between the parties to the contract or arising out of or in respect of the contract shall be referred to the 'MANAGING DIRECTOR' U.P. Jal Nigam who will have the power to decide the same as an arbitrator if he so likes or may nominate any one as an arbitrator to decide it and his AWARD shall be final and binding on the parties. The Managing Director while nominating any one as Arbitrator will have the power to fix FEE of the nominee. The arbitrator will have the power to decide the COUNTER-CLAIM if lodged by the other party. The arbitrator will also have the power to award pendent elite and further interest on the principal sum so awarded but not in **excess of 6% P.A. (SIMPLE INTEREST)** as he thinks reasonable. Initially the FEE of the Arbitrator will be paid by the claimant i.e the party who invoked the arbitration clause which will be one of the elements of costs of the arbitration and will finally be borne by the parties as per award of the arbitrator. The VENUE of arbitration will Lucknow. For matters other than those mentioned above in condition -29 the provisions of Arbitration & conciliation Act.-1996 will be applicable.

**CONDITION OF CONTRACT, ANNEXURE – I**  
**SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS**  
**ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.**

- a) Workmen Compensation Act 1923: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- b) Payment of Gratuity Act 1972: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days' (say, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.
- c) Employees P.F. and Miscellaneous Provision Act 1952: The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). The benefits payable under the Act are:
  - i. Pension or family pension on retirement or death as the case may be.
  - ii. Deposit linked insurance on the death in harness of the worker.
  - iii. Payment of P.F. accumulation on retirement/death etc.
- d) Maternity Benefit Act 1951: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.
- f) Minimum Wages Act 1948: - The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.
- g) Payment of Wages Act 1936: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- h) Equal Remuneration Act 1979: - The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.
- i) Payment of Bonus Act 1965: - The Act is applicable to all establishments employing prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may have different number of employment size.
- j) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- k) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get these certified by the designated Authority.
- l) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- m) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations of employment of children in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.
- n) Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Travelling expenses from home up to the establishment and back etc.

- o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- p) Factories Act 1948: - The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing the prescribed minimum (say, 10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process.
- q) Arbitration and Conciliation Act, 1996: - The Act lays down the procedure for appointment of Arbitrator, Arbitration and conciliation, Jurisdiction of Arbitral Tribunals, Recourse against Arbitral award appeals.

**S.E./E.E.  
UP JAL NIGAM**

**Signature of Contractor**

# CONDITION OF CONTRACT, ANNEXURE – II

## SAFETY CODE

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than  $\frac{1}{4}$  to  $1\frac{1}{4}$  horizontal and 1 vertical.)
2. Scaffolding of staging more than 3.6 m (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12ft.) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.
4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm. (3ft.)
5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit; action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.
6. **(a)** Excavation and Trenching - All trenches 1.2 m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30 m. (100 ft.) in length or fraction thereof, Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The side of the trenches which are 1.5 m. (5ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. (5ft.) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances, undermining or undercutting shall be done.  
**(b)** Safety Measures for digging bore holes:-
  - i. If the bore well is successful, it should be safely capped to avoid caving and collapse of the bore well. The failed and the abandoned ones should be completely refilled to avoid caving and collapse;
  - ii. During drilling, Sign boards should be erected near the site with the address of the drilling contractor and the Engineer in-charge of the work;
  - iii. Suitable fencing should be erected around the well during the drilling and after the installation of the rig on the point of drilling, flags shall be put 50m around the point of drilling to avoid entry of people;
  - iv. After drilling the bore well, a cement platform (0.50m x 0.50m x 1.20m) 0.60m above ground level and 0.60m below ground level should be constructed around the well casing;
  - v. After the completion of the bore well, the contractor should cap the bore well properly by welding steel plate, cover the bore well with the drilled wet soil and fix thorny shrubs over the soil. This should be done even while repairing the pump;
  - vi. After the bore well is drilled the entire site should be brought to the ground level.
7. Demolition - Before any demolition work is commenced and also during the progress of the work,
  - i. All roads and open areas adjacent to the work site shall either be closed or suitably protected.
  - ii. No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.

- iii. All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.
8. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned:- The following safety equipment shall invariably be provided:
- i. Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.
  - ii. Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes, shall be provided with protective goggles.
  - iii. Those engaged in welding works shall be provided with welder's protective eye shields.
  - iv. Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
  - v. When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public. In addition, the contractor shall ensure that the following safety measure are adhered to:-
    - (a) Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.
    - (b) At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.
    - (c) Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.
    - (d) Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.
    - (e) Safety belt with rope should be provided to the workers. While working inside the manholes, such rope should be handled by two men standing outside to enable him to be pulled out during emergency.
    - (f) The area should be barricaded or cordoned off by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.
    - (g) No smoking or open flames shall be allowed near the blocked manhole being cleaned.
    - (h) The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.
    - (i) Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The Engineer-in-Charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.
    - (j) Gas masks with Oxygen Cylinder should be kept at site for use in emergency.
    - (k) Air-blowers should be used for flow of fresh air through the manholes. Whenever called for, portable air blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.
    - (l) The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole.
    - (m) The workers shall be provided with Gumboots or non sparking shoes bump helmets and gloves non sparking tools safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.
    - (n) Workmen descending a manhole shall try each ladder stop or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.
    - (o) If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.
    - (p) The extent to which these precautions are to be taken depend on individual situation but the decision of the Engineer-in-Charge regarding the steps to be taken in this regard in an individual case will be final.



- vi. The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken:-
  - (a) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.
  - (b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scrapped.
  - (c) Overalls shall be supplied by the contractors to the workmen and adequate facilities shall be provided to enable the working painters to wash during and on the cessation of work.
- 9. Safety Measures for laying of pipe lines and sewers:
  - 9.1 Measures as provided in Manual on water supply and Manual on sewerage shall be complied with strictly along with safety measures to be followed as per Nigam/LSGED orders issued from time to time. Some important measures are given below:
    - 9.2 Proper barricading of trenches shall be done and caution boards and red flags shall be displayed along with lighting arrangements and watchmen during night and
    - 9.3 Watchmen shall be deployed during construction for diversion of traffic and necessary permission shall be taken before excavation of trenches from local administration/traffic police/Nagar Nigam/PWD/BSNL/POER CORPORATION etc.
    - 9.4 Mouth of pipe or sewer shall be properly capped with end caps or steel plates to avoid entry of soil/mud/water, before leaving the site at the end of days work and as far as possible no trench shall be left open at the end of days work or shall be left unguarded.
    - 9.5 Open timbering should be done as per norms if the trench is more than 1.5 meter deep and close timbering should be done when more than 3.0 meter deep.
    - 9.6 Excavated earth should be kept at sufficiently safe distance from the sides of trench not less than 60 cm away.
    - 9.7 Special care should be taken during rains against collapse of trench or settlement of soil which may take place and may pose danger to life and property.
    - 9.8 If any trench which is more than 1.5 meter deep and within 3.0 meter adjacent to any structure or building, then close timbering should be done.
  - 10. When the work is done near any place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision, should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.
  - 11. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions:-
    - i. (a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept repaired and in good working order.
    - (b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.
    - ii. Every crane driver or hoisting appliance operator, shall be properly qualified
    - iii. In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
  - 12. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.
  - 13. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.
  - 14. These safety provisions should be brought to the notice of all concerned and the person responsible for compliance of the safety code shall be named therein by the contractor.

15. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer or Engineer-in-Charge of the department or their representatives.
16. Notwithstanding the above clauses from (1) to (15), there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

**S.E./E.E.**  
**U.P. Jal Nigam**

**Certificate:**

I hereby certify that I have read/been explained contents of safety code above and shall be abide by above rules fully and shall take all responsibility arising out of any lapses on the part of my men and labour/workers and shall bear all costs and expenses, claims what so ever etc. following any mishappening.

**Signature of Applicant/Bidder**  
**(Annexure –III)**

**(DRAFT)**

**BANK GUARANTEE FOR ADVANCE/MOBILISATION LOAN**

The Project Manager / Executive Engineer,  
----- Unit/Division,  
U.P. Jal Nigam,  
-----

Name of the work: -----

WHEREAS M/s ----- and having its registered office at ---  
----- (hereinafter called "the Contractor") has  
undertaken, in pursuance of Contract Bond No. ----- to execute the work -----  
----- from ----- called "the Contract").

AND WHEREAS it has been stipulated by you in the said contract that the contractor/ Bidder shall furnish you with a Bank Guarantee by a recognized Bank for the sum specified therein as security for compliance with his obligations in accordance with the contract for getting mobilization advance from you.

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 i.e. ----- (Rupees -----.)

We, ----- undertake to pay you upon your written demand and without cavil and argument, any sum or sums within the limits of Rs. ----- (Rupees ----- only) as aforesaid without your heeding to prove or to show the grounds or reason for your demand for the sum specified therein.

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

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

This guarantee is valid up to -----

The bank guarantee can be en-cashed by you at our branch \_\_\_\_\_ (also at our branch at the city/place of work).

We----- lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Authority in writing. Notwithstanding any contained hereinabove.

- a) Our liability under this Bank Guarantee shall not exceed Rs----- (Rupees Thirty ----- only.)
- b) This Bank Guarantee shall be valid up to -----(60 days beyond date of completion)
- c) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim on or before -----

The ----- has here unto set his hand at \_\_\_\_\_ the day of ----- '20.....

SIGNATURE & SEAL OF THE GUARANTOR \_\_\_\_\_  
Name of the Bank \_\_\_\_\_  
Address \_\_\_\_\_  
Date \_\_\_\_\_

**Signature of Bidder/Applicant**

**FORM OF BANK GUARANTEE FOR SECURITY DEPOSIT**  
**(SPECIMEN)**

**Project Manager,  
Gomti Pollution Control Unit-I,  
U.P. Jal Nigam, Lucknow**

WHEREAS (Name & Address of Contractor/bidder \_\_\_\_\_ dated \_\_\_\_\_ Herein after called “the contractor / bidder”) has undertaken, in pursuance of letter of award/letter of intent/contract bond no. \_\_\_\_\_ dated \_\_\_\_\_ to execute (Name of Contract & Brief description of works \_\_\_\_\_ called “the contract”) AND WHEREAS it has been stipulated by you in the said contract that the Contractor/ Bidder shall furnish you with a Bank Guarantee by a recognized bank for this sum specified therein as security for compliance with his obligations in accordance with the contract. AND WHEREAS we have agreed to give the Contractor/ bidder such a Bank Guarantee \_\_\_\_\_

\_\_\_\_\_ we undertake to pay you upon your written demand and without cavil or argument, any sum or sums within the limits of amount of guarantee \_\_\_\_\_ as aforesaid without your heeding to prove or to show the grounds or reason for your demand for the sum specified therein.

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

We further agree that no change or addition to or other modifications of the terms of the contract or of few works to be performed there under or any of the contract documents which may be made between you and the Contractor/ bidder shall in any way release us from any ability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee is valid up to ----- from the date of issue of this guarantee (Guarantee period shall be minimum for ----months

The bank guarantee can be en-cashed by you at our branch \_\_\_\_\_ (also at our branch at the city/place of work).

SIGNATURE & SEAL OF THE GUARANTOR \_\_\_\_\_ Name of the  
 Bank \_\_\_\_\_ Address  
 \_\_\_\_\_ Date \_\_\_\_\_

**Engineer-in Charge**

**Contractor**

(Annexure –V)

**UNDERTAKING FROM CONTRACTOR IF CONTRACTOR FURNISHES BANK  
GUARANTEE**

If the Bank Guarantee as produced by us hereby is accepted by U. P. Jal Nigam. I/we undertake to renew the same atleast one month before the date of expiry of the bank guarantee, in the case the contract is not performed to the satisfaction of Engineer within the stipulated period, and if we fail to do so, we agree that Employer will recover the entire amount in cash from our bill or any other payment due to us without any notice. This procedure will remain in force till we receive in writing form the Employer that the Bank Guarantee in no longer required to be extended.

This is further undertaken that the Bank Guarantee will not be got released, until the Employer's written permission to get it released whether or not the time of Bank Guarantee expires and if time is due to expire, I/we shall be and to renew the same and shall inform the Employer.

**Signature of Contractor**



# U.P. JAL NIGAM

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## E-TENDER

FOR

“Construction of FSTP Plant of 7 town / cities (GONDA, FAIZABAD, BAHRAICH, AKBARPUR, SITAPUR, HARDOI & FARUKHABAD) (32 KLD capacities each) under AMRUT”

ON

LUMPSUM CUM ITEM-RATE BASIS

Part – II  
(Scope of Work & Technical Specifications)

**Note: 1. Contractors are advised to visit the site before submission of the bid.**

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## **(A) GENERAL SPECIFICATIONS**

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### **1.0 GENERAL ARRANGEMENTS & SETTING OUT THE WORKS :**

The contractor will establish the necessary bench marks and levels, and he must set out the work and shall be held responsible for its correctness and it shall be incumbent on him to dismantle, remove and rebuild at his own expenses any work not correctly set out.

The contractor shall make provision in his rates to provide all pegs, plates, pillars lines boning rods, sight rails and templates required for setting out the work and shall give such assistance as may be required by the Engineer or his authorised representative in checking the work before, during and after the execution of the work.

### **2.0 ERECTION & CHECKING OF WORKS :**

The contractor shall provide and supply and include in his rates for all labour, machinery, engines, pumps, timbering, shoring, strutting, drain pipes, culverts, rails, tools, tackles, implements, staging, scaffolding, planking, centering, piling, moulds, profiles, templates, timber, boning rods, posts, sight rails and setting materials, all fencing and lighting etc. necessary both for proper execution of works and for the safety and convenience of the public during the progress of the work and maintenance and all temporary plants and appliances and permanent materials of any and every kind whatsoever, although the same may not be included in the description aforesaid, or any of them become, proper or necessary for, or incidental to the full and complete execution of the several works in all their parts or may have been omitted, or otherwise referred to in these specifications or in the annexed schedules, or shown in the drawings.

As materials are collected and the construction of any section of the works is completed, it will be checked over and passed by the Engineer or his authorised representative but such approval shall in no way relieve the contractor of his responsibility which will not end until the whole work is actually commissioned and the defect liability period has expired as defined in the scope of work.

### **3.0 TEST:**

During the progress of the work & during the period of maintenance the Contractor shall carryout such tests as in the opinion of the Engineer or his authorised representative are necessary to determine that the materials supplied comply with the specifications and conditions . The tests to be carried out shall be as described in Schedule 'E' & or as may be required by the Engineer. All the tests shall be done in laboratories approved by the Employer. The contractor is required to take written approval from Engineer-In-Charge, in this respect. The rates in Schedule 'G' shall include cost of such tests.

### **4.0 SAMPLES:**

As the work proceeds the Contractor shall submit samples of materials for approval as may be required by the Engineer and all deliveries at the site shall not be below the standard of the samples, A list of such samples as are required in the first instance is given in schedule 'C'.

## **5.0 WANT OF KNOWLEDGE:**

The Contractor must carefully go through the conditions, specifications and items of contract and examine the necessary drawings before tendering and in case of any obscurity he should apply to the Engineer for its elucidation/clarification as no excuse for want of knowledge for non compliance with any part of portion of the specification or terms of contract shall be considered. He is also advised to see the site of work before tendering to make him self familiar with the conditions there in.

## **6.0 OCTROI:**

Octroi charges on all materials brought by the Contractor for the work from out side the municipal limit shall be paid by him to the municipal board in accordance with municipal schedule of rates in force at the time the materials cross the municipal barrier. The Contractor shall consult the municipal schedule of rates and make an allowance for the same in his rate. No claim on account of its shall be entertained.

## **7.0 FIRM TENDERS:**

Firm rates shall be quoted by the Contractor for each item in the schedule 'G' Tenders shall remain good and open for acceptance for a period of 120 days from the date, they are opened.

The Contractor shall, before tendering, consider the fluctuation in rates of materials and labour from time to time and shall make sufficient provision for the same in his rates as no request for allowing any increase in the rates tendered by him on this account will be entertained later on.

## **8.1 MATERIALS:**

### **8.2 1<sup>st</sup> CLASS BRICKS: (M-100/M-150)**

Bricks shall have a uniform deep cherry red or copper colour, shall be thoroughly burnt but not over burnt, and regular in shape. Their edges must be Straight Square and the two bricks must emit a clear ringing sound on being struck with each other. They must be free from cracks, chips, flaws and stones or lumps of any kind. The bricks shall comply with the I.S. – 1077.

### **8.3 STONE BALLAST:**

Stone ballast shall consist of crushed stone and shall be hard, strong, dense, durable, clean, of proper gradation and free from weather effect. It shall be generally cubical in shape. As far as possible, soft, thin, flaky or elongated or laminated pieces shall be rejected for RCC work it should not contain any materials which might effect the reinforcement. The grading and test requirements should comply with the I.S. – 383.

### **8.4 TIMBER:**

Timber to be used in shuttering works shall be from the heart of a sound tree of natural growth, the sapwood being entirely removed. It shall be uniform in substance, straight in fibre, free from large, loose and dead knots, flaws, shakes, decay, rot, fungi and insect attacks and from any other damages of harmful nature which will deffect the strength, durability, appearance or its usefulness for the purpose for which it is required. The colour should be uniform as far as possible. The other requirements of timber shall comply with the PWD specification No. 1.5 (material) part-I.

### **8.5 STEEL:**

The steel for RCC shall be high yield strength deformed bars of Grade Fe 415 conforming to IS -



1786 -1985 the placement of reinforcement shall be as per IS 456-2000. The steel shall be rust free.

**8.6 PORTLAND CEMENT:**

The cement shall be Ordinary Portland of 43/53 grade cement conforming to I.S:8112/ ..... with its latest amendments.

**8.7 SAND:**

The sand shall consist of natural sand, crushed stone or crushed gravel or a combination of any of these. it should be hard, durable, clean and free from adherent coating and organic matter and shall not contain any clay. The fine sand which shall be used for plaster and brick work shall have F.M. as 1.25 and the coarse sand for cement plaster/ brick work shall have F.M. as 2.0 and for cement concrete 2.5 to 3.2. All materials which shall be brought and used at site shall confirm to I.S. - 383.

**8.7 QUARRY MATERIALS:-**

The Contractor shall be wholly responsible to identify the suitable sources for quarry materials required for the Works, such as earth, sand, stone, murrum, etc., and to make his own arrangements for collection and transportation of the materials irrespective of the leads and lifts required. The quarry thus identified by the Contractor should have proper license from the concerned Government. All materials supplied by the Contractor shall satisfy the requirements set forth in the Specifications and shall be subject to the approval of the Engineer In-charge . The Contractor shall take this into account while offering his rates and no claims whatsoever shall be entertained for extra costs on this account.

**8.8 SUNDRY MATERIALS:**

Certain other materials not particularly mentioned or described herein may be required for the works and these if not specifically mentioned shall comply with the description set out in standard specifications of PWD, LSGED (now U.P. Jal Nigam) or ISI for the respective materials and these specifications in so far as they are applicable shall be deemed to be incorporated in this contract.

**9.0 WATER SUPPLY FOR WORK AND DRINKING PURPOSE AND FACILITIES TO LABOUR:**

The contractor shall make his own arrangement in regard to water required for the execution and tests of the works and shall also arrange for a supply of drinking water to his employees and labour.

He shall bear all charges in this connection and include in his rates a sufficient amount to cover such charges. All such facilities as are required to be provided for the labourers under the labour welfare rules in force shall also be made available by the contractor at his own cost.

Minimum reasonable sanitary conditions are to be maintained in and around the labour camps and at the site or work. As soon as one or more labour in trenches or at site get wounded or hurt due to accident or carelessness immediate proper medical-aid shall be provided by the contractor to them. However, if it is felt by the engineer that proper medical aid has not been provided to them, it shall be incumbent upon the contractor to follow the instruction of the engineer for proper medical-aid. A first-aid box should be maintained by the contractor during execution period of the work. If proper medical facility is not provided by the contractor, same shall be done by the department & cost shall be debited to the contractor's account.

**10.0 NOTICE BOARD TO BE DISPLAYED:**

Notice boards shall be supplied and fixed in suitable positions by the contractor where the roads

have been opened out for the construction of the culverts or any other construction and the traffic has to be diverted. Such boards shall display in big letter in BLACK AND WHITE or in RED AND WHITE colours such warnings as ROAD CLOSED DRIVE SLOW, - WORK AHEAD MEN ON WORK etc. Such caution boards be fixed at suitable points in the neighborhood of the work or well before diversion where other roads join or cross the road opened out, so that traffic may have sufficient warning to avoid the blocked road by taking any alternative routes or by using the diversion provided by the contractor. No extra payment shall be made to the contractor on this account. The caution boards shall be painted such that the warning or notices glow in the night also to avoid accident specially during heavy traffic.

#### **11.0 BARRICADING:**

The contractor shall provide necessary barricading in portion the excavation is done for any works. The barricading shall consist of ballies and G.I. sheet duly painted red and white in colour as per direction and approval of E/I. The contractor shall also make arrangement in proper warnings like providing fencing, danger flags, night warning light and watch and ward etc.. Safety code for excavation work I.S. 3764-1966 shall be rigidly followed.

#### **12.0 TIP FOR SURPLUS EARTH OR RUBBISH:**

The contractor shall remove from the works all surplus earth after refilling of trenches, wastes of construction process, spoil and rubbish found on the alignment of works. He shall include in his rates sufficient sum to cover the charges required for carting and disposal at suitable places as directed by Engineer.

#### **13.0 QUANTITIES IN THE SCHEDULE NOT GUARANTEED:**

The quantities given in the schedule of rates are approximate and may vary up to any extent on either side. The payment will be made on the basis of actual 'NETT' measurements taken during construction and after completion of work. It is, therefore, important that the contractor orders the exact quantities of materials required after working out his own quantities as he will not be paid for any materials ordered but not used on the works.

#### **14.0 STANDARD DETAILED SPECIFICATIONS:**

The certain clause of these specification reference is made to the Indian standard specification and PWD / Irrigation Department detailed specification or LSGED / Jal Nigam specifications. The former are publications issued by the Bureau of Standards and may be obtained through Indian Standard Institutions Delhi / Kanpur and the later (PWD specifications) published by the Govt. of U.P./ jal Nigam and may be consulted in the office of the Engineer-In-charge or may be obtained from the Superintendent Printing and stationery, U.P. Allahabad / U.P. Jal Nigam, Lucknow. Where no reference has been made to any of the contract regarding any work it is deemed that it shall comply with relevant I.S. codes, PWD / Irrigation Department detailed specifications or LSGED / U.P. Jal Nigam specification / CPHEEO Manual of sewerage and sewage treatment, ministry of Urban Development Govt. of India.

#### **15.0 EMPLOYMENT/REMOVING OF CONTRACTOR EMPLOYEES:**

The contractor shall employ, for the execution of the work only such persons as are careful, skilled and experienced in their trades and cells. The engineer shall have full powers to ask the contractor to remove immediately from the work any persons employed by the contractors on the execution of the work who in the opinion of the engineer misconduct or are incompetent in the proper performance of their duties or are otherwise undesirable.

## **16.0 TIME OF WORKING:**

The contractor will be required to see that the usual hours of work 8 AM to 6 PM are adhered too. No work shall be done in the night without the prior permission of engineer except when it is absolutely necessary for the saving of life or property or for the safety of work in which case the contractor shall immediately inform such reasons to the engineer.

## **17.0 SMALL AND SCATTERED WORK:**

The contractor may be required to carry out works in small quantities and at scattered locations. The contractor shall be paid only at rates tendered in bill of quantities. No claim for any extra payment on ground of small works or of scattered nature shall be entertained.

## **18.0 PHOTOGRAPHS & RECORDS:**

The contractor must allow sufficient margin in his rates to cover the cost of photographs that may be felt necessary either before or during the works, by the engineer. The contractor shall also supply three sets of photographs.

## **19.0 Inspection and Testing:**

- a) The EIC shall have free access at all reasonable times to those parts of the manufacturers' works which are concerned with the fabrication of steel work and shall be afforded all reasonable facilities to satisfy that the fabrication is being undertaken in accordance with the specifications.
- b) Unless specified otherwise, inspection prior to dispatch shall not interfere with the operation of the work.

## **20.0 Site Erection:**

### **a) Plant and Equipment:**

The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the Engineer-in-charge.

### **b) Storing and Handling:**

All structural steel should be so stored and handled at the site that the members are not subject to excessive stresses and damage.

### **c) Setting Out:**

The positioning and leveling of all steelwork, the plumbing of stanchions and the placing of every part of the structure with accuracy shall be in accordance with approved drawings and to the satisfaction of Engineer-in-charge.

### **d) Security during Erection:**

Safety precaution during erection shall conform to BIS 7205:1974. During erection, the steel work shall be securely bolted or otherwise fastened and, when necessary, temporarily braced to provide for all load to be carried by the structure during erection including those due to erection equipment and its operation.

No riveting, permanent bolting or welding should be done until proper alignment has been obtained.

## **21 Design Standards:**

All civil designs shall be based on the latest BIS/PWD/CPWD norms.

### **21.1 Design Loading:**

#### **21.2 General:**

All buildings and structures shall be designed to resist the worst combination of the following loads/ stresses under test and working conditions: dead load, live load, wind load, seismic load, stresses due to temperature changes, shrinkage and creep in materials dynamic load, vehicular load and uplift pressure etc.

#### **Dead Load**

This shall comprise all permanent construction including walls, floors, roofs, partitions, stairways fixed, service equipments and other items of machinery. In estimating the loads of process equipment for the purpose of design, the empty weight of the equipment including all fixtures and attached piping, but excluding contents, shall be considered. Dead loads shall be taken as per relevant BIS codes.

#### **Live Load**

Live loads shall be in general as per BIS: 875. Surcharge load for underground structures, if any shall be considered as per actual condition. Equipment load shall be considered as per manufacturer's specification

In the absence of any suitable provisions for live loads in BIS codes or as given above for any particular type of floor of structure, assumptions made must receive the approval of the Department / prior to taking up the design work. Apart from the specified live loads or any other load due to material stored, any other equipment load or possible overloading during maintenance or erection shall be considered and shall be partial or full whichever causes the most critical condition.

#### **Wind Load**

Wind loads shall be as per BIS: 875.

#### **Earthquake Load**

Earthquake load shall be computed as per relevant latest I.S. codes taking into consideration soil foundation system, importance factor appropriate to the type of structure, basic horizontal seismic coefficient/ seismic zone factor & average acceleration coefficient as applicable.

#### **Dynamic Load**

Dynamic Loads due to working of machines / equipments such as pumps, blowers, compressors, switch gears, travelling cranes, etc. shall be considered in the design of structures as given by the manufacturers or in BIS code, whichever is more.

#### **Vehicular Load**

IRC Class AA (wheeled vehicle) loading shall be considered for design of structures under or by the side of roads.

### **21.3 Design Conditions for Underground or Partly Underground Liquid Retaining Structures**

Liquid retaining/conveying structures including the members covering the same (such as roof of a

chamber, channel etc.) shall be designed by uncracked method of design as per BIS: 3370 and 6494. Basement RC walls and slabs below ground shall also be designed by uncracked method of design as liquid retaining structures. Shear shall be checked by working stress method as per BIS: 456. Minimum temperature and shrinkage reinforcement shall be adequately considered in each direction.

All underground or partly underground liquid containing structures shall be designed for the following conditions:

Liquid depth up to full height of wall including free board : no relief due to soil pressure from outside to be considered.

Structure empty (i.e. empty of liquid, any material, etc.) : full earth pressure and surcharge pressure wherever applicable, to be considered;

Partition wall between dry sump and wet sump : to be designed for full liquid depth up to full height of wall; including free board

Partition wall between two compartments : to be designed as one compartment empty and other full including free board;

Structures shall be designed for uplift in empty conditions with the water table and due care should be taken for seasonal variation on higher side, wherever required.

Underground or partially underground structures shall also be checked against stresses developed due to any combination of full and empty compartments with appropriate ground/uplift pressures below base slab. The design shall be such that the minimum gravity weight (empty conditions) exceeds the uplift pressure at least by 15%.

#### **21.4 Foundations:**

Foundation depths and the type of footings shall be appropriately computed from the parameters of soil test report obtained during the soil testing by the contractor, and got reviewed and approved by department.

The minimum depth of foundations for all structures, equipments, buildings and frame foundations and load bearing walls shall be as per the recommendation of BIS provided adequate bearing pressure is available at that depth.

Bearing capacity of soil shall be determined as per BIS: 6403.

Care shall be taken to avoid the foundations of adjacent buildings or structure foundations, either existing or not within the scope of this contract. Suitable adjustments in depth, location and sizes may have to be made depending on site conditions. No extra claims for such adjustments shall be accepted by the Employer.

A structure subjected to groundwater pressure shall be designed to resist floatation. The dead weight of empty structure shall provide a factor of safety of 1.15 against uplift during construction and service.

Where there is level difference between the natural ground level and the foundations of structure or floor slab, this difference shall be filled up in the following ways.

In case of non-liquid retaining structures the natural top soil shall be removed till a firm strata is reached (minimum depth of soil removed shall be 500 mm) and the level difference shall be made up as

per specifications. However the thickness of each layer shall not exceed 150 mm. The area of backfilling for floor slabs shall be confined to prevent soil from slipping out during compaction.

In case of liquid retaining structures, the natural top soil shall be removed as described above and the level difference shall be made up with Plain Cement Concrete of M-10 grade.

Wherever the plinth level is above the ground level, a curtain wall shall have to be provided from plinth level up to 300 mm below ground level, but not less than 1m in total height.

## **(B). DETAILED SPECIFICATIONS FOR CIVIL WORKS:**

### **1. Earth Work**

#### **1.1 GENERAL**

The conditions/specifications laid down hereunder will hold good whether the excavation is to be carried out over areas for levelling foundations of structures, trenches for pipes or cables or any other type of work which involves earth work like the levelling of forming/embankments etc. as per UP Jal Nigam / UP PWD specifications.

- a. Earthwork in excavation includes site-cleaning activities like removal of shrubs, loose stones, rubbish of all kinds, interfering with the works and with complete removal of roots.
- b. The products of the above clearing operations shall be removed from the site, dumped, stacked at a place or places, burnt or otherwise disposed of as directed by the Engineer-in-Charge within the compound.
- c. A permanent base line and cross lines shall be established to serve as reference grid using MS plates, pegs, pins set in concrete or brick masonry pillars where they will be free from disturbances.
- d. A permanent bench marks or marks as required necessary for the works connected to the nearest GTS benchmark shall be established for reference.
- e. Excavation shall be carried out in all types of soil like top soil, silt, sand, gravel, soft murrum, clay, kankar, hard materials like disintegrated rock shale which can be removed by picks, crowbars and shovels. Soil/earth may contain boulders. Loosening of rocks include the other methods of excavation other than blasting such as chiselling, wedging line drilling to avoid shattering of rocks. The Engineer-in-Charge shall decide what method shall be adopted for removal of the hard rock.
- f. Excavation, whose sides are required to be maintained at a steeper slope than the stable slopes, will be required to be properly shored and strutted failing which the contractor will be required to execute the work by open cutting by the approval of Engineer-in-Charge.
- g. Negligence on account of this leading to any mishap will be entirely the responsibility of the contractor.

#### **1.2 DRAINAGE IN THE VICINITY OF EXCAVATION**

- i. The contractor shall control the drainage in the vicinity of the Excavation so that the surface of the ground will be properly sloped to prevent surface water running into excavated areas during construction. Arrangements shall be made for preventing rain and other extraneous liquids entering the excavated parts. Seepage water shall be directed to flow away from the trenches by gravity. If any pumping is required to keep the trench and the exposed areas dry for further work the same shall be done by the contractor at his own expenses.
- ii. The rates quoted by the contractor shall be deemed to be inclusive of all the above costs or charges for stipulations stated above.
- iii. Excavated material shall not be deposited within 1.5 meters from the top edge of the excavation.
- iv. The contractor shall remove the excavated material to spoil heaps on the site or transport the same

to a place as directed by the Engineer-in-Charge.

- v. If the bottom of the excavation is left exposed by the contractor and in the opinion of the Engineer-in-Charge it has become deleteriously affected by atmospheric changes or affected by water then the contractor shall remove at his own cost such portions of the affected foundations and shall make good by filling with lean concrete or with compacted sand as directed by the Engineer-in- Charge.
- vi. Where Excavation is made in excess of the depths required as shown in the drawings or as directed by the Engineer-in-Charge the contractor shall at his own expense fill up to the required level with lean concrete or well compacted sand as decided by the Engineer-in-Charge.
- vii. Loose, soft or bad soil encountered in Excavation at the -required depth on Engineer-in- Charge's directions shall be excavated to the firm bed and the difference of levels between the required level and the firm bed shall be filled up or dealt with as directed by the Engineer-in-Charge.
- viii. Any obstacle encountered during excavation shall be reported immediately to the Engineer-in-Charge and shall be dealt with as instructed by him. Same shall be applicable for any antiques/treasure found during excavation.
- ix. Any public utility services/facilities like water supply lines, gas supply line, sewers, telephone/electric cables poles etc. met with during Excavation shall not be damaged and no disruption is caused to the utility service on account of damages caused by the contractor. Such facilities shall be properly supported in their original positions by giving signs, suspension beams etc. as contractors own expenses.
- x. The contractor shall not undertake any concreting or constructing work of any nature on the excavated surfaces until approved for the same is given by the Engineer-in-Charge.
- xi. The contractor shall be solely responsible for the protection of adjoining properties from damages that may be on account of excavation close to the properties whether the property belongs to government or to a private party.
- xii. The contractor shall make all arrangements for proper warnings like providing . fences, danger flags, barricading, night warning lights, watch and ward etc, to caution the public as well as the labourers engaged by him about the dangers that may be involved by excavation of trenches, pits, foundations etc. Safety code for excavation work IS: 3764-1966 shall be rigidly followed unless instructed otherwise by the Engineer-in-Charge.
- xiii. Any useful material obtained during Excavation shall be stacked as directed by the Engineer-in-Charge and will be the property of the department. The decision of the Engineer-in-Charge in this regard shall be final and binding on the contractor.
- xiv. Any material used by the contractor out of the Excavated stuff in lieu of his own materials shall be charged to the contractor at the market rates.
- xv. The rates quoted shall include back filling of excavated material and disposal of surplus earth as directed by the Engineer-In-Charge.

### **1.3 EXCAVATION IN TRENCHES AND CABLE DUCTS:**

- i. Excavation as required in trenches, cable ducts, for manholes, other overflow structures, cross drainage works, extra depths for joints of pipes shall be carried out as shown in the



drawings/directed by the Engineer-in-Charge.

- ii. For deep foundations necessary shoring and strutting shall be executed as directed by the Engineer-in-charge. If additional slopes are to be provided where vertical cuts 'are not possible the same shall be executed without any additional cost. The rates quoted shall be deemed to be inclusive of all such extra work.
- iii. The trench shall be kept perfectly dry by preventing the extraneous water entering the pits and also wherever necessary by pumping at the cost of the contractor. No additional cost of dewatering shall be payable.
- iv. The trenches after laying, jointing and testing of pipes/cables are to be back filled. The trenches shall be filled with the excavated material if found suitable as directed by the Engineer-in-Charge.
- v. All surplus soil/earth shall be transported and disposed of as directed by the Engineer- in-Charge. Boulders, sharp objects, brickbats, roots of trees, rubbish, rubble etc. shall not be used for back filling. The back filling shall be done very carefully so as not to damage the pipes/cables or disturb the alignment levels of the pipes/cables. The back filling shall be done in layers on both sides of the pipes watered, consolidated by ramming to a dense layer. The thickness of each layer shall not be more than 15 cms. Special care shall be taken to avoid unequal pressures and not to disturb the pipe.
- vi. In case the excavated material falls short of requirement the back fill soil/earth shall be taken from borrow pits approved by the Engineer-in-Charge. The rates quoted by the contractor shall be deemed to be inclusive of all such works.
- vii. Sight rails and boning rods are to be used at regular intervals as directed by the Engineer-in-Charge to excavate the trenches true to line and grade.

#### **1.4 PUMPING OF SUB SOIL WATER DURING EXECUTION:**

Nearly half of the excavation in trenches/pits including construction of bedding, laying and jointing of AC Class 15, H.D.P.E. D.W.C. & D.I. K-7 pipes as sewer line and D.I. K-9 pipe as Rising Main, construction of manholes and other appurtenant works are to be carried out above sub soil water. If in any case sub soil water level conditions are encountered then the sub soil water level shall be required to be lowered down during execution of all items of works as mentioned above so as to have totally dry conditions. The dry conditions shall have to be maintained at least 24 hours after execution of all items involving cement such as cement concrete, brick work, plastering, jointing of RCC pipes etc and also during testing of sewer line laid as directed by Engineer.

For this purpose the contractor shall be required to bore the requisite number of shallow tube wells including supply of all labour, T&P and other accessories such as strainers, valves, piping, pumping plants along with their installation for lowering the sub soil water as per requirement and direction of Engineer. The pumping shall have to be done continuously round the clock (day and night). For this the contractor shall have to make his own arrangements for the supply of electric power through power generating sets/ power grid including supply of all diesel, M. oil lubricants and other accessories etc.

The contractor is advised to make their rates sufficiently comprehensive to cover all costs in this connection. No extra claim in this regard shall be entertained.

#### **1.5 BACK FILLING / EARTH FILLING**

- i. Back filling of earth around liquid retaining structures and pipes shall be done only after the

water-tightness test is done to the satisfaction of the Engineer-in-Charge. Selected earth from the excavated earth shall be used for back filling / embankment.

- ii. Care shall be taken to see that unsuitable soil/earth does not get mixed up with the material proposed to be used for filling.
- iii. Regarding the soil/earth to be used for back filling the contractor shall have the prior approval of the Engineer-in-Charge.
- iv. Backfill shall be placed in successive horizontal layers of loose material not more than 15 cm thick. The material shall be brought to within + or - 2% of the optimum moisture content as described in IS:2720 (Part VIII) after adjusting the moisture content, the layers shall be thoroughly compacted with such equipment . as may be required to obtain a density equal to or greater than 95% of maximum laboratory dry density of the soil.
- v. Successive layers of filling shall not be placed until the layer under construction has been thoroughly compacted to satisfy the requirements laid down in the requirements.

#### **1.6 FILLING AND EMBANKMENT**

- i. The area where filling or embankment is to be carried out shall be cleared from loose material and the virgin soil shall be exposed. All shrubs and vegetation with roots are cleared. All soft patches shall be removed and filled with selected soil/earth and consolidated. Exposed soil/earth shall be consolidated properly to obtain 95% to 97% of maximum laboratory dry density of the soil.
- ii. Approved filling material shall be uniformly spread in layers not exceeding 15 cms in loose depth. All clods, lumps, etc shall be broken before consolidation.
- iii. Successive layers of filling shall not be placed until the layer under construction has been thoroughly compacted to satisfy the requirements laid down in these specifications.
- iv. The contractor shall give the samples of the earth he proposes to use for back filling for testing, if required or directed by the Engineer-in-Charge along with the following characteristics of the soil/earth.
- v. Only earth having plasticity index less than 20 shall be used.
- vi. Soil/earth having laboratory maximum dry density of less than 1500 kg per cubic meter shall not be used.
- vii. If the layer fails to meet the required density it shall be reworked or the materials shall be replaced and method of compaction altered as directed by the Engineer-in-Charge to obtain the required density.
- viii. If any test indicates less than the specified degree of compaction the Engineer-in-Charge may require all the fill placed; subsequent to the latest successfully tests to be removed and compacted and compaction procedure to be done once again to obtain satisfactory density.
- ix. The contractor shall perform all necessary tests to determine optimum moisture content and the degree of compaction. He shall furnish the results to the Engineer-in-Charge.
- x. Prior to rolling, the moisture content of the material shall be brought to within +2% of the

optimum moisture content as described in IS-2720 (part VIII). The moisture content shall preferably be on the wet side for potentially expansive soil/earth. After adjusting the moisture content as described in this clause, the layers shall be thoroughly compacted by means of rollers till 95% to 97% of maximum laboratory dry density is obtained.

- xi. The embankment shall be finished to the alignment levels and grades, cross sections, dimensions shown in the drawings or as directed.
- xii. If sand filling is specified in the tender for filling the trenches, plinth or foundations the sand used shall be hard, free from inorganic materials and deleterious materials and approved by the Engineer-in-Charge. Filling shall be carried out in layers not exceeding 30 cms in loose depth and flooded and tamped till it meets the approval of the Engineer-in-Charge.
- xvi. The contractor shall perform all necessary tests to determine optimum moisture content and the degree of compaction. He shall furnish the results to the Engineer-in-Charge.

### **1.7 BORROW AREAS**

Borrow pits, if required shall be fixed or as directed by Engineer-in-charge.

All areas required for borrowing earth or embankment shall be cleared of all trees and stumps, roots, bushes, rubbish and other objectionable materials. Particular care shall be taken to exclude all organic matter from the material to be placed in the embankment. The cleared areas shall be maintained free of cost.

Borrow areas shall be stripped of top soil or any unsuitable material. Stripping operation shall be limited to designated borrow areas.

### **1.8 PLACEMENT OF EARTH FILL:**

The earth placed at the top of existing ground shall be free from all clods and organic matter. The earth shall be placed in layers of not more than 15 cm in thickness before being rolled. If the rolled surface appears to be too dry, it should be moistened and if too wet, it should be raked up, allowed to dry to reduce the moisture content to the required extent and compacted (by vibratory rollers) again with additional number of passes before placement of next layer. When compacting the soil against abutment or walls or masonry or concrete structures, the construction surface shall be sloped away from the masonry and concrete structure, for a distance of 2.5 M. at an inclination of 6 : 1 or steeper. The portion of the embankment directly against the structure shall be compacted with pneumatic hand tampers in thin layers. The moisture content of the earth fill placed against the structure shall be slightly above the optimum. In extending any embankment, the benching shall be done by cutting steps on the slopes not steeper than 2 to 1 on the old embankment before laying fresh earth in the extension. No extra payment shall be made for this work. Care shall be taken in placing first layers of the fill so that no damage is caused by the hauling machinery. Sheep foot roller shall not be employed for compaction till the thickness of the layer compacted by other means is greater by 30 cm than the depth of the foot of the roller drums.

### **1.9 COMPACTION :**

Adequate labour shall be kept by the contractor for spreading earth in proper layers.

Compaction is to be done by vibratory rollers

Compaction of spoil banks shall be done by the contractor by manual labour by making the top surface even regular. Inner slopes shall be dressed manually by wooden durmats and other slopes by manual labour. If the contractor employees machines including trucks for the transport of earth, the

embankment so constructed shall not be taken as mechanically compacted.

Levelling if necessary on account of any fault of the contractor may be restored to by the department at the cost of the contractor for which the contractor shall have no objection nor any claims on the account shall be entertained.

#### **1.10 INSPECTION ROAD :**

The contractor shall maintain the inspection road along the lake for movement of light vehicles in the entire reach in connection with the work in his borrow and embankment reach. In case he failed to do so the Engineer-in-charge shall be at liberty to maintain the road by employing any other agency or by departmental labour by giving 24 hours notice to the contractor and the expenditure so incurred shall be recovered from the contractors bill, The decision of the Engineer-in-charge in this respect shall be final and binding upon the contractor.

#### **1.11 MINTENANCE OF EARTH WORK DURING PROCESS OF WORK :**

During the executing of work the contractor shall be responsible for the maintenance. Any damage to the work already executed on account of rains, cross or images and /or flow from adjoining reaches shall be made good by him. No extra payment shall be made to the contractor for these operations.

#### **2.1 SHORING/STRUTTING/TIMBERING:**

- i. When the depth of foundation trench is great and the soil/earth is soft and generally for depths more than 1.5 m. Stepping, sloping and or panelling and strutting of sides shall be done as directed by the Engineer-in-Charge. The decisions regarding the positions and depths at which and what type of precautions are to be provided shall be decided by the Engineer-in-Charge.
- ii. It shall be the responsibility of the contractor to take all necessary precautions or steps to prevent the sides of trenches from collapse. The contractor shall be responsible to make good any losses or damages caused to execute works, life and property due to his negligence.
- iii. Deep excavation shall be inspected after every rain, storm, or other hazards and if necessary the precautions required shall be augmented.
- iv. Planking and strutting shall be either "Close" or "Open" type depending upon the nature of the soil/earth and depth of excavation etc.
- v. The timbering shall be of sufficient strength to resist earth pressure and ensure safety to the adjoining property and to persons. Where the excavation is subjected to vibrations due to machinery, vehicles, rail traffic, blasting and other sources, additional bracings shall be provided.
- vi. Generally the specifications and sizes and spacing of sheeting, walers and struts used for timbering of different depths shall be as given in the IS: 3764-1965 Safety code for excavation work unless otherwise specified in the tender else where. Shoring shall extend 30 cms, above the vertical sides.
- vii. Withdrawal of timbering shall be done very carefully to prevent collapse of the sides of excavation and any damage to the work executed.

Open timbering shall be provided wherever the Engineer-in-Charge directs, where the trenches are not close to any buildings/property/structures. In open timbering the trench shall be protected by covering 1/3 the surface area by planks.

#### **3.0- SHEET PILING:**

In soils combined with ground water, it may be necessary to use continuous interlocking steel

sheet piling to prevent excessive soil movements due to ground water percolation, such sheet piling shall extend at least 1.50 metre below the bottom of the trench unless the lower part of the trench is in fine material. Excavation and shoring shall be done in stages, if required at the site.

All the works of sheet piling shall be as per code of practices and manual of sewerage and water supply.

### **Important Note**

1. The bottom of Excavation shall be trimmed to the required levels and when carried below such levels, by error, shall be brought to level by filling with lean concrete of grade 1:4:8 or as specified at the contractor's cost and nothing extra shall be paid to the contractor on this account.
2. The contractor shall be responsible for assumptions and conclusions that he may make regarding the nature of materials to be excavated and the difficulty in making and maintaining the required Excavation and performing the work required as shown on the drawing and in accordance with these specifications. Cofferdams, sheeting, shoring, bracking, draining, dewatering, etc. shall be furnished and installed as required and the cost thereof shall be included in the rate quoted for the item of excavation. The contractor shall be held responsible for any damage to any part of the work and property caused by collapse of sides of Excavation. Materials may be salvaged if it can be done with safety for the work and structures, as approved by the Engineer-in-Charge. However, no extra claim shall be entertained for material not salvaged or any other damage to contractor's property as a result of the collapse. He shall not be entitled to any claim for re-doing the excavation as a result of the same.
3. The excavation for foundations shall be carried out carefully, creating least disturbance to the founding stratum. The founding stratum should be blended by the concrete layer immediately after exposure so that it does not loose its strength on exposure to air and water.
4. Where excavation requires bracing, sheeting, or shoring etc, the contractor shall submit to the Engineer-in-Charge, drawings showing arrangement and details of proposed installation, and shall not proceed until he has received approval from the Engineer-in-Charge.
5. The contractor shall have to constantly pump out the water collected in pits due to rainwater, springs etc. and maintain dry working conditions.
6. For the purpose of excavation in earthwork, all types of soil including kankar, murrum, single and boulders without binding matrix are included.
7. All excavated material obtained as a result of over excavation for which payment shall not be made, and that shall also be transported and disposed off as directed and at places shown by the Engineer-in-Charge, at no extra cost to the department within plot boundary.
8. All excavated materials obtained from excavation shall remain in the department's property. The useful portion as decided by the Engineer-in-Charge, shall be separated from the useless ones and deposited in regular stacks at places indicated and as directed by the Engineer-in-Charge.
9. In no case the excavated soil shall be stacked upto a distance of 1.5 m from the edge of excavation or one-half the depth of excavation whichever is more.
10. IS Codes

Some of the important relevant applicable codes for this section are

IS: 1200 (Part-I)-Method of measurement of building and civil engineering works and earthwork

IS: 3764 - Safety -code for excavation work

IS: 4701 - Code of practice for earthwork on canals

## **2. PLAIN CEMENT CONCRETE:**

### **General**

Aggregate shall be of inert materials and shall be clean, dense, hard, sound durable, non-absorbent and capable of developing good bond with mortar. Coarse aggregate shall be of hard broken stone or granite or similar stone free from dust dirt and other foreign matters. The stone ballast shall conform to UP Jal Nigam, UP PWD specifications.

Fine aggregate shall be of coarse sand consisting of hard, sharp and angular grains and shall pass through screen of 4.75 mm IS Sieve. Sand shall be of standard specifications, clean and free from dust, dirt and organic matters. Fine aggregate may also be crushed stone.

Ordinary Portland cement of 43/53 grade as per IS: 8112 shall be used. It shall have the required tensile and compressive stresses and fineness. Water shall be clean and free from alkaline and acid matters and suitable for drinking purposes.

The proportion of concrete shall be 1:3:6 (Cement: Fine Aggregate: Coarse Aggregate) by unless otherwise specified. Minimum compressive strength of concrete of 1:3:6 proportion shall be as per IS: 456 2000 or its latest revision.

Stone aggregate, sand and cement shall be mixed as per UP Jal Nigam, UP PWD specifications. All materials shall be dry. If damp sand is used, compensation shall be made by adding additional sand to the extent required for the bulking of damp sand.

Appropriate quantity of water required for cement may be taken as specified in IS 456-2000 or its latest amendment. For concrete compacted by mechanical vibrations the quantity of water shall be reduced by 20%.

Mixing shall be of machine mixing type. Hand mixing shall not be permitted.

Machinery Mixing: Stone ballast, sand and cement shall be put into the cement concrete mixer to have the required proportion. For concrete of 1:2:4 proportion, first four boxes of stone ballast, then two boxes of sand and then one bag of cement shall be put into the C.C. Mixer, the machine shall then be revolved to mix materials dry and then water shall be added gradually to the required quantity, 25 to 30 litres per bag of cement to have the required water cement ratio. The mixing shall be thorough to have a plastic mix of uniform colour. It requires 1.5 to 2 minutes rotation for thorough mixing. Mixed concrete shall be unloaded on a masonry platform or on a sheet iron. Output of concrete mixer is 15 to 20 mix per hour.

Regular slump test shall be carried out to control the addition of water and to maintain the required consistency.

Formwork centering and shuttering shall be provided as required, as per standard specifications before laying concrete to continue to support or to keep the concrete in position.

Concrete shall be laid gently (not thrown) in layers not exceeding 15 cm and with mechanical vibrating machine until a dense concrete is obtained. (For important work mechanical vibrating shall be used for thick or mass concrete immersion type vibrators and for thin concrete surface vibrators shall be used for compacting concrete). Over vibration will separate coarse aggregate from concrete and shall be avoided. After removal of the formwork in due time the concrete surface shall be free from honey combing, air holes or any other defect.

Concrete shall be laid continuously, if laying is suspended for rest or for the following day the end shall be shuttered and vibrated to achieve dense concrete and made rough after de-shuttering for further jointing. When the work is resumed, the previous portion shall be roughened, cleaned and watered and a grout of neat cement shall be applied and the fresh concrete shall be laid. For successive layer the upper layer shall be laid before the lower has set.

After about 2 hours laying when concrete has begun to harden, it shall be kept damp by covering with wet gunny bags or wet sand for 24 hours, and then cured by flooding with water, making mud walls 7.5 cm high or by covering with wet sand or earth and kept damp continuously for 15 days. If specified, curing may be done by covering concrete with special type of waterproof paper as to prevent water escaping or evaporating.

Plain cement concrete shall be provided for leveling courses, foundations, pipe bedding or at other places wherever indicated in the drawings/directed by the Engineer-in-Charge. Grade and thickness of all PCC works shall be as mentioned in the drawings.

The proportion of the concrete, size of the aggregate shall be as specified in the drawings and technical specifications approved by Engineer-in-Charge.

While placing concrete directly on the soil for foundations etc. all the loose material shall be removed. The surfaces shall be trimmed and well consolidated.

The material specifications, mixing, placing of concrete compaction, curing, removal of the form work shall all be done as specified for reinforced cement concrete in the section of this tender document. The clauses provided therein shall also equally apply for this item of work to the extent relevant.

The rates quoted shall include supply of material, labour, tools and plant, water, mixing platforms, curing, supplying, erecting and dismantling of all form works as required.

### **Testing and Acceptance Criteria of Concrete**

The sampling of concrete making the test specimens, curing and testing procedures etc. shall be in accordance with IS: 1199, IS: 3085 and IS: 516, the size of specimen being 15 cm cubes. Normally only compression tests shall be performed in accordance with IS: 516.

For each grade of concrete and for each 8 hours of work or portion thereof the following samples shall be taken.

At least six specimens shall be taken from the first 15.0 m<sup>3</sup> or part thereof and three of these shall be tested at 7 days and the remaining at 28 days. Four additional specimens shall be taken from each additional 15.0 m of concrete or portion thereof of which 2 specimens shall be tested at 7 days and the remaining at 28 days.

To control the consistency of concrete from every mixing plant slump tests, and/or compacting factor tests in accordance with IS: 1199 shall be carried out by the contractor every two hours or as directed by the Engineer-in-Charge. Slumps corresponding to the test specimens shall be recorded for reference. The acceptance criteria of concrete shall be in accordance with IS: 456-2000 or its latest amendment.

Concrete work found unsuitable for acceptance shall have to be dismantled and replacement is to be done as per specifications by the contractor. No payment for the dismantled concrete, the relevant formwork and reinforcement embedded fixtures etc. shall be paid.



In the course of dismantling if any damage is done to, the embedded items or adjacent structures the same shall be made good free of charge by the contractor to the satisfaction of the Engineer-in-Charge.

### **3. BRICK MASONRY AND PLASTERING**

#### **3.1 BRICK**

##### **MASONRY General**

All bricks shall be of class designation 10 or best locally available approved by Engineer-in-Charge made of good brick earth thoroughly burnt, and shall be of deep cherry red or copper colour. Bricks shall be regular in shape and their edges shall be sharp and shall emit clear ringing sound on being struck and shall be free from cracks, chips, flaws and lumps of any kind. Bricks shall not absorb water more than one sixth of their weight after one hour of soaking by immersing the water. Bricks shall have a minimum crushing strength of 105 kg/cm<sup>2</sup> (10.5 N/mm<sup>2</sup>).

Bricks shall be fully soaked in clean water by submerging in a tank for a period of 12 hours immediately before use. Soaking shall be continued till air bubbling is ceased.

Bricks shall be well bonded and laid in English bond unless otherwise specified. Every course shall be truly horizontal and wall shall be truly in plumb. Vertical joints of consecutive course shall not come directly over one another, vertical joints in alternate course shall come directly over one another. No damaged or broken bricks shall be used. Closers shall be of clean-cut bricks and shall be placed near the ends of walls but not at the other edge. Selected best-shaped bricks shall be used for face work. Mortar joints shall not exceed 6 mm in thickness and joints shall be fully filled with mortar. Bricks shall be laid with frogs upwards except in the top course where frogs shall be placed downward. Brickwork shall be carried out not more than 1.2m height at a time. When one part of the wall has to be delayed, stepping shall be left at an angle of 45°. Corbelling or projections where made shall not be more, than X brick projections in one course. All joints shall be raked and faces of wall cleaned at the end of each day's work.

These specifications deal with all types of brickwork required for buildings, manholes, drains, retaining walls or any construction made out of bricks.

##### **3.1.1 Materials**

###### **3.1.1.1 Bricks**

Bricks used for the construction of brick masonry shall be hard, rectangular in shape and size and well burnt of uniform deep red, cherry or copper colour and shall conform to IS: 1077-1986.

The bricks shall be brought from approved brick kilns. The bricks shall be free from cracks, chippings, flaws, stones or lumps of any kind. The bricks shall not show any signs of efflorescence and shall be homogeneous in texture.

They shall emit a clear metallic ringing sound on being struck and shall have a minimum compressive strength of 10.5 N/mm<sup>2</sup> equivalent to 105 kg/cm<sup>2</sup>.

They shall not absorb more than 20% of its dry weight when soaked in cold water for 24 hours or otherwise specified in the Indian Standard Specification.

###### **3.1.1.2 Mortar**

The proportion of the cement mortar used for the masonry work shall be as specified on the various drawings for different places/types of construction, specifications for each part of the work.

For cement mortar fresh Portland cement of standard specifications shall be used. Sand shall be sharp, clean and free from organic and foreign matters. For rich mortar coarse or medium sand shall be used and for weak mortar local fine sand may be used. Materials of mortar shall be measured to have the required proportion with measuring box and first mixed dry to have a uniform colour in a dean masonry platform and then mixed by adding clean water slowly and gradually to have workable consistency and mixed thoroughly by turning at least three times. Fresh mixed mortar shall be used, old and stale mortar shall not be used and mortar for an hour work only shall be mixed with water so that the mortar may be used before setting starts.

Coarse sand is mixed with the required quantity of cement for the preparation of the mortar. Mortar shall be prepared in accordance with IS: 2250-1981. The sand used for the masonry mortar shall meet the requirements as specified in IS: 2116-1980. For masonry mortars, sand and cement of required proportions are mixed in small quantities in a dry state first and then water is added to make the mortar of required consistency suitable for the type of work for which it is required as directed by the Engineer- in-Charge. No left over mortar shall be used and therefore only that much quantity of mortar that can be consumed within 30 minutes shall be mixed in batches.

### 3.1.1.3 Sand for Brick Masonry

Table 3.1 : Grading of sand for use in Masonry Mortar

IS Sieve Designation	Percentage passing by mass
4.75 mm	100
2.36 mm	90 to 100
1.18 mm	70 to 100
600 micron	40 to 100
300 micron	5 to 70
150 micron	0 to 15

### 3.1.2 Construction

The brick masonry shall be constructed as per the Indian Standard Code of Practice for Brick Work IS: 2212-1962. The thickness of the joints shall not be thicker than those specified in para 5.4 of the above Code of Practice.

The bricks shall be thoroughly soaked in water before using them on the work for at least twelve hours and all the air bubbles shall come out during soaking process. The soaked bricks shall be stacked on wooden planks/platforms so as to avoid sticking of the earth and other materials on to the surfaces of bricks. Bricks required for construction in mud mortar or lime mortar shall not be soaked. Brickwork shall be laid in English Bond unless otherwise specified. Half bricks shall not be used except when needed to complete the bond. Each course shall be perfectly straight and horizontal. The masonry shall be true to plumb in case of vertical walls and in case of battered construction the batter or slope shall be truly maintained. The level of the courses completed shall be checked at every one meter interval or less as required.

The bricks shall be laid frogs upwards. While laying the bricks they shall be thoroughly bedded and flushed in mortar and well tapped into position with wooden mallets and superfluous mortar shall be removed.

No part of the structure shall be raised more than one meter above than the rest of the work. In case it is unavaoided the brickwork shall be raked back at an angle of not more than 45 degrees so as to maintain a uniform and effectual bond, but raking shall not start within 60 cms from a corner.

In case of construction of buttresses, counterforts, returns they are built course by course carefully bound into the main walls.

At all junctions of walls the bricks at alternate courses, shall be carried into each of the respective walls so as to thoroughly unite both the walls together. The brickwork shall not be raised more than 14 courses per day.

All the beds and joints shall be normal to the pressures applied upon them Le horizontal in vertical walls, radial In arches and at right angles to the face in battered retaining walls.

Vertical joints in alternate courses shall come directly one over the other and shall be truly vertical. Care shall be taken to ensure that all the joints are fully fitted up with mortar, well flushed up where no pointing is proposed, nearly struck as the work proceeds. The joints in faces which are plastered or painted shall be squarely raked out to a depth not less than 12 mm while the mortar is still green. The raked joints shall be well brushed to remove the loose particles and the surfaces shall be cleaned with a wire brush so as to remove any splashes of mortar sticking to the surfaces during the construction.

All iron fixtures, pipes, bolts, conduits, sleeves, holdfasts etc. which are required to built into the walls shall be embedded in cement mortar or cement concrete as shown in the drawings/indicated in the specifications/directed during the execution by the Engineerin-Charge as the work proceeds and no holes be left for fixing them at a later date unless authorised by the Engineer-in-Charge.

#### **3.1.2.1 Curing**

Green work shall be protected from rain by covering the work suitably. Masonry work as it progresses shall be thoroughly kept wet by watering on all the faces for atleast 10 (Ten) days after completion of the parts of the work. Proper watering cans, flexible pipes, nozzles shall be used for the purpose in case of fat lime mortar curing shall start two days after construction of masonry and shall continue for seven days. No additional payment is admissible for curing and the rates quoted are deemed to be inclusive of the cost of curing.

#### **3.1.2.2 Scaffolding**

Double scaffolding sufficiently strong so as to withstand all loads that are likely to come upon it and having two sets of vertical supports shall be provided. Where two sets of vertical supports are not possible the inner end of the horizontal supporting pole shall rest in a hole provided in a header course only. Only one header for each pole shall be left out. Such holes however shall not be permitted in pillars less one meter in width or immediately near the skew backs of arches. Such holes shall be filled up immediately after removal of the scaffoldings. Safety Code for Scaffolds and Ladders, IS: 3696-1987 (Parts I and II) shall be followed.

### **3.2 Plastering**

Cement mortar used for plastering shall be of the mix proportions and thickness as specified on the drawings or bill of quantities or particular specifications for the various different parts of the works. The materials used i.e. cement, sand and water shall be of the same quality and of the same specifications as indicated for plain and reinforced cement concrete works according to the specifications and approved by the Engineer-in-Charge. Sand further shall meet the specifications as

laid down in IS: 1542-1977 Specification for sand for plaster.

The sand for preparation of mortar for plastering shall confirm to the following gradation, shown in Table 3.2

TABLE 3.2: GRADING OF FINE AGGREGATES

Percentage by weight passing IS Sieve		
IS Sieve Designation	Class -A	Class-B
4.75 mm	100	100
2.36 mm	90 to 100	90 to 100
1.18 mm	70 to 100	70 to 100
600 Microns	40 to 85	40 to 95
300 Microns	50 to 50	10 to 65
150 Microns	0 to 10	0 to 15

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

The procurement of sand for Mortar for plastering and pointing shall confirm to be specifications given in Table 3.2.

Surface that are to be applied with plaster shall be thoroughly cleaned to remove dust, dirt, loose particle, oil, soil, salts etc, that may be sticking to the surfaces. The surfaces shall be washed, clean and watered properly for 4 hours before applying plaster. Plaster shall not, in any case, be thinner than specified. It shall have uniform specified thickness. When smooth finishing is required the cement plastering shall be floated over with neat cement within 15 minutes after application of the last coat of plastering. The plaster shall be protected from the sun and rain by such means as the Engineer-in-Charge may approve.

The plastered surface shall be cured for 10 (ten) days. Construction joints in plastering shall be kept at places approved by the Engineer-in-charge. When the thickness of the plaster specified is to be made up in more than one layer the second layer shall be applied only when the lower coat is still green. Wherever specified approved brands of additives like water proofing compounds shall be added in specified quantities as recommended by the manufacturer of the compound or as directed by the Engineer-in-Charge.

Wherever scaffolds are necessary for plastering they shall be provided as specified for scaffolds under clause 3.2.2. Stage scaffolding shall be provided for ceiling plaster.

To ensure even thickness and true surface, patches of plaster about 15 cm x 15 cm shall be first applied both horizontally and vertically 2.0 m apart. Plastering shall be done from top of bottom and care shall be taken to avoid joints on continuous surface.

In case any other finish like rough cast finish or dry dash finish is specified in the drawings the small shall be provided as directed by the Engineer-in-Charge.

Surface which is to be plastered shall be roughened while they are still green or raked so as to give proper bond between the surface and plaster.

All corners junctions shall be truly vertical or horizontal as the case may be and carefully finished. Rounding or chamfering of corners shall be carried out with proper templates to the required size and

shapes.

The work shall be tested frequently with a straight edge and plumb bob. At the end of the day the plaster shall be left cut clean to line. When the next days plastering is started the day the plaster shall be left cut clean to line. When the next days plastering is started the edge of the old work shall be scrapped, cleaned and wetted with cement slurry. At the end of the day the plastering shall be closed on the body of the wall and not nearer than 15 cm to any corner.

Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for at least 10 days. Any defective plaster shall be cut in rectangular shape and replaced.

## **4. REINFORCED CEMENT CONCRETE AND ALLIED WORKS:**

### **GENERAL**

In general RCC work is to be executed as per IS : 456-2000 or its latest revision. The water storage tanks/reservoirs shall be followed by IS : 3370 Part I to IV & latest revision. Steel reinforcement bars shall be of High Yield Strength Deformed (HYSD) steel bars as per IS: 1786 and shall be free from corrosion, loose rust scales, oil, grease, paint, etc. Wire mesh or fabric shall be in accordance with IS: 1566. The steel bar shall be capable of being bent without fracture. Bars shall be bent accurately and placed in position as per design and drawing and bound together tight with 20 SWG annealed steel wire @ 10 kg/ton of reinforcement at their point of intersection.

Formwork and shuttering shall be made with steel plate close and tight to prevent leakage of mortar, with necessary props, bracings and wedges, sufficiently strong and stable and should not yield on laying concrete and made in such a way that they can be slackened and removed gradually without disturbing the concrete. For slab and beam small chamber should be given in centering, 1 cm per 2.5 m with a maximum of 4 cm. Centering should not be removed before 14 days in general (4 days for RCC columns, 10 days for roof slab, and 14 days for beams).

The grade of concrete to be used shall be as mentioned in specifications/shown on drawings.

Table - 4.1 Minimum compressive strength of 15 cm cubes at 7 and 28 days after mixing, conducted in accordance with IS: 516

Class	Preliminary Test N/mm <sup>2</sup>		Work Test N/mm <sup>2</sup>		Maximum size of Aggregate mm	Locations for Use
	At 7 days	At 28 days	At 7 days	At 28 days		
M40	33.50	50.00	27.00	40.00	20	As indicated in the specifications or as required
M35	30.00	44.00	23.50	35.00	20	-do-
M30	25.00	38.00	20.00	30.00	20	--do-
M25	22.00	32.00	17.00	25.00	20	--do-
M20	17.50	26.00	13.50	20.00	20	--do-
M15	13.50	20.00	10.00	15.00	20	--do-

The coarse aggregate shall usually be 20 mm to 6mm gauge unless otherwise specified. For heavily reinforced concrete members as in the case of ribs of main beams the maximum size of aggregate should usually be restricted to 5 mm less than the minimum clear distance between the main bars or 5 mm less than the minimum cover to the reinforcement whichever is smaller.

Mixing is done in the same manner as in PCC.

Before laying the concrete, the shuttering shall be clean, free from dust, dirt and other foreign matters. The concrete shall be deposited (not dropped) in its final position. In case of columns and wall, it is desirable to place concrete in full height if practical so as to avoid construction joints but the progress of concreting in the vertical direction shall be restricted to 1.2 metre. Care should be taken that the time between mixing and placing of concrete shall not exceed 20 minutes so that the initial setting process is not interfered with. During the winters concreting shall not be done if the temperature falls below 4°C.

Concrete shall be compacted by mechanical vibrating machine until a dense concrete is obtained. The vibration shall continue during the entire period of placing concrete. Compaction shall be completed before the initial setting starts i.e. within 30 minutes of addition of water to the dry mixture. Over-vibration which will separate coarse aggregate from concrete shall be avoided. After removal of the form work in due time, the concrete surface shall be free from honey combing, air holes or any other defect.

Concrete shall be laid continuously, if laying is suspended for rest or for the following day the end shall be shuttered and vibrated to achieve dense concrete and made rough after deshuttering for further jointing. When the work is resumed, the previous portion shall be roughened, cleaned and watered and a grout of neat cement shall be applied and the fresh concrete shall be laid. For successive layer the upper layer shall be laid before the lower has set.

Pre-cast concrete shall be provided with lifting device.

#### **4.1.1 Standards**

Following Indian Standards as revised most recently along with amendments will be followed for the works included in the contract.

IS:8112	Ordinary, Portland cement
IS:383	Coarse and fine aggregates from natural sources for concrete
IS:445	Portland slag cement
IS:456-1978	Code of practice for plain and reinforced concrete
IS:516	Method of test for strength of concrete
	Methods of sampling and analysis of concrete
IS:2386	Methods of test for aggregates for concrete (Part I to VI)
IS:3414	Code of practice design and installation of expansion and contraction joints in building.
IS: 3713 Part- I to IV	Code of practice for water storage Tanks

Standards on special subjects have been mentioned elsewhere in this para and also shall be followed.

## **4.2 Forms, false work or centering**

### **4.2.1 Definitions**

“Forms, formwork or shuttering” shall include all temporary moulds for forming the concrete to the required shape, together with any special lining that may be required to produce the concrete finish specified.

“False work or centering” shall consist of furnishing, placing and removal of all temporary construction such as forming, props and struts required for the support of forms.

### **4.2.2 Materials**

Steel shuttering shall be provided as directed by the Engineer-in-Charge.

### **4.2.3 Forms**

All forms shall be of mild steel approved by the Engineer-in-Charge and shall be fabricated and prepared



water tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other incidental loads incident to the construction operations.

All form shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods which shall be specified hereinafter. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer-in-Charge shall order to stop the work until the defects have been corrected.

All formwork shall be approved by the engineer-in-charge before concrete is placed within it. The contractor shall be required to submit copies of his calculations of the strength and stability of the formwork or false work but not withstanding the Engineer-in-Charge's approval of these calculations, nothing shall relieve the contractor of his responsibility for the safety or adequacy of the formwork.

Formwork shall be true to line and braced and strutted to prevent deformation under the weight and pressure of the unset concrete, constructional load, wind and other forces. The deflection shall not exceed 3 mm. Beam bottom shall be erected with an upward chamber of 2 mm per meter of the span. The form work for a column may be erected.

One side shall be left open and shall be built up in sections as placing of the concrete proceeds. Before placing the concrete, bolts and fixtures shall be in position, and cores and other devices, used for forming openings, holes, chases, recesses and other cavities shall be filled to the formwork. No holes shall be cut in any concrete unless approved. Approved mould oil or other material shall be applied to faces of formwork in contact with unset concrete to prevent adherence of the non-staying concrete. Such coating shall be insoluble in water, non-staying and non detrimental to the concrete and shall not be flaky or removed by wash water.

#### 4.2.4 Tolerance in finished concrete

(As per IS code 456-2000, 0.1)

The form work shall be so made as to produce a finished concrete true to shape, lines, level, plumb and dimensions as shown in the drawing subject to the following tolerances, unless otherwise specified in drawings or directed by the Engineer-in-Charge.

For

Deviation from specified

Dimensions of cross-section of columns

And beams = -6mm  
+12mm

b. Deviations of dimension of footings

(See Note)

Dimensions in plane = -12mm  
+50mm

Eccentricity = 0.02 times the width of footing in the direction

of deviation but not more than 50 mm

Thickness = +/- 0.05 times the specified thickness

Note: Tolerances applied to concrete dimensions only, not to positioning of vertical reinforcing steel or dowels.

#### **4.2.5 False work and Centering**

Detailed plans for false work or centering shall be supplied by the contractor if specifically asked for by the Engineer-in-Charge at least 14 days in advance of the time the contractor begins construction of the false work. Notwithstanding the approval by the Engineer-in-Charge of any designs for false work submitted by the contractor, the contractor shall be solely responsible for the strength, safety and adequacy of the false work or centering.

All false work shall be designed and constructed to provide the necessary rigidity and to support the loads from the weight of green concrete and shuttering and incidental construction loads.

False work or catering shall be founded upon a solid footing safe against undermining and protected from softening.

False work which cannot be founded on satisfactory footing shall be supported on piling which shall be spaced, driven and removed in a manner approved by the Engineer-in-Charge. The Engineer-in-Charge may require the contractor to employ screw jacks or hardwood wedges to make up any settlement in the formwork either before or during the placing of concrete. Props of the upper storey shall be placed directly over those in the storey immediately below.

False work shall be set to give the finished structure the required grade and camber specified on the plans.

#### **4.2.6 Formwork and Construction Joints**

Where permanent or temporary joints are to be made in horizontal or inclined members, stout stopping off boards shall be securely fixed across the mould to form a watertight joint. The form of the permanent construction joint shall be as shown on the drawings. Temporary construction joints shall have blocks of timber at least 75 mm thick, slightly tapered to facilitate withdrawal and securely fixed to the face of the stopping off board. The area of the key or keys so formed shall be atleast 30% the area of the member. The blocks shall be kept back atleast 50 mm from the exposed face of the concrete.

Where reinforcement passes through the face of a construction joint the stopping off board shall be drilled so that the bars can pass through, or the board shall be made in sections which a half round indentation in the joint faces for each bar so that when laced, the board is a neat and accurate fit and no grout leaks from the concrete through the bar holes or joints.

#### **4.2.7 Removal of Forms and False work**

In the determination of the time for the removal of forms, falsework and housing, consideration shall be given to the location and character of the structure, the weather and other conditions influencing the settings of the concrete and the materials used in the mix.

MS shuttering/formwork and scaffolding should be of standard reputed make to ensure better quality of concrete finish.

Forms shall be removed in such a manner as not to injure the concrete and no formwork shall be removed before the concrete has sufficiently set and hardened. The minimum periods which shall elapse between the placing and compacting of normal Portland cement concrete for the various parts of the structures are given in the following table, but compliance with these requirements shall not relieve the contractor of the obligation to delay the removal of the forms if the concrete has not set sufficiently hard.

Forms shall not be struck until the concrete has reached strength at least twice the stress to which the concrete may be subject at the time of removal of formwork. In normal circumstance, generally where the temperatures are above 20°C and where ordinary Portland cement is used, form may generally be removed after the expiry of the following periods, according to the Clause 10.3, IS:456-2000.

**Table 4.2 : Removal of the Forms**

a.	Walls columns and vertical faces of all structural members	12 to 48 hours as may be decided by the engineer-in-charge
b.	Slabs (Props left under)	3 days
c.	Beam soffit (props left under)	7 days
d.	Removal of props under slabs 1. Spanning upto 4.5m 2. Spanning above 4.5 m	7 days 14 days
e.	Removal of props under beams and arches 1. Spanning upto 4.5m 2. Spanning above 4.5 m	14 days 21 days

Where sulphate resistant cement is used, manufacturers instructions are to be followed.

The Engineer-in-Charge may modify these requirements taking into account the type of cement and method of compaction used, and contractor shall obtain the Engineer-in-Charge's written approval for any decrease in time of stripping of the formwork given above. The contractor shall notify the Engineer-in-Charge when he proposes to stripe of any formwork and no formwork shall be struck except in the presence of the Engineer-in-Charge or his representative.

#### **4.2.8 Reuse of Forms**

Only mild steel formwork of best quality as per approved vendor list given by Engineer-in-Charge shall be used for concreting purpose. These shuttering shall not be reused unless it is properly scraped cleaned and repaired, so that it gives a plane, even, fair and dense concrete surface.

#### **4.2.9 Cleaning and treatment of Forms**

All forms shall be thoroughly cleaned of old concrete, wood shavings, sawdust, dirt and dust sticking to them before these is fixed in position. All rubbish, loose concrete, chippings, shavings, saw dust etc. should be scrupulously removed from the interior of the forms before concrete is poured. Wire brushes, brooms, compressed air jet and/or water jet etc. shall be kept handy for cleaning, if directed by the Engineer-In-Charge.

Before formwork is placed in position, the form surface that will be in contact with concrete shall be treated with approved non-staining oil or composition, which is insoluble in water and not injurious to concrete. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or stain the concrete surface. Burnt oil shall not be allowed to be used especially where the concrete surface will require finishing and/or plaster.

### **4.3 Materials for Concrete**

#### **4.3.1 Water**

Water used for cement concrete mortar, plaster, grout, curing or washing of sand shall be clear and free from injurious amount of Oil, Acid, Alkali, Organic matter or other harmful substances in such amounts that may impair the strength or durability of the structure.

Potable water shall generally be considered satisfactory for mixing and curing concrete. In case of doubt regarding development of strength, the suitability of water for making concrete shall be ascertained by compressive strength and initial setting time specified in the IS: 456 Code of Practice for Plain and Reinforced concrete. The Engineer-in-Charge may require the contractor to get the water tested from an approved laboratory at his own expense and in case the water contains any salts for an excess of acid, alkali, any injurious substances etc., the Engineer-in-Charge may refuse its use. And the contractor shall be required to arrange suitable water at his own cost.

#### **4.3.2 Aggregate**

##### **General**

Coarse and Fine Aggregates for concrete shall conform in all respect to PWD Specification / IS:383 Specification for Coarse and Fine Aggregates from Natural Sources for Concrete. Aggregates shall be obtained from a source known to produce satisfactory material for concrete. Aggregates shall consist of naturally occurring sand and gravel or stone, crushed or uncrushed or a combination thereof. They shall be chemically inert, hard strong, dense, durable, clean and free from veins and adherent coatings and of limited porosity. Flaky and elongated pieces shall not be used. Whenever required by the Engineer-in-Charge the aggregates shall be washed by the Contractor before use in the work.

The source of aggregates shall be approved by the Engineer-in-Charge and shall not be changed during the course of the job without his approval. Rejected aggregates shall be promptly removed from the work site by the contractor at his own expense.

##### **4.3.2.1 Deleterious Materials**

Aggregates shall not contain any harmful material, such as iron pyrites, coal, mica, shale or similar laminated materials, clay, alkali, soft fragments, sea shells, organic impurities etc, in such quantities as to affect the strength or durability of the concrete and in addition to the above, for reinforced concrete, any material which might cause corrosion of the reinforcement. Aggregates which are chemically reactive with the alkalis of cement shall not be used.

The maximum quantities of deleterious materials in the aggregate, shall be in accordance with IS: 2386 (Part II). Methods of Test for Aggregates for Concrete, shall not exceed the limit given in Table I of IS: 383.

The sum of the percentages of all deleterious materials shall not exceed five. Deleterious materials also include material passing 75 micron IS sieve.

##### **4.3.2.2 Coarse Aggregates**

Coarse aggregate is aggregate most of which is retained on 4.75 mm IS: sieve. Coarse aggregate for concrete shall conform to IS: 383.

These may be obtained from crushed or uncrushed gravel or stone and shall be clean and free from elongated, Flaky or laminated pieces, adhering coatings, clay lumps, coal residue, clinkers, slag, alkali,

mica, organic matter or other deleterious matter. Coarse aggregate shall be either in single size or graded, in both cases the grading shall be within the following limits.

Table 4.3: Grading of Coarse Aggregates

IS Sieve size (mm)	Percentage Passing For Single Sized Aggregate of Normal Size					Percentage Passing for Graded Aggregate of Normal Size			
	40mm	20mm	16mm	12.5mm	10mm	40mm	20mm	16mm	12.5mm
63	100	-	-	-	-	100	-	-	-
40	85-100	100	-	-	-	95-100	100	-	-
20	0-20	85-100	100	-	-	30-70	95-100	100	-
16	-	-	85-100	100	-	-	-	90-100	-
12.5	-	-	-	85-100	100	-	-	-	90-100
10	0-5	0-20	0-30	0-45	85-100	10-35	25-35	30-70	40-85
4.75	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2-36	-	-	-	-	0-5	-	-	-	-

The Engineer-in-Charge may allow graded aggregates to be used provided they satisfy the requirements and Table IV of IS: 383.

### **GSB for CC Road –**

**GSB stone ballast size range - 53 mm to 5.00 mm = 50 %**

**- 9.5 mm to 2.36 mm = 20 %**

**- 2.36 mm and bellow = 30 %**

#### **4.3.2.3 Fine Aggregates**

Fine aggregates is aggregate most of which passes 4.75 mm IS sieve but not more than 10% passes through 150 micron IS Sieve. These shall comply with the requirements of grading zones I, II and III as given in Table III of IS:383. Fine aggregate conforming to grading zone IV shall not be normally used in reinforced concrete unless tests have been made by the contractor to ascertain the suitability of the proposed mix proportions and approved by the Engineer-in-Charge.

As per IS: 383 Table is given below:

Table 4.4: Grading of Aggregates

IS: Sieve Designation	Grading Zone-I	Grading Zone-II	Grading Zone-	Grading Zone-
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	5-90	75-100	90-100
600 microns	15-34	35-59	60-79	80-100
300 microns	5-20	8-30	12-40	15-50
150 microns	0-10	0-10	0-10	0-15

Note: To use the sand falling in Zone -IV, IS: 383 shall be followed.

Fine aggregates shall consist of natural sand resulting from natural disintegration of rock and which has been deposited by streams or glacial agencies, or crushed stone sand or crushed gravel sand.

#### **4.3.2.4 Sampling and Testing**

Sampling and testing shall be carried out by the contractor, at the contractor's expense, in accordance with:

IS: 516 METHOD OF TEST FOR STRENGTH OF CONCRETE

IS: 2386 Methods of Test for Aggregates for concrete

#### **4.3.2.5 Storage of Aggregates**

The contractor shall at all times maintain at the site of work such quantities of aggregates as are considered by the Engineer-in-Charge to be sufficient to ensure continuity of work.

Each type and grade of aggregate shall be stored separately on hard firm ground having sufficient slope to provide adequate drainage to rain water.

Any aggregate delivered to site in a wet condition or becoming wet at site due to rain shall be kept in storage for at least 24 hours to obtain adequate drainage, before it is used for concreting, or the water content of mix must be suitably adjusted as directed by Engineer-in-Charge.

#### **4.3.3 Cement**

##### **4.3.3.1 General**

The cement used shall be ordinary Portland cement conforming to IS: 8112 or as specified in the particular specifications/drawings or as directed by the Engineer-in-charge. Supply of cement shall be taken either in silos or in 50 kg bags bearing manufacturer's name and BIS marking. Ordinary Portland cement, as required in the work, only, from reputed manufacturers such as L&T, ACC, Gujarat Ambuja, Cement Corporation of India, Vikram, J.P. etc. and as approved by the Employer, Ministry of Industry, Government of India and holding license to use BIS certification mark for their product, whose name shall be got approved from Engineer In-charge.

##### **4.3.3.2 Storage on the site**

The cement shall be stored in a suitable weatherproof building and in such a manner as to permit easy access for proper inspection and counting. The cement shall be stored in such a manner as to prevent deterioration. Cement of different types and brands shall be kept in separate stacks and marked accordingly. Cement older than two months shall not be used on site.

All cement stored on the site shall be arranged in batches, and used in the same order as received from the manufacturer. A cement register shall be maintained at site in which all entries shall be completed day to day, showing the quantities received date of receipt, source of receipt, type of cement etc, and also the daily cement consumption on site. This register shall be accessible to the Engineer-in-charge for his certification. The godown / room in which cement shall be kept, shall be locked double; one of UPJN and another of contractor.

##### **4.3.3.3 Rejection of Cement**

The Engineer-in-charge may reject any cement as a result of any tests (cost of such tests would be borne by the contractor), thereof, notwithstanding the manufacturer's certificate. He may also reject cement, which has deteriorated owing to inadequate protection during storage from moisture or due to intrusion of foreign matter or other causes. Any such cement which is considered defective by the Engineer-in-Charge shall not be used, and shall be promptly removed from the site of the work by the contractor at

his own expense.

#### **4.3.4 Other Materials**

AI materials including admixtures, joint filters and joint sealants not fully specified herein and which may be used in the work shall be of quality approved by the Engineer-in-Charge and he shall have the right to determine whether all or any of the materials offered or delivered for use in the works are suitable for the purpose. Contractor shall give the samples of materials to the Engineer-in-Charge and shall get them approved before procurement and use.

#### **4.3.5 Reinforcement**

All reinforcement shall be clean and free from pitting, loose mill scales, dust and coats of paints. oil or other coating which may destroy or reduce the bond.

##### **4.3.5.1 Welded Joints**

Welding of joints in reinforcement for bars of 28 mm dia and below shall not be allowed. However, in case of using welded joints for bars 32 mm and above the approval of the Engineer-in-Charge shall be obtained. The Engineer-in-Charge may require the Contractor, prior to the use of welded joints to have tests carried out at the contractor's expense to prove that the joints are of the full strength of the bars connected. The welding of the reinforcement shall be done in accordance with the recommendation of IS: 2751 code of practice for welding of mild steel bars for reinforced concrete construction. Special precautions are required in the welding of cold worked reinforcing bars. No extra payment for welded joints shall be made to the contractor unless specifically mentioned in the schedule of rates or bill of quantities and approved by the Engineer-in-Charge. Tack welding may be permitted by the Engineer-in-Charge under certain conditions for fixing reinforcements.

##### **4.3.5.2 Reinforcement Splices**

Laps & anchorage length of reinforcing bars shall be in accordance with IS: 456, unless otherwise specified. If the bars in a lap are not of the same diameter, the smaller dia will guide the lap lengths. Laps shall be staggered as far as practicable and as directed by Engineer-in-Charge and not more than 50% of the bars shall be lapped at a particular section. Mechanical connections, for splicing reinforcement bars in congested locations may be used by the contractor, only if approved by the Engineer-in-Charge. Reinforcement bars shall not be lapped unless the length required exceeds the maximum available lengths of the bars at site.

Unless otherwise specified the splices shall be wired contact lap splices as per the relevant standards. No splicing of vertical bars shall be allowed except at specified or approved horizontal construction joints. Splices in horizontal bars shall be lapped with at least one continuous bar between adjacent splices. The minimum spacing of splices in anyone run of bar shall be 6.0 m with splices in adjacent bars offset at least 3.0 m where walls or slab contain two layers of reinforcement, splices in opposite layer shall be offset by at least 1.50m.

##### **4.3.5.3 Supports and Accessories :**

Support blocks shall be made of concrete with embedded wire ties for placement. Plastic coated spacers shall be used on sides of walls columns and beams, if the material is approved by the Engineer in charge.

##### **4.3.5.4 Fabrication and placement**

Bars shall be pre fabricated accurately to dimensions, forms and shapes, Bending procedure shall be

approved by the Engineer-In-Charge. Placing and typing of reinforcement shall conform to IS: 2502-1963 Code of practice for bending and fixing of bars for concrete reinforcement. Bar bending schedules for the reinforced concrete works shown on the drawings shall be prepared by the contractors and furnished to the Engineer-in-Charge at least two weeks before the commencement of bending. Dimensions shown as furnished by the contractor shall be his responsibility and approval of the schedule shall not constitute the approval of the dimensions thereon.

#### **4.3.5.5 ANTICORROSIVE TREATMENT TO STEEL REINFORCEMENT:**

These specifications cover the general guidelines for applying anticorrosive treatment to steel reinforcement. However details of chemical process being out of the scope of these specifications are not given.

All the M.S./H.Y.S.D. bars to be used for the work as primary or secondary reinforcement, spacers, chairs, hangers etc. shall be provided with anticorrosive treatment as per the processes covered by the following patent numbers.

- a) Indian Patent No. 465- dipping reinforcement in derusting solution.
- b) Indian Patent No. 109879-Applying phosphating jelly.
- c) Indian Patent No. 109784/67- Applying inhibitor solution.
- d) Indian Patent No. 1124067- Applying sealing solution.

The treatment shall be carried out as per the processes developed by Central Electrochemical Research Institute, Karaikudi (Tamil Nadu), to be done by the contractor either through an agency holding licence from NRDC of India or in association with the CECRI, of the contractor may himself obtain a licence from the NRDC of India, 20, Zamroodpur Community Centre, Kailash colony Extension, New Delhi-11004 for the technical knowhow and process in which case entire cost of procuring licence for giving the treatment shall be borne by the contractor.

#### **a) PROCEDURE:**

The sequence of operations to be followed is described below which shall be strictly followed:

Bars to be used shall be cut and bent to the dimensions indicated on detailed drawings and bars bending schedule.

These bars shall be cleaned of rust and dirt with a wire brush. All scale, rust, grease, oil shall be removed from the surface to be treated.

These bars shall then be placed in derusting solution for pickling for a period of 30 minutes or for such sufficient time so that all rust is removed from the bars and natural colour of steel appears.

This shall be followed by cleaning the bars with wet waste cloth carrying alkaline powder.

Alternatively bars may be rinsed in a tank filled with alkaline solution.

Bars shall be rinsed well with water after removing from alkaline tank.

The rinsed bars shall be applied with phosphating jelly such a manner that all the surface of bars is coated with a thin film of jelly. This shall be done with the help of a nylon fibre brush.

After application of jelly the bars shall be air dried for 45-60 minutes at a place specially prepared for



this purpose.

After drying, the bars shall be rinsed well with water or cleaned with wet waste cloth.

This shall be followed by application of first coat of cement slurry with inhibitor. The bars shall be dried for 24 hours after this at a place specially reserved for this purpose..

After drying, sealing solution with required chemicals shall be applied and the bars shall be dried for 24 hours.

After drying, again sealing solution shall be applied and bars shall be allowed to dry for 4 hours. After, drying final coat of sealing solution shall be applied and the bars after drying shall be stacked properly.

It shall be strictly observed during the entire process, that as soon as the acid (derusting) and alkali solutions lose their strength, they shall be drained off to the nearby sump and tanks shall be cleared thoroughly and filled again with fresh solutions.

#### **b)- HANDLING:**

While handling the bars the following instructions shall be strictly observed:

Only that steel, which is required immediately shall be treated as per recommendations of manufacturer.

Treated bars shall be consumed within 30 days or as per recommendations of the manufacturer. If time limit is exceeded, the contractor shall have to treat the bars again at no extra cost.

Extreme care shall be taken while stacking, storing transporting and placing to see that the protective covering does not get damaged.

Bars shall be placed gently in position and not dropped from a height.

Once the treatment is started, no bar shall be allowed to come in contact with ground.

Special chairs shall be prepared for drying and stacking, so as to avoid any contact with ground.

#### **4.3.5.6 Field Control**

The contractor shall appoint a qualified Engineer experienced in reinforcement cutting, bending and placing the same correctly, binding and cleaning before pouring the concrete. The reinforcement shall be continuously kept in correct position during connections.

#### **4.3.5.7 Steel Reinforcement**

The reinforcement shall be High Yield Strength Deformed (HYSD) bars. Grade Fe-415 conforming to IS: 1786-1985 shall be used unless otherwise specified.

Placement of reinforcement should be as per IS: 456 Clause 11.3.  
Approved Manufacturers: TISCO, SAIL, Rashtriya Ispat Nigam

#### **4.3.5.8 Structural Steel**

Structural steel shall conform to IS: 226 and IS: 2062.

Electrodes for welding shall conform to IS: 814 or IS: 815 or equivalent.

All bolts and nuts shall conform to IS: 1367. Stainless steel nuts and bolts shall be of SS 307 type. All materials shall be of new and unused stocks. Manufacturer's test certificate shall be made available to

the Engineer-in-charge when called for.

#### 4.3.5.9 Storage

The steel reinforcement and structural steel shall be stored in steel yard in such a way as to prevent deterioration and corrosion, preferably at least 150 mm above ground by supporting on wooden or concrete sleepers at contractor's expenses.

#### 4.4 Proportioning of Concrete

The determination of the water-cement ratio and proportions of the aggregates to obtain the required strength shall be made from preliminary tests by designing the concrete mix as per provisions laid down in IS: 456-2000 & IS: 10262 or its latest revision. Design mix shall be admissible only if contractor is able to manage the quality control of design mix e.g. weighbridge, proper water measuring device etc. and designing the concrete mix as and when source of any of the constituent of concrete is changed. If contractor fails to comply with the requirements of design mix concrete, he shall have to follow the nominal mix as tabulated below.

Table- 4.5 Recommended Water-Cement Ratio (As per IS: 456-2000)

Grade of Concrete	Nominal Mix of Concrete	Quantity of Water per 50 Kg. of cement (Max)
M 5	1:5:10	60 litres
M 7.5	1:4:8	45 litres
M 10	1:3:6	34 litres
M 15	1:2:4	32 litres
M 20	1:1.5:3	30 litres
M-25	1:1:2	26 litres

Cube tests shall be carried out by the contractor on the trial mixes before the actual concreting operation starts. Based on the strength of the concrete mix sanction for its use has to be obtained from Engineer-in-charge.

If during the execution of the works it is found necessary to revise the mix because of the cube tests lower strengths than the required one due to inconsistency of quality of material or otherwise, the Engineer-in-charge shall ask for fresh trial mixes to be made by the contractor. No extra claim shall be entertained due to such change in mix variations, as it is the contractor's responsibility to produce the concrete of the required grade.

Great care shall be exercised when mixing the actual works concrete using the proportions of the selected trial mix. The final concrete mix shall have the same proportions of cement, fine and coarse aggregates and water as that of the approved selected mix.

Where the weight of cement is determined by accepting the manufacturer's weight per bag, a reasonable number of bags should be weighed separately to check the next weight. Proper control of mixing water is deemed to be of paramount importance. If mixers with automatic addition of water are used water should be either measured by volume in calibrated buckets, tins or weighed. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked and certified and the Engineer-in-Charge's approval obtained.

The Engineer-in-Charge may require the contractor to carry out moisture content tests in both fine and coarse aggregates. The amount of the added water shall then be adjusted to compensate for any observed variations in the moisture contents. For the determination of moisture content IS: 2386 shall be referred

to.

No substitution in material, used on the work or alternation in the established proportions shall be made without additional tests to show that the quality and strength of concrete are satisfactory. No alternations shall be permitted .without the prior sanction of the Engineer-in-Charge.

#### 4.5 Mixing of Concrete

The mixing of concrete shall be strictly carried out in an approved type of mechanical concrete mixer. The mixing equipment shall be capable of combining the aggregates, cement and water within the specified time into a thoroughly mixed and uniform mass, and of discharging the mixture without segregation. The entire batch shall be discharged before recharging. Mixing periods shall be measured from the time when all of the solid materials are in the mixing time has elapsed. The mixing time in no case shall be less than two minutes. The mixer speed shall not be less than 14 and not more than 20 revolutions per minute.

Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. Hand mixing of concrete shall not be permitted at all.

#### 4.6 Grades of Concrete

The different grades of concrete shall conform to the strength as required by IS:456-2000. Standard deviation shall be calculated as stated in clause 14.5 of IS:456-2000. The acceptable criteria for concrete shall be as stated in clause 15 of IS: 456-2000.

The assumed standard deviations as given in table 6 of 18:456-2000 have to be followed. and are given hereunder :

**Table 4.6 : Assumed Standard Deviation**

Grade of Concrete	Assumed standard Deviation N/mm <sup>2</sup>
M 10	2.3
M 15	3.5
M 20	4.6
M 25	5.3

In order to get a quick idea of quality of concrete, the optional tests are conducted as stipulated in 14.1.1 of IS: 456-2000 and the results are analysed according to table 5 of IS: 456-2000.

##### 4.6.1 Concrete

In general design mix concrete shall be used conforming to IS:456-2000. Nominal Mix concrete batching by volume can only be one if the contractor is not able to adhere to the quality control provision of the design mix.

The mix proportions for all grades of nominal mix concrete shall be provided corresponding to the values specified in Table -4.7 below for respective grades of concrete.

**Table - 4.7 Characteristics Compressive strength of Concrete**

Grade Designation	Proportion of cement : fine aggregate: coarse aggregate	Specified characteristic compressive strength at 28 days (N/mm <sup>2</sup> )
M 15	1:2:4	15

M 20	1:1.5:3	20
M 25	1:1:2	25

The maximum water-cement ratio for all concrete works shall be as specified in IS:456-2000 and required by the Engineer-in-Charge.

To keep the water cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and coarse aggregates and determination of the same shall be made as frequently as directed by the Engineer-in-charge. The determination of moisture contents shall be according to IS: 2386 (Part III).

#### 4.6.1.1 Controlled concrete-

Controlled concrete shall be used on all concreting works except where specified otherwise.

The mix proportions for all grades of concrete shall be designed to obtain strengths corresponding to the values specified in Table I below for respective grades of concrete.

**Table –I**

Grade of Concrete	Specified characteristic compressive strength at 28 days [N/mm <sup>2</sup> ]
M 15	15
M20	20
M25	25
M30	30

The maximum water cement ration for all controlled concrete works shall be as specified in IS: 456 and Preliminary tests as specified in the IS code and required by the Engineer shall be carried out, sufficiently ahead of the actual commencement of the work with different grades of concrete, made form representative sample of aggregates and cement expected to be used on the job to ascertain the ratios by weight of cement, of total quantity of fine and coarse aggregates and the water cement ration required to produce a concrete of specified strength and desired workability.

The minimum cement content for each grade of concrete shall be as per Table-2 below. If the requirement of cement is found to be more than that specified below then such excess quantites of cement shall be used and for which no extra payment shall be made.

**Table –2**

Minimum Cement Content In Concrete

Grade of Concrete	Minimum cement content as per IS: 456 in kg./cu. M of finished Concrete
M 15	310
M20	360
M25	410
M30	500

At least 4 (four) trial batches are to be made and 7 (seven) test cubes taken for each batch noting the slump on each mix. These cubes shall then be properly cured and two cubes for each mix shall be tested in a testing laboratory approved by the Engineer at 7 (seven) days and others at 28 (twenty eight) days

for obtaining the ultimate compressive strength. The test reports shall be submitted to the Engineer. The cost of mix design and testing shall be borne by the contractor.

On the basis of the preliminary test reports for trial mix, a proportion of mix by weight and water cement ratio will be approved by the Engineer, which shall be expected to give the required strength, consistency and workability and the proportions so decided for different grades of concrete shall be adhered to, during all concreting operations. If however, at any time the Engineer feels that the quality of material being used has been changed from those used for preliminary mix design, the contractor shall have to run similar trial mixes to ascertain the mix proportions and consistency.

The mix once approved must not be varied without prior approval of the Engineer. However, should the contractor anticipate any change in the quality of future supply of materials than that used for preliminary mix design, he shall inform the same to engineer and bring fresh samples sufficiently ahead to carry out fresh trial mixes. The Engineer shall have access to all places and laboratory where design mix is prepared. Design mix will indicate by means of graphs and curves etc. the extent of variation in the grading of aggregates which can be allowed. In designing the mix proportions of concrete, the quantity of both cement, and aggregate and water shall be determined by weight. All measuring equipment shall be maintained in clean and serviceable condition and their accuracy periodically checked.

To keep the water cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and coarse aggregates and determination of the same shall be made as frequently as directed by the Engineer. The determination of moisture contents shall be according to IS: 2386 (Part III).

#### **4.6.2 Strength Requirements**

Where ordinary Pozzolano Portland cement conforming to IS: 269 is used the compressive strength requirements for various grades of concrete shall be as shown in Table -2 of IS: 456 -2000 where rapid hardening Portland cement is used the 28 days compressive strength requirements specified in Table-2 shall be met in 7 days. The strength requirements specified in Table-2 as previously given shall apply to both controlled concrete and ordinary concrete.

Other requirements of concrete strength as may be desired by the Engineer-in-Charge shall be in accordance with India Standard IS: 456-2000. The acceptance of strength of concrete shall be as per clause 14 "Sampling and Strength Test of Concrete" and clause. 15 "Acceptance Criteria" of IS: 456-2000 subject to stipulations and/or modifications stated elsewhere in this specification. if any.

Concrete work found unsuitable for acceptance shall have to be dismantled and replaced to the satisfaction of the Engineer-in-charge by the contractor free of cost to the Department. No payment for the dismantled concrete, the relevant formwork and reinforcement, embedded fixtures, etc. washed in the dismantled portion shall be made. In the course of dismantling if any damage is done to the embedded items or adjacent structures, the same shall also be made good free of charge by the contractor to the satisfaction of the Engineer-in-charge. If the water quantity has to be increased in special cases, cement also be increased proportionately to keep the ratio of water to cement same as adopted in trial mix design for each grade of concrete. No extra payment for the additional cement shall be made.

#### **4.6.3 Workability**

The workability of concrete shall be checked at frequent intervals by slump test. Where facilities exist and if required by the Engineer-in-Charge, alternatively the Compacting Factor test in accordance with

IS: 1199 shall be carried out. The degree of workability necessary to allow the concrete to be well consolidated and to be worked into the corners of formwork and round the reinforcement to give the required surface finish shall depend on the type and nature of the structure and shall be based on experience and tests. The limits of consistency for structures are as specified in Table 4.8 below:

**Table 4.8: Limits of Consistency (as per IS : 456)**

Placing Conditions	Degree of Workability	Values of Workability
Concreting of shallow sections with vibration	Very low	20-30 seconds, vee-bee time or 0.75-0.60 compacting factor
Concreting of lightly reinforced sections with vibration	Low	10-05 seconds, vee-bee time or 0.80 - 0.85 compacting factor
Concreting of lightly reinforced sections without vibration or heavily reinforced section with vibration	Medium	05-02 seconds, vee-bee time or 0.85 - 0.92 compacting factor or 25-75mm, slump for 20mm aggregate
Concreting of heavily reinforced sections with vibration	High	Above 0.92 compacting factor or 75 - 125 mm, slump or 20 mm *aggregate

\* For smaller aggregate the values shall be lower.

#### 4.7 Workmanship

All workmanship shall be according to the latest relevant standards. Before starting a pour the contractor shall obtain the approval of the Engineer-in-Charge or his representative in a "Pour Card" maintained for this purpose. He shall obtain complete instructions about the material and proportion to be used, slump, workability, quantity of water per unit of cement, number of test cubes to be taken, finishing to be done, any admixture to be added, etc.

#### 4.8 Transportation and Pouring

The concrete mixer shall be as close to the place of concreting as possible but not as close as to produce vibration and disturbance to the shuttering and reinforcements. It shall be located at such a position that time lapse for transportation of unloaded concrete mix from the mixer to the place of deposition of concrete is minimum.

When there is a difference in level between the unloading platform of concrete from the mixer to the actual place of deposition of concrete, the concrete shall be transported manually as by means of builders' hoist/crane or concrete pump to the actual level of concreting, depending on requirement as approved by Engineer-in-charge.

Chutes for transporting the concrete shall not normally be used. The Engineer-in-Charge's written permission shall be taken for transporting by means of chutes. If use of chutes is permitted then the concrete shall be again thoroughly mixed by using spades manually before placing the concrete in the moulds/shuttering to avoid segregation of concrete. It shall be ensured that initial setting of the concrete shall not take place and the mix of the concrete is as good as that of freshly poured concrete delivered directly into the moulds/shuttering. It shall be ensured that the drop of concrete is not from an excessive height and that the vibration and deposition of concrete are simultaneously carried out.

Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned and all debris shall be removed from the place to be occupied by the concrete. All form and soil surface shall be finished to desired levels and shall be thoroughly wetted immediately prior to placing of concrete.

No concrete shall be placed until the Engineer-in-Charge has approved the excavation formwork and the reinforcement. The competent formwork maker and steel fixer shall be in attendance during concreting operation.

Concrete shall be handled from the place of mixing to the place of final deposit as rapidly as practicable by methods, which shall prevent the segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. The concrete shall be placed and compacted before setting commences and shall not be subsequently disturbed.

To ensure bond and water tightness between old concrete surface and the concrete to be placed PVC water stops of approved make and size 150 mm wide, 10 mm thick should be used. The bonding of old and new concrete shall be done by applying cement slurry after thoroughly watering the old concrete surface and removing all loose particles.

In specified cases, with approval of Engineer-in-charge the surface shall be cleaned and roughened by initial green cut by wire brushes or chipping. The initial green cutting may be done after 6 hours of placing concrete in order to facilitate the work. The old concrete walls/members shall be given a shear of 50 x 65 mm deep. This key shall also be thoroughly cleaned with wire brush in green stage before next lift pouring to avoid percolation of works.

- **Special methods of Concreting**

Should be contractor propose to use the special methods of concreting not included in this specification, such as pumping concrete or using vacuum moulds he shall obtain the Engineer's approval before commencing work and comply with any subsequent specifications made by the Engineer for this special methods of concreting. Contractor is advised to use modern techniques in adapting methods of laying/finishing concrete in raft/wall etc., e.g. in raft, use of any other acceptable and proven method will be welcomed. The contractor may elaborate same on while quoting the offer.

#### **4.8.1 Placing of concrete in slabs and beams**

Concrete in slabs shall be placed in one continuous operation for each span unless otherwise directed. Longitudinal construction joints, if required by reason of the width to be placed shall be located as shown on the drawings or as directed by the Engineer-in-Charge.

Concrete in the stem and slab of T -beam shall be placed in one continuous operation and shall be deposited uniformly for the full length of the beam and brought up evenly in horizontal layers.

Where the size of the member is such that it cannot be made in one pour, transverse vertical construction joints shall preferably be located within the area of contraflexure. For continuous spans, where required by design considerations the concrete placing sequence shall be approved by the Engineer-in-Charge.

#### **4.8.2- Placing of Concrete in culverts and trenches:**

In general, the base slab or footings of the culverts shall be placed and allowed to set before the remainder of the culvert is constructed. In this case suitable provision shall be made for bonding the side walls to the culvert base. preferably by means of raised longitudinal keys so constructed as to prevent as far as possible, the percolation of water through the construction joint.

Before concrete is placed in the sidewalls, the culvert footing shall be thoroughly cleaned of all the shaving, sticks, sawdust or other extraneous material and the surface carefully chipped and roughened in accordance with the method of bonding construction joints.

In the construction of culvert/ trenches less than 1.2m in height the concrete in the wall shall be placed and allowed to set before the top slab is placed. In this case appropriate keys shall be left in the sidewalls for anchoring the cover slab.

#### **4.8.3- Depositing concrete under water :**

Concrete shall not be deposited in water, except with the approval of the Engineer and under his supervision. Concrete deposited in water shall be of grade 20 with 10 percent excess cement. To



prevent the segregation it shall be by means of a trowel, or other approved method and shall not be disturbed after being deposited. To ensure through bonding at each succeeding layer, a seal shall be placed before the preceding layer has taken initial set.

Concrete shall be placed in the horizontal layers not more than 300mm thick. When less than a complete layer is placed in one operation it shall be terminated in a vertical bulkhead. Each layer shall be placed and compacted before the initial set of the preceding layer takes place so that no cold joint is formed.

Unless otherwise approved, concrete shall be placed in single operation to the full thickness of slabs, beams and similar members and shall be placed in horizontal layers not exceeding 1M deep in walls, columns and similar members, Concrete shall be placed continuously until completion of the part of the work between construction joints or as directed by Engineer in charge.

#### **4.8.4 Concreting floors**

Concreting in floor shall be done in a chess board pattern, allowing sufficient time to elapse before the adjacent band is cast. The panel size is restricted to 7.5m in reinforced concrete slab.

Concreting shall not be started unless the electrical conduits or any other piping Puddle Collars wherever required or laid by the concerned agency. The civil contractor shall afford all the facilities and maintain co-ordination of work with other agencies engaged in electrical and such other works as directed by the Engineer-in-Charge.

Where concrete is placed on soil it shall be placed only on firm undisturbed ground. Any concrete that is placed on a well compacted fill shall have the prior approval of the Engineer-in-Charge. Concrete shall not be placed in standing water, on sub-grade or in foundation Excavation.

#### **4.9 Compaction**

Concrete during and immediately after depositing shall be thoroughly compacted. The compaction shall be done by mechanical vibration subject to the following provisions:

- a. The vibration shall be internal unless special authorization of other methods is given by the Engineer-in-charge or as provided herein.
- b. Vibrators shall be of type and design approved by the Engineer-in-charge. They shall be capable of transmitting vibration to the concrete at frequencies of not less than 4,500 impulses per minute.
- c. The intensity of vibration shall be such as to visibly affect a mass of concrete of 25 mm slump over a radius of at least 0.5m
- d. The contractor shall provide a sufficiently number of vibrators to properly compact each batch immediately after it is placed in the forms.
- e. Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures, and into the corners and angles of the forms.

Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators shall be inserted into and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localised areas of grout are formed.

Application of vibration shall be at points uniformly spaced and not further apart than twice the radius over which the vibration is visibly effective.

f. Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in forms over distances so great as to cause segregation and vibrators shall not be used to transport concrete in the forms.

g. Vibration shall be supplemented by such rodding/spading as necessary to ensure smooth surface and dense concrete along form surfaces and in corners and locations impossible to reach with the vibrators.

The whole process starting from the mixing of concrete to the placing and compaction shall not take more than 20 minutes and the process shall be completed before the initial setting takes place.

#### **4.10 Curing**

Curing shall be accomplished in accordance with IS: 456-2000 by keeping the concrete covered with a layer of sacking canvas, hessian or similar absorbent materials and kept constantly wet for at least seven days from the date of placing of concrete unless otherwise specified. The approval of the Engineer-in-Charge shall be obtained for the method of curing the contractor proposes to use on the work. In very hot weather precautions shall be taken to see that temperature of wet concrete does not exceed 38°C while placing.

Heavy loads shall not be placed on or moved across over the floor slabs until curing is complete. Care shall be taken to prevent floor surface from being marred during curing period. Freshly laid concrete form work shall not be jarred. Concrete placed in trenches or Excavation shall be protected from falling earth during and after placing.

#### **4.11 Consistency**

The consistency of concrete shall be frequently checked by means of a slump test performed as per the relevant Indian Standard by the Engineer-in-Charge. The maximum and minimum slump for each class of concrete shall be as directed by the Engineer-in-Charge, and any concrete as represented by the slump test which fails to comply with these directions shall be removed from the site and disposal off at the contractors cost.

#### **4.12 Finishing Concrete**

On striking the formwork, all blowholes and honeycombing observed shall be brought to the notice of Engineer-in-Charge. The Engineer-in-Charge may, at his discretion allow such honeycombing or blowholes to be rectified by necessary chippings and packing or grouting with concrete or cement mortar. If mortar is used, it shall be 1:2 mix or as specified by Engineer-in-Charge. However, if honey combing or blowholes are of such extent as being undesirable, the Engineer-in-Charge may reject the work totally and his decision shall be binding. No extra payment shall be made for rectifying these defects. All burrs and uneven faces shall be rubbed smooth with the help of carborundum stone.

The surface of non-shuttered faces shall be smoothed with a wooden float to give a finish equal to that of the rubbed down shuttered faces. Concealed concrete faces shall be left as from the shuttering except that honeycombed surface shall be made good as detailed above. The top faces of slabs not intended to be surfaced shall be leveled and floated to a smooth finish at the levels or falls shown on the drawings or elsewhere. The floating shall not be executed to the extent of bringing excess fine

material to the surface.

The top faces of slabs intended to be covered with screed, granolithic or similar faces shall be left with a rough finish.

#### **4.13 Work in Extreme Weather**

During hot weather (atmospheric temperature above 40 degree centigrade) or cold weather (atmospheric temperature at 5 degree centigrade and below) the concreting shall be done as per the procedure and precautions set out in IS: 7861 (Part I and II).

Dependence shall not be placed on salt or other chemicals for the prevention of freezing. Calcium chloride shall not be used as an accelerator except with the approval of the Engineer-in-Charge. Recommendation given in relevant clauses of IS: 456 shall be strictly adhered to.

#### **4.14 CONSTRUCTION JOINTS:**

Construction joints shall, in general, conform to the relevant clauses of IS:456-2000.

They shall be made in the positions as specified or elsewhere as approved. Such joints shall be truly vertical or horizontal as the case may be, except that an inclined or curved member the joint shall be strictly at right angles to the axis of the member.

Construction joints shall be rebated to an approved profile and an approved water stop shall be inserted in the joints when specified.

When the work is to be interrupted the concrete shall be rebated at the joint to such shape and size as may be required by the Engineer in charge or as shown on the drawings. All vertical construction joints shall be made with stop boards, which are rigidly fixed and slotted to allow for the passage of the reinforcing steel. If desired by the Engineer in charge, keys and/or dowel bars shall be provided at the construction joints. In the case of water retaining structures, water stop of approved materials shall be provided if specified on the drawing or desired by the engineer in charge. Construction joints shall be provided in position as shown or described on the drawings. Where it is not described the joints shall be in accordance with the following:

In a column the joint shall be formed about 75mm below the lowest soffit of the beams framing into it.

Concrete in a beam shall be placed throughout without a joint. A joint in a suspended floor slab shall be vertical at the middle of the span and at right angle to the main reinforcement.

In forming a joint, concrete shall not be allowed to slope away to a thin edge. The locations of construction joints shall be planned by the contractor well in advance of pouring and have to be approved by the Engineer in charge.

Construction joints in foundations of equipment shall not be provided without specific concurrence of the Engineer in charge. Before fresh concrete is placed the cement skin of the partially hardened concrete shall be thoroughly removed and surface made rough by hacking, sand blasting, water jetting, air jetting or any other method as directed by the Engineer in charge. The rough surface shall be thoroughly wetted for about two hours and shall be dried and coated with 1:1 freshly mixed cement sand slurry immediately before placing the new concrete. The new concrete shall be worked against the prepared surface before the slurry sets. Special care must be taken to see that the first layer of concrete placed after a construction joint is thoroughly rammed against the existing layer. Old joints during pour shall be treated with freshly made cement sand slurry only after removing all the loose materials.

#### **4.15 Expansion Joints:**

Permanent expansion joints in structures shall be provided at maximum interval of 30m or where directed. When joints are to be filled with joints filling materials as stipulated the permanently exposed edges of joints shall be sealed with polysulphide of standard and approved make.

#### **4.16 Loading of the Structures**

No concrete structures shall be loaded until the concrete is at least 28 days old and only then with the approval of the Engineer-in-Charge and subject to such conditions as he may lay down.

#### **4.17 Testing and Acceptance Criteria of Concrete**

The sampling of concrete making the test specimens, curing and testing procedures etc. shall be in accordance with IS: 1199, IS: 3085 and IS: 516, the size of specimen being 15 cm cubes. Normally only compression tests shall be performed in accordance with IS: 516.

For each grade of concrete and for each 8 hours of work or portion thereof the following samples shall be taken.

At least six specimens shall be taken from the first 15.0 m<sup>3</sup> or part thereof and three of these shall be tested at 7 days and the remaining at 28 days. Four additional specimens shall be taken from each additional 15.0 m<sup>3</sup> of concrete or portion thereof of which 2 specimens shall be tested at 7 days and the remaining at 28 days.

To control the consistency of concrete from every mixing plant slump tests, and/or compacting factor tests in accordance with IS: 1199 shall be carried out by the contractor every two hours or as directed by the Engineer-in-Charge. Slumps corresponding to the test specimens shall be recorded for reference. The acceptance criteria of concrete shall be in accordance with IS: 456-2000.

Concrete work found unsuitable for acceptance shall have to be dismantled and replacement is to be done as per specifications by the contractor. No payment for the dismantled concrete, the relevant formwork and reinforcement embedded fixtures etc. shall be paid.

In the course of dismantling if any damage is done to, the embedded items or adjacent structures the same shall be made good free of charge by the contractor to the satisfaction of the Engineer-in-Charge.

#### **4.18 Load Test of Structures**

The Engineer-in-Charge may instruct for a load test to be carried out on any structure if in his opinion such a test is deemed necessary for any of the following reasons.

The works site made concrete test-cube failing to attain the specified strength, as per the criteria laid down in IS: 456-2000.

Suspected overloading during construction of the structure under review

Shuttering being prematurely removed and not as per the specification

The concrete is being improperly cured.

Visible deficiencies of the concrete

If the results of the load test be unsatisfactory, the Engineer-in-Charge may instruct the Contractor to

demolish and reconstruct the structure or part thereof at the contractor's cost. The load test of structures shall be carried out as per the clause 16.5 of IS: 456-2000.

#### **4.19 Special methods of concreting**

The contractor should propose to use special methods of concreting not included in the specifications, such as pumping concrete or using vacuum moulds, he shall obtain the Engineer-in-Charge's approval before commencing work and comply with any subsequent specification made by the Engineer-in-Charge for this special method of concreting. Contractor is advised to use modern techniques in adopting methods of laying/finishing concrete in raft/walls etc. e.g. in raft use of any other acceptable and proven method will be welcomed. The contractor may elaborate same on while quoting the offer.

## **5.0 MEASUREMENT AND PAYMENT FOR CONCRETE:**

### **5.1 INSITU CONCRETE:**

The unit of measurement for insitu concrete shall be cubic meter, measured in place in the work as set forth in the bill of quantities, and shall distinguish between the various classes of concrete work. The rate for insitu concrete shall include for complying with the provisions of the specifications herein described, and shall include for providing samples, trial mixes, providing all materials, stockpiling, mixing transporting to any point on site, placing, compacting, curing and finishing, forming making cubes and transporting to a laboratory. Reinforcement and shuttering will not be paid for separately.

Adding extra cement to concrete deposited under water as provided in the section entitled "Depositing Concrete under Water" shall be considered as included in the price of concrete work and no extra will be allowed therefore.

### **5.2 PRECAST CONCRETE UNITS:**

Precast concrete unit will be measured either by number or in linear meters. The rate for precast concrete shall include all factors mentioned in a. above and in addition any shuttering and reinforcement; unless specifically shown separately in the bill of quantities.

## **6.0 Codes and Standards**

All applicable standards, specifications, etc. and codes of practice shall generally be the latest editions, including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the contractor.

All work shall be carried out as per the stipulations contained in various sections of these specifications and the latest Indian Standards, Acts, Codes and best practices.

In case of conflict between the stipulations contained in various' sections of these specifications and stipulations of Indian Standard, Codes, etc. the requirements of stipulations contained in various sections of these specifications, shall prevail over that of Indian Standards, Codes, etc.

Some of the applicable Indian Standard Codes, etc. are referred to here below.

IS:73	Specification for paving bitumen
IS:2060	Specification for structural steel
IS-8112	Specification for ordinary Portland cement 43 grade.
IS:280	Specification for mild steel wire for general engineering purposes
IS:383	Specification for coarse and fine aggregates from natural sources for concrete
IS:432 (Part I & II)	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
IS:455	Specification for Portland Slag Cement
IS:456	Code of practice for plain and reinforced concrete
IS:457	Code of Practice for general construction of plain & reinforced concrete for dams and other massive structure.
IS:516	Method of test for strength of Concrete
IS:650	Specification for standard sand for testing of cement
IS:702	Specification for industrial bitumen
IS:816	Code of practice for use of metal as welding for general construction in mild steel
IS:1199	Methods of sampling and analysis of concrete
IS:1200 (Part II, V, VIII, XVIII, SVIII)	Method of measurement of building and civil engineering works, water proofing and damp proofing
IS:1367	Technical supply conditions for threaded steel fasteners
IS:1489	Specification for Portland pozzolana cement (Part I) Fly ash based & (Part II) Calcined clay based
IS:1566	Specification for Hard drawn steel wire fabric for concrete reinforcement
IS:1609	Code of practice for laying damp proof treatment. using bitumen felts.
IS:1786	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS:1791	General requirements for batch type concrete mixer.
IS: 1838	Specification for performed fillers for expansion joints in concrete pavements and structures (non-extruding and resilient type)
IS:2204	Code of practice for construction of reinforced concrete shell roof
IS:2210	Criteria for the design of reinforced concrete shell structures and folded plate
IS:2386 (Part 1 to	Methods for test of aggregates for concrete
IS:2438	Specification for roller pan mixer
IS:2502	Code of practice of bending and fixing of bars for concrete reinforcement
IS:2505	General requirements for concrete vibrators, immersion type
IS:2506	General requirements for concrete vibrators, screen board type
IS:2514	Specification for concrete vibrating tables
IS:2571	Code of practice for laying in situ cement concrete flooring
IS:2645	Specification for integral cement water proofing compounds
IS:2722	Specification for portable swing weigh batchers for concrete (single and



	double bucket type)
IS:2750	Specification for steel scaffoldings
IS:2751	Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction
IS:3025	Methods of sampling and test waste water
IS:3067	Code of practice for general design details and preparatory work for damp proofing & water proofing of buildings
IS:3150	Specification for hexagonal wire netting for general purposes
IS:3366	Specification for pan vibrators
IS:3370 (Part I & II)	Code of practice for concrete structures for the storage of liquids
IS:3384	Specification for bitumen primer for use in water proofing & damp proofing
IS:3414	Code of practice for design and installation of joints in buildings
IS:3550	Methods of test for routine control for water used in industry
IS:3558	Code of practice for use in immersion vibrators for consolidating concrete
IS:3696 (Part I & II)	Safety code for scaffolds and ladders
IS:4014 (Part I & II)	Code of practice for steel tubular scaffolding
IS:4031	Methods for physical tests for hydraulic cement
IS:4130	Safety code for demolition of buildings.
IS:4326	Code of practice for earthquake resistant design and construction of buildings
IS:4461	Code of practice for joints in surface hydroelectric power stations
IS:4656	Specification for form vibrators for concrete
IS:4925	Specification for batching and mixing plant
IS:4990	Specification for plywood for concrete shuttering work
IS:4995 (Part I & II)	Criteria for design of reinforced concrete bins for the storage of granular and powdery materials
IS:5121	Safety code for piling and other deep foundations
IS:5256	Code of practice for sealing joints in concrete lining on canals
IS:5525	Recommendations for detailing of reinforcement in reinforced concrete work
IS:5624	Specification for foundation bolts
IS:6461	Glossary of terms relating to cement concrete
IS:6494	Code of practice for water proofing of underground water reservoirs and swimming pools
IS:6509	Code of practice for installation of joints in concrete payments
IS:7193	Specification for glass fibre base coal tar pitch and bitumen felts
IS:7293	Safety code for working with construction machinery
IS:7861 (Part I & II)	Code of practice for extreme weather concreting
IS:9012	Recommended practice for shuttering
IS:9103	Specification for admixtures for concrete

IS:9417	Recommendations for welding cold worked steel bars for reinforced concrete construction.
IS:9595	Recommendations for metal-arc welding of carbon and carbon manganese steels
IS:10262	Recommended guidelines for concrete mix design
IS:11384	Code of practice for composite construction in structural steel and concrete
IS:12118	Specification for two parts poly sulphide
IS:122000	Code of practice for provision of water slops at transverse contraction joints in masonry and concrete dams
IS:12269	53 grade ordinary Portland cement
IS:12600	Portland cement, low heat
IS:23	Handbook of concrete mixes
IS:24	Explanatory Handbook on IS:456-1978
IS:34	Handbook on concrete reinforcement and detailing.

## **7. ROAD- BITUMEN/ PAVED**

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7.1 All work shall be carried out as per IRC detailed specifications where there are no IRC specifications M.O.S.T. specifications/P.W.D. specifications will be followed unless otherwise specified or directed by the Engineer in charge.

7.2 The contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking flags, lights and flagman, as necessary at either end of work site and at such intermediate points as directed by the Engineer in charge for the proper identification of the construction area. He shall be responsible for all damages and accidents caused due to negligence on his part. The temporary warning lamps or reflective barriers or sign boards shall be installed at all barricades during the hours of darkness.

7.3 Stone ballast / Stone grit should be stacked at site for satisfaction regarding quantity of material to Engineer in charge.

7.4 The material collected for use in the work shall satisfy all requirements for the particular work, failing which the material will be rejected. The gauge of stone ballast shall be as per detailed specification for the respective items and deduction will be made for the under gauge/ over gauge material as per Engineer in charge.

7.5 During construction care shall be taken to ensure there is least disturbance to the traffic. Adequate barriers, red flags in day time and light in night hours shall be provided to guide and inform the traffic. All necessary precautions shall be taken to avoid any road accident at work-site but if there happens any the responsibility will be of the contractor and he shall be responsible for all consequences and damages/ claims etc.

7.6 The consolidation will be in specified layers. Proper and adequate camber or super elevation etc. shall be provided as per directions of Engineer in charge.

7.7 Next coat of consolidation shall be allowed after checking of the crust and quality of previously consolidated layer by the Engineer in charge and found satisfactory.

7.8 The material of the different layer will be spread in required loose thickness so as to achieve the desired compacted thickness.

7.9 The binding material for consolidation shall be soil having plasticity index not more than 6 which is to be arranged by the contractor from a suitable place as directed by Engineer in charge. The soil shall be got approved from the Engineer in charge before start of consolidation and nothing extra shall be paid either for the cost of binding material or for its cartage.

7.10 Proper arrangement of water and its storage for consolidation shall have to be made by the contractor at his own cost.

7.11 The stone ballast shall confirm to the following sieves.

Name of metal	Percentage by weight passing						
1.	63-45 mm gauge	90 mm	63 mm	53 mm	45 mm	22.4 mm	1.2 mm
		10%	90-100%	25-75%	0-15%	0-5%	-
2.	53-22.4 mm gauge	-	100%	95-100%	65-90%	0-10%	0-5%

7.12 (a) 16-22.4 mm size grit shall pass 100% from 22.4 mm square mesh sieve

And all retained on 16 mm square mesh sieve.

(b) 10-16 mm size shingle / grit shall pass 100% from 16 mm square mesh

Sieve and all retained on 10 mm square mesh sieve.

7.13 (A) Material for Ist coat painting shall be as follows:-

(i) Grit 16-22.4 mm size (crushed) 1.9 cum per% sqm

(ii) Bitumen

(a) For Precoating 15 kg per cum of shingle/grit

(b) For tack coat 180 kg per% sqm.

(B) Material for IInd coat painting shall be as follows:-

(i) Grit /Shingle 10-16 mm size 1.20 cum per% sqm.

(ii) Bitumen

(a) For Precoating 15 kg per cum of shingle/grit

(b) For tack coat 110 kg per% sqm.

(C) Material for open Graded Premix Carpet shall be as follows:-

(i) Aggregates for Carpet

(a) Stone chippings 13.2 mm size, passing

22.4mm sieve and retained on 11.2 mm sieve 1.8 cum per% sqm (b)

Stone chippings 11.2 mm size, passing 13.2 mm

Sieve and retained on 5.6 mm sieve 0.9 cum per% sqm

(ii) Bitumen

(a) For tack coat	180 kg per% sqm
(b) For stone chipping of 13.2 mm size	52 kg per cum
(c) For stone chipping of 11.2 mm size	56 kg per cum

(D) Material for type 'A' seal coat shall be as follows:-

(i) Stone chippings 6.7 mm size passing through 11.2 mm sieve and retained on 2.36 mm sieve	0.9 cum per% sqm
(ii) Bitumen	98 kg per % sqm

(E) Material for type 'B' seal coat shall be as follows:-

(i) Chippings aggregates passing 2.36 mm sieve and be retained on 180 micron sieve	0.6 cum per% sqm
(ii) Bitumen	68 kg per % sqm

7.14 Stone ballast/Grit/Shingle of approved quarry only, confirming to I.R.C. Specifications shall be used. Before using stone ballast/Stone Grit/River shingle the quality & size has to be approved by the Engineer in charge.

7.15 Contractor shall always cooperate in procurement of sample, conduction of tests as may be directed and no extra payment shall be made for the same. Test samples shall be taken carefully in accordance with the standard method of taking the test sample.

7.16 The contractor shall at all times keep the premises free from accumulated waste materials or rubbish caused by his employee on the works and on completion of the work, he shall clear away and remove from site all surplus materials, rubbish and temporary works of any kind and fill up borrow pits dug by his. He shall leave whole of the site and work clean and in a workman like condition to the entire satisfaction of the Engineer in charge.

### **8.0 DISMANTLLING OF ROADS:**

Dismantling of various road surfaces before the excavation in trenches shall be carried out in following two parts-

(i) Breaking and sorting out the top coat and stacking in the dismantled materials properly so as to be placed at the top of trench after filling with excavated earth in 30cm layers and its proper compaction by watering and ramming.

(ii) Breaking and sorting out the serviceable materials from inter and soling coat of the road, carting and stacking the same upto 250m from the trench, which shall also be used after filling and compaction of trench as soon as the pipe laying is completed.

The measurement for dismantling of road surfaces will be made per sqm. The thickness of road cut during dismantling of road surfaces will not be measured in the item of excavation. The contractors should quote their rates accordingly. As soon as the laying of pipes is completed, the road metal, which were sorted out at the time of cutting of road, will be placed on top in such a way that it reinstates the road temporarily and to avoid inconvenience to the public. No extra payment to the contractor will be made on this account. "Further it is made clear that the various kinds of road surfaces exist in town viz. C.C. roads, Bituminous, WBM, Interlocking tiles etc. The thickness of road metal may vary considerably as the town is an old city which may have different layers of road surfaces one beneath the other. No claim whatsoever shall be entertained on account of these circumstances.

## **8.0 BOUNDARY WALL:**

### **8.1 CONSTRUCTION:**

Boundary wall all round the FSTP site (180 m X 110 m indicative size) of 1.50 m height above plinth level, 0.3 m plinth height above ground level is proposed. The foundation of boundary wall is to be decided as per soil bearing capacity report.

The boundary wall should be constructed in Brick/Block work in substructure and superstructure in cement mortar 1:5 which should be plastered with 1:4 cement mortar. P.C.C. & D.P.C. is to be done as per standards.

The boundary wall should be fixed with MS gate of 3.60 m width with 1.2 m wide inbuilt small gate in R.C.C. pillars as per approved design.

### **8.2 PAINTING:**

The surface of boundary wall should be finished with wall putty prior to painting, after which it should be painted with two coats of Acrelic paint as directed and approved by Engineer. Preferrable makes are Asian, Burger, Nerolac.

The surface of Gate should be finished with two coats of primer, prior to paint, after which it should be painted with colour paint as directed and approved by Engineer.

## 9.0 TUBEWELL/BOREWELL CONSTRUCTION

### General And Technical Specification for constructions of bore well

#### (A) General Specification:-

1. Contractor has to arrange adequate water arrangement required during drilling and include the cost of the same in the rates.
2. The rates shall include the collection and preservation of strata samples taken at every three meters depth and where ever the strata changes, supplying the boring/strata chart immediately after completion of drilling and supplying lowering chart to the Deptt.
3. If required, approach path for construction of bore well would be constructed by the contractor and if any hindrance encountered in making approach path the same will be resolved by the contractor at his own cost. Any damage/loss to public or Govt. properties will be borne by the contractor.
4. Site clearance/leveling of site will be done by the contractor.
5. Site office facility, if necessary, will be provided by the contractor as per direction of Engineer incharge as per site conditions.
6. The contractor shall take protection/safety measures for safety of lives around the site, such as fencing with barbed wire around the construction site of T.W., should be provided by the contractor. In case of any accident during the work which results in any type of injury to labour or any public, shall be the sole responsibility of the contractor.
7. Proper lighting arrangement at site will be made by the contractor at his own cost.
8. After completion of work all pits would be leveled and cleared, excess earth shall be removed from the site by the contractor.
9. The contractor must have in his possession and will deploy R.C./suitable rig machine and all required T&P for execution of work.
10. The contractor shall have the storage for pipe at site at his own risk and cost.
11. Site selection of pin point shall be done in presence of Engineer In-Charge.

#### (B) Technical Specification:-

##### 1 Arrangement of works: -

The contractor shall pay all charges for use, deterioration or damage of all tools, implements and tackle as well as all other apparatus supplied by the Deptt., if any, which may be necessary for the proper execution of the works as herein specified.

The contractor shall maintain a Chaukidar to watch the T&P and also provide necessary fencing for protection of the work. He shall make his own arrangement for storing of T&P and materials and



for accommodation of supervising staff engaged in the work; the cost of such services must also be included in the rates. The contractor shall also arrange his own supplies of water, light, fuel etc. for the use of his workman and also for the execution of the work whenever required.

## **2. Design, Material, Workmanship: -**

All materials used on this work shall be as per IS unless otherwise specified on the contrary. The design, construction and erection of the various parts covered by these specifications are proposed to be followed but any alteration or suggestions with a view to effect economy in design or construction or increased reliability in operations, which the firm tendering may wish to offer, must be clearly set forth in schedule as addendum similar to those attached to this tender and will be considered.

## **3. Responsibility of Contractor:**

Until the test specified herein have been applied and the installation has been passed and formally by the Engineer, the contractor shall be entirely responsible for all apparatus whether such working be for the purpose of testing or in the service of Jal Nigam.

As such part of the construction, the boring is complete it shall be checked over by the Engineer or his authorized representative. The representative of contractor shall ascertain from the Engineer's representative from time to time, what part be wished to check over and pass, but such passing shall in no way relieve the contractor of his responsibility until the entire work has been completed by the contractor at his own costs.

## **4. Bore well assembly**

The specifications of the pipe for alluvial soil/other than alluvial soil are given below.

### **(A) For Alluvial Area: 100 mm dia uPVC pipe should be used for screen and casing.**

*Following specifications are to be followed for supply of screen and casing uPVC pipes of 100mm diameter for alluvia area.*

1. Pipe should be manufactured as per IS-12818.
2. Casing (CM) pipes should have dimensions as :

2.1 Internal diameter:	100 mm
2.2 Mean outer diameter:	113.0 to 113.3 mm
2.3 Outer diameter at any point:	112.9 to 113.4 mm
2.4 Wall thickness:	5 to 5.7 mm
3. Screen (RMS) pipes should have dimensions as:

3.1 Internal diameter:	100 mm
3.2 Mean outer diameter:	117.0 to 117.3 mm
3.3 Outer diameter at any point:	116.8 to 117.4 mm
3.4 Wall thickness:	5 to 5.7 mm
3.5 Mean outer diameter over connection:	124.0 mm
4. The Screen and Casing pipes should have threads accordance with basic profile for metric trapezoidal threads and male threads should be at spigot end and female threads at the socket end.
5. The density of material should be between 1.40 to 1.46 g/cm<sup>3</sup>.
6. Pipes should also be marked with standard mark.

**(B) Other than Alluvial Area**

*Following specifications are to be followed for supply of screen and casing MS pipes of 125mm diameter.*

1. Pipe should be manufactured as per IS-1239, Class-B.
2. Casing pipes should have dimensions as 125 mm internal dia.

5. **Gravel Packing:**

Gravel packing shall be done by suitable method approved by the Engineer or his authorized

representative. The placing of the gravel in the annular space between the well pipe and the hole shall start at the bottom of the well and extend upward up to 1 mtr. above of slotted pipe above bottom level. The construction of the gravel filter once started will be continuous operation until it is finished.

*The following specifications are to be followed for supply of Pea Gravel for Borewell.*

1. The Gravel has to be supplied from Lalkuan, Haldwani and conforming to IS 4097-1967 and as latest amendments.
2. The average particle size of Gravel shall be 2.0 to 4.75mm.
3. The Gravel shall consist of hard quartz (about 96% SiO<sub>2</sub>) or other suitable material, with an average specific gravity of not less than 2.5. Not more than 10% by weight of the material shall have a specific gravity of less than 2.25. The Gravel shall contain not more than 2% by weight of thin flat or elongated pieces. In case of such pieces, the larger dimensions shall not be more than 3 times the smallest dimensions. The quartz shall be of sub rounded to rounded grains with minimum angular features.
4. The Gravel shall be free from impurities, such as shale, mica, feldspar, clay, sand, dirt, loam hematite and organic materials.
5. The particle size distribution of Gravel may be Determine by screening through standard sieve accordance with IS: 460.
6. The gravel shall have a hardness of not less than 5 in Mohr'' s scale.
7. Voids @ 5% shall be deducted from quantities measured at site.
8. Any tax, royalty shall be included in the offered rates.

6. **Tests: -**

During the progress of the work and after its completion the contractor shall carry out such tests, as in the opinion of the Engineer are necessary to ensure that the installation complies with conditions of these specifications whether under test conditions or in ordinary working. All pumps engines and pipe connections and other apparatus required for the test shall be provided by the contractor at his own costs.

**6.1 Development:**

The development of bore well will be done by single phase submersible pump of suitable capacity to get the sand free discharge of minimum 50 LPM.

The discharge of borewell shall be measured by means of water meter or orifice meter or rectangular V-

notch chamber constructed according to IS such that the full size discharge from the outlet pipe the plumb will fall into the first compartment of V-notch chamber. In order enable the collection of water in a bucket for measuring the sand contents of water a bib cock shall be provided in the delivery pipe away from the discharge outlet. The contractor will also provide necessary measuring jars.

## **7. Reinstatement**

The contractor shall remove all surplus materials and reinstate the ground disturbed by the operation of the excavation, boring and construction of the well to the satisfaction of the Engineer. No pits shall be permitted to be dug around the tube well.

No octroi and terminal tax will be paid by the department for materials used in the tube wells and equipment for execution of wells. No sales tax will be paid by the Deptt. The contractors are advised to include in their rates on account of taxes which are to be paid by them.

## **8. Preservation of Excavated Materials :**

The contractor shall submit to the Engineer daily report of the work done by him each day on the prescribed form to be obtained from the Engineer. These reports shall be handed over to the Engineer's representative at site or posted to the Engineer (in case there be no representative stationed at site) every day after close of day's work. The cost of such postage shall however not be borne by the Deptt.

As the boring of tubewell is proceeding, the contractor shall keep care full notes of all changes of strata measurements from ground level and shall preserve a sample of soil taken from

every stratum. Each sample must be at least 15×15×23 cm. deep in bulk and must be carefully preserved and marked with the depth and place from which it was taken. The contractor shall also maintain at the site a boring chart showing progress of the work, nature of soil passed through each day and the thickness of each stratum and other particulars in the prescribed form. Immediate after completion of boring the contractor shall submit the preserved samples of soil/strata met during boring in transparent plastic container duly marked firmly the depth and name of soil/strata on each container arranging all containers in a box.

**9. Want of Knowledge:** Contractor is particularly requested to read the specification and term of contract and obtain clearance of surety, if any, before submitting his tender, as no excuse for non-compliance with part or portion of the works described in these specification and conditions of contract shall be accepted.







## **10.0 SOLAR PANEL SYSTEM**

A Solar dual pumping system consist of a modified hand pump, solar submersible pump set, electronics if any, interconnect cables, a MCB/ controller/ ON/ off switch to control water level in over head tank and a PV array mounted of the solar dual pumping system. The submersible pump and Hand pump will share same riser pipe. No separate riser pipe will be used for solar Submersible pump.

In case of deep well submersible pumps a solar PV Water pumping system should provide a minimum of 15 liters of water per watt of PV array capacity used per day from a total depth of 45 meters. The manufacturer of SPV water pumping is required to specify whether the minimum water output is achieved directly or through tracking of PV array. The actual duration of pumping of water on a particular day and the quantity of water pumped may vary depending on the location, season, etc.

(i) Basic details/ requirements:

- (i) Minimum Installation depth for solar submersible pump
- (ii) Total head
- (iii) Daily yield of submersible pump at 6 to 7 Kwh/m<sup>2</sup>

DC submersible motor pump set is permitted to be used in the SPV water pumping system. The manufacturer of the SPV pumping system will submit a declaration that the PV array size has been select for optimum efficiency of the motor pump set to give the desired water output performance. They will also report the overall efficiency of the motor pump set used by them. The solar submersible pump set should be capable to deliver the minimum discharge of approx. 9000 LPD at 30 m. head.

**Solar Powered Pump set should have following features:**

1. Light weight stainless steel pump and body.  
1 H.P, 900 Watt ( 4x225 Wp ) Submersible pump
2. Option for operating head from 15-45 m
3. Discharge range from 9000-15000 LPD
4. Suitable for bore of 100 mm dia
5. High efficiency permanent magnet Brushless
6. Pump and motor construction SS -304
7. Helical Rotor Features for dry running protection, over and under voltage protection,
8. Rated speed 500-3600 RPM.
9. Rated current 10 Amp.
10. Rated voltage- 30 to 300 V DC
11. Having in-built MPPT function which can optimize the performance of the pump
12. Over load protection, over/ under voltage protection, short circuit protection, Sensor Less, Electronic Dry Run Protection

and Automatic Start and shut off as per solar Intensity,

13. Cable 2 core x 2.5 mm<sup>2</sup>

14. No external inverter/ converter . Solar panel should directly be connected to solar pump.

15. Steel wire rope from pump.

(iv) SPV Panel/ Array Capacity:

The SPV water- pumping system should be operated with a PV array of P max= 675 watts or suitable wattage as required, measured under standard test conditions. Sufficient number of modules in series and parallel will be used to obtain the required PV array current, voltage and power output. The power output of individual PV modules used in the PV array, under STC, should be a minimum of 75 watts with adequate provision for measurement tolerances. Use of PV modules with higher power output (preferably) 225 Wp and more) is encouraged to avoid associated power losses and ease of installation & maintenance. The PV module shall contain mono/multi crystalline silicon solar cells. The PV module shall be as per IEC 61215 (revised) specification or equivalent National or international standards.

(v) Auto Water level controller without battery-

Automatic ON/OFF switch for controlling the water level in the tank. No battery is to be used in this system.

(vi) Power cable:-

1) 2 core x 2.5sq.mm cable as per IS 694 : As required

2) PVC pipe ¾ inch for covering cable for concealed : As required

(vii) Protection: Adequate protection is incorporated against dry operation of motor pump set, protection against lightning, hails & storms. Full protection against open circuit, accidental short circuit and reverse polarity is provided.

(viii) Other Features:

(i) A good reliable MCB is to be provided with the motor pump set. Sufficient size & length of cable should be provided for inter-connection between the PV array and the motor pump set.

(ii) The following details should be marked indelibly on the motor pump set and the photovoltaic modules.

(a) Name of the manufacture or Distinctive Logo.

(b) Model Number

(c) Serial Number

(iii) An Operation, Instruction and maintenance Manual, in English and the local language, should be provided with the solar PV pumping system.

The Following minimum details must be provided in the Manual.



- (a) About Photovoltaic
- (b) About solar pump
- (c) About PV module
- (d) About motor pump set
- (e) Clear instruction about mounting of PV module.
- (f) About electronics used in Ac motor pump sets, if any.
- (g) Do's and Don'ts,
- (h) Clear instructions on regular maintenance and trouble shooting of the pumping system.
- (i) Name & address of the person or Centre to be contacted in case of failure or complaint.
- (j) Components and parts used in the solar pumping system including the metallic structures should confirm to the BIS specifications, wherever such specifications are available and applicable.
- (iv) The PV module(s) will be warranted for a minimum period of 10 years from the date of supply and the complete Solar pumping system will be warranted for minimum period of five years from the date of installation.

The warrantee card to be supplied by the manufactures with the system must contain the serial number of PV modules, motor pump set, electronics if any and the relevant dates about validity of warrantee. The full name and address of contact person(s) for after sales service and warranty obligations must also be stated on the warranty card A copy of additional information about the system and conditions of warranty as necessary. To ensure compliance of MNRE specifications, copies of data sheets of the PV modules, motor pump set, system design calculations, installation and O&M manuals and blank warranty cards, pass book for maintaining maintenance records etc. will be supplied by the manufactures to User/U.P. Jal Nigam. A copy of the drawing of the support structure will also be provided to User/U.P. Jal Nigam,

**PV MODULES:**

- 1.1 The PV modules must conform to the latest edition of any of following IEC/equivalent BIS Standards for PV module design qualification and type approval: Crystalline Silicon Terrestrial PV Modules- IEC 61215/IS 14286 Thin Film Terrestrial PV Modules- IEC 61646/Equivalent is (Under Dev.) Concentrator ,PV Modules & Assemblies- IEC 62108
- 1.2 In addition, the modules must conform to IEC 61730 Part 1 requirements for construction & Part 2- requirements for testing, for safety qualification or Equivalent is (Under Dev.)
- PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701/IS 61701.

**IDENTIFICATION AND TRACEABILITY**

- 1.3 Each PV module must use a RF identification tag (RFID), Which must contain the following information.
- 1.4
- (i) Name of the manufacturer of PV Module.
  - (ii) Name of the manufacturer of Solar cells.
  - (iii) Month and year of the manufacture (separately for solar cells and module.
  - (iv) Country of origin (separately for solar cells and module)
  - (v) I-V curve for the module.
  - (vi) Peak Wattage,  $I_m$ ,  $V_m$  and FF for the module.
  - (vii) Unique Serial No and Model No. of the module.
  - (viii) Date and year of obtaining IEC PV module qualification certificate.
  - (ix) Name of the test lab issuing IEC certificate.
  - (X) Other relevant information on traceability of solar cells and module as per ISO -9000 series.

Until March 2013, the RFID can be inside or outside the module laminate, but must be able to withstand harsh environmental conditions. However from 1st April 2013 onwards; RFID shall be mandatorily placed inside the module laminate.

**1.5 VALIDITY:**

The validity of the existing Certificate/Reports in the old format/ procedure shall be valid till March 2014 only. Manufactures are advised to get their samples tested as per the new format/Procedure before 31th March 2014 whose validity shall be for five years.

1.6 **AUTHORIZED TESTING LABORATORIES/CENTERS:**

PV modules must qualify (enclose test reports/ certificate from IEC/NABL accredited laboratory) as per relevant IEC standard. Additionally the performance of PV modules at STC conditions must be tested and approved by one of the IEC/NABL accredited Testing Laboratories including Solar Energy Centre. For small capacity PV modules up to 50Wp capacity STC performance as above will be sufficient. However, qualification certificate from ICE/NABL accredited laboratory as per relevant standard for any of the higher wattage regular module should accompanied with the STC report/ certificate.

1.6.1 **Details of Test Labs:-**

Test lab that has set-up for testing may contact Director, MNRE.

1.6.2 While applying for Testing, the Manufacturer has to give the following details:

\ -A copy of registration of the company particularly for the relevant product/component/ PV system to be tested.

-An adequate proof from the manufacturer, actually showing that they are manufacturing product by way of production, testing and other facilities.

-Certification as per JNNSM standards for other bought in items used in the system.

Without above proof test centers are advised not to accept the samples.

**WARRANTY:**

1. Complete system would be under warranty for a period of 1 year from the date of commissioning against any defects.
2. PV modules used in solar power plants/system must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. To ascertain the performance of the solar panels for 90% efficiency after 10 years of installation as per the warranty clause

**3. MAINTENANCE:**

**Maintenance of 5 years including** 1 year of defect liability period of the installed solar dual pumping system and steel structure for water storage tank, LLDPE water tank, rising main and distribution system etc. for the work Supply, installation, commissioning and maintenance for 5 years of solar energy based dual pump (solar pump and hand pump) in Various Districts of Uttar Pradesh is to be done by the tenderer/firm/contractor free of cost with all required material and T&P.

**4. INSURANCE:**

Complete insurance of the system i.e. of solar panels, pumps controller, cables, LLDPE tanks etc. has to be done by the firm for a fixed term of 5 years. A policy for the same, site wise has to be got done and a copy has to be provided to the Deptt. also.

Date

Tenderer

**FORMAT FOR TECHNICAL DETAILS/SPECIFICATIONS/FEATURES/DRAWINGS  
MENTIONED/PROVIDED BY TENDERER**

Note:

1. Please must fill up the information in the format
2. Please attach relevant document to support the information given in the format and wherever any document is attached the serial no. of attachment shown also be mentioned.

	Description of items	Details/Specifications/
	2	
	Solar submersible pump set	
	SPV Panel/Array Capacity	
	Auto Water Level Controller without battery	
	Submersible cable	
	Steel Structure for Water Storage Tank and solar mounting	
6		

7	LLDPE Water Storage Tank & Rising Main	
8	Distribution Systems	
9	Miscellaneous Items	

## **REQUIREMENTS FOR DC SOLAR PUMPING PLANT**

1. Light weight stainless steel pump and body.
2. Option for operating head from 15-90 m.
3. Discharge 9000 LPD
4. Rated speed-500-3600 rpm.
5. Current 9 amps (maximum)
6. Cable 3 core x 2.5 mm.
7. Suitable for 100 mm ID Bore wells.
8. Outlet size 32mm.
9. Low/high Voltage, Overload and Low Water Level protector.
10. The overall efficiency of the motor pump set at 10meter total head-40%

**ADDITIONAL**  
**TECHNICAL SPECIFICATION**

Design, Supply, installation, Testing & Commissioning, of Solar Water Pumping Systems as well as 1000 litres storage with 3 m staging along with mounting structure in the campus. Solar PV Module (without tracking), DC pump Motor Sets, Control unit, with 5 years Maintenance Contract in accordance with MNRE norms.

**TECHNICAL SPECIFICATION FOR SOLAR WATER PUMPING SYSTEMS FOR DRINKING WATER SUPPLY**

**MINIMAL TECHNICAL REQUIREMENTS / STANDARDS**

**I. DEFINITION**

A solar photovoltaic (SPV) water pumping system consists of a PV array, a DC submersible motor pump set, electronics, if any, interconnect cables and an “On-Off” switch. PV array is mounted on a suitable structure.

Electronics could include Inverter and Controls/Protections. Storage batteries will not constitute a part of the SPV Water Pumping System.

Components and parts used in the SPV water pumping system including the PV modules, pumps, metallic structures, cables, junction box, switch, etc. should confirm to the BIS/ IEC/ international specifications, wherever such specifications are available and applicable. Hand Pump attached solar pumping system includes complete turnkey solution for supply, installation, commissioning and comprehensive maintenance contract (CMC) for FIVE years. The solar hand pump should consist of Modified India Mark II deep well hand pump with force lift arrangement inclusive of riser pipes and accessories etc., Solar DC Submersible pump with controller, cables and its accessories, Solar Panels Hot dip galvanized mounting structure, Hot dip galvanized Tank Tower Structure (3m ht) suitable for LLDPE water tank (5000 liters), Auto Water Level Controller, 32 mm dia uPVC Distribution line, Galvanized one Stand Post (with 1 taps) and platform. Solar DC Submersible Pump and the Hand Pump should share the SAME RISER PIPE.



## **II. PERFORMANCE SPECIFICATIONS AND REQUIREMENTS (DUTY CYCLE)**

Under the “Average Daily Solar Radiation” condition of 7.15 KWh/sq. on the surface of PV array (i.e. coplanar with the PV Modules), the minimum water output from a Solar PV Water Pumping System at different “Total Dynamic Heads” should be as specified below:

- i. 100 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 metres (Suction head, if applicable, minimum of 7 metres) and with the shut off head being at least 12 metres.
- ii. 55 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 metres (Suction head, if applicable, minimum of 7 metres) and with the shut off head being at least 25 metres.
- iii. 35 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 metres and the shut off head being at least 45 metres.
- iv. 21 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 metres and the shut off head being at least 70 metres.
- v. 14 liters of water per watt peak of PV array, from a Total Dynamic Head of 70 metres and the shut off head being at least 100 metres.

The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the solar intensity, location, season, etc.

Use of a tracking system to enhance the availability of solar radiation to lift desired quantity of water is desirable. It should be specified whether the minimum water output is achieved directly or through tracking of PV Array. The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the location, season, etc.

### **PV ARRAY**

The SPV water pumping system should be operated with a PV array capacity in the range of 200 watts peak to 3000 watts peak, measured under standard Test Conditions (STC)

Sufficient number of modules in series and parallel could be used to ensure optimal efficiency to obtain the required PV array maximum power output. The power output of individual PV modules used in the PV array, under STC, should be a minimum of 75 watts peak, with adequate provision for measurement tolerances. Use of PV modules with higher power output is preferred.

### **PV MODULES**

a. Indigenously produced PV module (s) containing monocrystalline silicon solar cells with following features should be used in the PV array for the SPV Water Pumping systems:

- Modules supplied with the SPV water pumping systems should have certificate as per IEC 61215 specifications or equivalent National or International/ Standards.
- Modules must qualify to IEC 61730 Part I and II for safety qualification testing.

- The efficiency of the PV modules should be minimum 13% and fill factor should be more than 70%.
- The terminal box on the module should have a provision for “Opening” for replacing the cable, if required.

•The PV modules must confirm to the latest edition of any of the following IEC / equivalent BIS Standards for PV module design qualification and type approval

Crystalline Silicon Terrestrial PV Modules	IEC 61215 / IS14286
Thin Film Terrestrial PV Modules	IEC 61646 / Equivalent IS (Under Dev.)
Concentrator PV Modules & Assemblies	IEC 62108

- In addition, the modules must conform to IEC 61730 Part 1-requirements for construction & Part 2 - requirements for testing, for safety qualification or Equivalent IS (Under Dev.)
- PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701 / IS 61701.
- Solar Module shall be crystalline type & made of transmissivity glass front surface giving high encapsulation gain, employing lamination technology using established polymer (EVA) & tedlar or polyester back sheet & hot butyl rubber edge sealant for module protection & mechanical support.
- All materials used have a proven history of reliable & stable operation in external applications. It shall perform satisfactorily with temperatures between -10 deg C & +85 Deg C & withstand gust up to 200 Km/hr. from back side of the panel. Mounting structure shall have zinc coating of 120 micron.  
Each module shall have low Iron tempered 3mm thick high transmission toughened glass front for strength & superior light transmission. It shall also have tough Tedlar / Polyester back sheet for environment protection against moisture & provide high voltage electrical insulation.
- The module frame is made of light weight anodized aluminium frame with edge sealant around the laminate, which is electrolytic alloy compatible with the structural material used for mounting the module.

## **IDENTIFICATION AND TRACEABILITY**

• Each PV module must use a RF identification tag (RFID), which must contain the following information:

- (i) Name of the manufacturer of PV Module (ii) Model or Type Number
- (iii) Serial Number
- (iv) Month and year of the manufacture
- (v) I-V curve for the module
- (vi) Peak Wattage of the module at 16.4 volts (vii)  $I_m$ ,  $V_m$  and FF for the module
- (viii) Unique Serial No and Model No of the module
- (ix) Specify whether PV modules are based on without or auto tracking system
- (x) Adequate anti- theft fittings shall be provided for each solar panel.

Until March 2013, the RFID can be inside or outside the module laminate, but must be able to withstand harsh environmental conditions. However from 1st April 2013 onwards; RFID shall be mandatorily placed inside the module laminate

A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the tedlar sheet of the module.

## **MOUNTING STRUCTURES**

The PV modules will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 200km per hour. The support structure used in the pumping system will be hot dip galvanized iron (G.I) of minimum 120 micron. The structure is earthed using GI wire & GI Pipe type earthing kit.

### **The “Mounting Structure” should have the following features:**

The modules support structure shall be mild steel, hot dipped galvanized (120 micron) iron for holding the PV modules. The size of angle iron should not be less than 50x50x5mm with the required height but should be provided as per actual design in accordance with norms and guidelines.

Each panel frame structure shall be so fabricated as to be grouted on ground or roof on its legs. It will withstand severe cyclone/ storm with the speed of 200 Km/hr.

Each panel frame shall be complete with a weatherproof junction box as per the relevant BIS specifications, where the module terminals shall be interconnected and output taken.

All nuts and bolts should be made of very good quality and should be corrosion resistant.

The structure should be designed to allow easy replacement of any module.

The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.

Mounting structure for solar panels shall be provided separately in shadow free area as per MNRE guidelines.

Foundation of mounting structure shall be designed as per site specific properties of soil and water level conditions i.e. in consideration with soil bearing capacity. Minimum depth of foundation shall be designed as per requirement but should not be less than 1.5m

**BALANCE OF SYSTEM (BOS) ITEMS/ COMPONENTS**

The BOS items / components of the Solar Pumping systems deployed must confirm to the latest edition of IEC/ Equivalent BIS Standards/ MNRE Specification as specified in MNRE guidelines.

BoS item/Component	Applicable IEC/ equivalent BIS Standards	
	Standard Description	Standard Number
Power Conditioners/ Inverters*	Efficiency Measurement Environmental Testing	IEC 61683 IEC 60068 2 (6,21,27,3)
Charge controller /MPPT units*	Design Qualification Environmental Testing	IEC 62093 IEC 60068 2 (6,21,27,3)
Storage Batteries	General Requirements & Methods of Test Tubular Lead Acid	IEC 61427 IS 1651/IS 133369
Cables	General Test and Methods PVC insulated cables for working voltages up to and including 1100 VDC, UV resistant for outdoor installation	IEC 60189 IS 694/ IS 1554 IS/IEC 69947
Switches/ Circuit Breakers/ Connectors	General Requirements Connectors- safety	IS/IEC 60947 part I,II,III EN 50521
Junction Boxes/ Enclosures	General Requirements	IP 65 (for outdoor)/IP 21 (for indoor) IEC 62208
SPV System Design	PV stand-alone system design verification	IEC 62124
Installation Practices	Electrical Installation of building requirements for SPV supply systems.	IEC 60364-7-712

**\*Must additionally confirm to the relevant National/International Electrical Safety Standards.**

**TESTING**

PV modules must qualify (enclose test reports/ certificate from IEC/NABL accredited laboratory) as per relevant

IEC standard. Additionally the performance of PV modules at STC conditions must be tested and approved by one of the IEC / NABL accredited Testing Laboratories including Solar Energy Centre. For small capacity PV modules up to 50Wp capacity STC performance as above will be sufficient. However, qualification certificate from IEC/NABL accredited laboratory as per relevant standard in accordance with MNRE guidelines for any of the higher wattage regular module should be accompanied with the STC report/ certificate. Test report shall comply the MNRE requirement as specified in preceding para in duty cycle.

### **VALIDITY OF CERTIFICATION**

The validity of the existing Certificates/Reports in the old format/procedure shall be valid till March 2013 only. Manufactures are advised to get their samples tested as per the new format/procedure before 31st March 2014, whose validity shall be for five years.

### **WARRANTY**

PV modules used in solar pumping systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. The mechanical structures, electrical works including power conditioners /inverters / charge controllers / maximum power point tracker units/ distribution boards /digital meters/ switchgear/storage batteries, etc. and overall workmanship of the SPV power plants / systems must be warranted against any manufacturing / design /installation defects for a minimum **period of 5 years.**

### **MOTOR PUMP SET**

**DC Motor Pump sets are permitted to be used in the Handpump attached SPV water pumping system confirming to the CE specifications & 2006/42/EC standards used EN809-2009**

- DC Submersible motor pump sets shall be having CE as well as MNRE certification in accordance with the required specifications
- Required Submersible motor pump sets shall have either CE / IS marking
- The overall combined efficiency (Wire to water efficiency should be > 50%) and over all combined efficiency motor pumps sets at 10 meter total head should be 45%.
- The pump should be provided with specially developed mechanical seals which ensure zero leakage.
- The motor is of 1-5 HP having BLDC in case of D.C. Motor Pump Sets. The suction and delivery head will depend on the site specific condition of the field.
- Submersible DC pumps could also be used according to the technical need of the particular case.
- The suction/ delivery pipe (GI/HDPE), electric cables, floating assembly, civil work and other fittings required to install the system.
- The following details should be marked indelibly on the motor pump set
  - a. Name of the Manufacturer or Distinctive Logo.

b. Model Number

c. Serial Number

The manufacturer of the PV pumping system will submit a declaration that the PV array size has been selected for optimal matching with the motor pump sets to give the desired water output performance. They will also report the overall efficiency of the motor pump set used by them.

### **Solar Submersible Pump**

1. Submersible DC Pump models shall be of light weight S.S. grade 304 material suitable for drinking water with installed controller
2. Make – Grundfos/Lorentz
3. Pump type – Helical rotor brush less permanent magnet
4. Rated rpm – 500 to 3600
5. Rated Voltage – Range 30 to 300 V
6. Rated Current – 8.4 amp (max)
7. Built-in Features
  - a. Dry run protection
  - b. Over and under voltage protection
  - c. Overload Protection
  - d. Temperature Protection
  - e. ISI mark cable 3 core x 2.5 sq mm
8. Enclosure class shall be in accordance with IP 68
9. Junction Boxes, DC Distribution boxes as per IP 61 specifications.
10. Installation and safety requirements should be as per IEC 62548 or equivalent BIS standard.
11. Pumps including motor shall have CE conformity certification.
12. Under the “Average Daily Solar Radiation” condition of 7.15 KWh/sq.m. on the surface of PV array (i.e. coplanar with the PV Modules), the minimum water output from a Solar PV Water Pumping System at different “Total Dynamic Heads” should be as specified below:

- i. 100 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 metres (Suction head, if applicable, minimum of 7 metres) and with the shut off head being at least 12 metres.
- ii. 55 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 metres (Suction head, if applicable, minimum of 7 metres) and with the shut off head being at least 25 metres.
- iii. 35 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 metres and the shut off head being at least 45 metres.
- iv. 21 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 metres and the shut off head being at least 70 metres.
- v. 14 liters of water per watt peak of PV array, from a Total Dynamic Head of 70 metres and the shut off head being at least 100 metres.

Manufacturer will also report the wire to water efficiency of the motor-pump set used by them & submit copy of the test report as proof to (MNRE) Solar Energy Centre.

#### **ELECTRONICS AND PROTECTIONS**

- Adequate protection should be incorporated against dry operation of motor pump set, protection against lightning and hails and storms. Full protection against open circuit, accidental short circuit and reverse polarity should be provided.
- Junction box with hinged, weather-proof lid, captive screws, three cable glands entry points & one cable gland (standard)
- Auto Water level float switch at Over Head Tank.

#### **AUTO WATER LEVEL CONTROLLER WITHOUT BATTERY**

- Automatic OFF/ON Electronic unit for controlling water level in the tank and MCB switch.

#### **CABLE**

1. 3 core x 2.5 sq.mm cable as per IS 694
  - a. For 60 mtr. Solar Hand Pumping System – 70 mtrs
  - b. For 75 mtr. Solar Hand Pumping System – 85 mtrs
  - c. For 90 mtr. Solar Hand Pumping System – 100 mtrs
  - d. For 105 mtr. Solar Hand Pumping System – 115 mtrs
  - e. For 120 mtr. Solar Hand Pumping System – 130 mtrs

## OVERHEAD TANK FOR SPV

1. Tenderer should provide design and certificate from certified civil engineer at the time of installation and commissioning.
2. The tank will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of dead the tank and structure, live load of high wind velocities up to 200 km / hour. The support structure should be of 3 m staging (from level to bottom of tank). Structure shall be supported on 80 ∅ GI pipe class medium or 80 mm x 80 mm x 8 mm GI Square and 32 GI pipe class medium or 80 mm wide and 8 mm thick mm cross strudes as shown in enclosed drawing at different stages as well as supporting braces at Ground level and at 3 m & 6 m stage of 65 mm ∅ GI class medium pipe or 65 x 65 x 6 mm cross to be provided for the mounting structure to be used in the pumping system will be hot dip galvanized. Structure be strong enough (Main columns and base frame (supporting base of the tank shall consist of 25 ∅ thick total in 12 nos – 6 nos direction) for Overhead Tank and supporting structure.  
Tank as details shown in attached drawing to hold minimum dead load of 12 tones and cater to a minimum of 200km/hr wind. Complete structure shall have epoxy coating duly painted with anticorrosive paint. Interconnecting pipes for desired heights, fittings & specials as required for inlet, outlet scour and overflow as well as stand post interconnecting pipes shall be part of the system. RCC Concrete foundation with M200 as per IS 456 should be of size 750 x 750 x 1500 (depth) - 4 nos. Foundation bolt – M 16 900mm (length) -16 nos. 4 nos. for each concrete foundation. Civil work for essential for erection of Overhead Tank structure as per site condition and soil formation as per enclosed drawing.  
Tank shall be provided with inlet, Outlet, Overflow, scour of 32 mm, GI pipe as per IS 1239 inclusive of installation GM gate valve control as per attached drawing. All the mounting structure material shall be ISI marked.  
Construction of one standpost at a distance of 20 to 25 m away from the tank shall be part of system including 2 standpost with 1 taps each.  
Hot Dip galvanized 1 standpost with 1 taps. Standpost will consist of 4 nos of ½ inch tap at height min 800 mm.  
All the related civil works like platform, waste water drainage system shall be user responsibility.  
Plumbing outside the periphery of 10 mtrs for interconnection of Tubewell to overhead tank shall be charged extra as per approved drawing.
3. The structure should be sized to hold 5,000 liters LLDPE water tank duly ISI marked.
4. The structure should be hot dip galvanized.
5. Providing 0.75 m wide suitable MS/ CI Stair case from ground level to up to Over Head Tank Base duly welded with the mounting structure.

## LIST OF MAKE OF DIFFERENT EQUIPMENT

SL.NO	MATERIAL WORK	SUPPLIER, MANUFACTURER, VENDER, AGENCY
1	M.S. Pipe	Jindal/Surya
2	Submersible Cable	CCI, Finolex, Havells
3	PVC Tank	Syntex/Tirupati



4	Solar DC Pump	Lorentz, Grundfos
5	Solar PV Array	PV Power Tech, Vikram Solar, Soma Solar, Gautam Solar, EMMVEE Solar
6	Controller	Kirlosker

## **OTHER FEATURES**

The following details should be marked individually on the motor pump set and the photovoltaic modules:

- a. Name of the manufacturer of the distinctive Logo.
- b. Model No.
- c. Serial No.

An operation, instruction and maintenance manual, in English and Hindi should be provided with the solar PV pumping systems. The following minimum details must be provided in the manual: -

- a. About Photovoltaic
- b. About Solar Pump
- c. About PV module
- d. About Motor Pump Set
- e. Clear instruction about mounting of PV module.
- f. DO's and DON'T
- g. Clear instructions of regular maintenance and trouble shooting of pumping system.
- h. Name and address of the person or center to be contacted in case of failure or complain.

Components & parts used in the solar pumping systems including the metallic structure should confirm to the BIS specifications, wherever such specification are available and applicable.

The PV module will be warranted for a minimum period of 10 years from the date of supply and the complete SPV water pumping system will be warranted for a minimum period of 5 years from the date of installation.

The designer must satisfy himself regarding quantity and quality wise supply of Solar Modules / panel, Solar Photovoltaic (SPV) with support structures, DC motors pumps, storage tank with supporting structure as well as all aspects of supplying, installation, commissioning & testing of solar infrastructural facility. The scope of work includes supply, installation & commissioning of Solar PV Water Pumps on bore-well of minimum 4" diameter (to be provided by the user) at various sites as per the technical specification mentioned.

However, manufacturer/ supplier shall ensure that GI mounting structure is efficient, strong enough to sustain load and is capable against high wind velocity.

### **O/M Manual**

An Operation and Maintenance Manual, in English and the local language, should be provided with the solar PV pumping system

The following minimum details must be provided in the Manual:

- a. About photovoltaic
- b. About solar pump
- c. About PV module

- d. About motor pump set
- e. Clear instructions about mounting of PV module.
- f. About electronics used in DC motor pump sets, if any
- g. DO's and DONT's,
- h. Clear instructions on regular maintenance and Trouble Shooting of the pumping system.
- i. Name & address of the person or Centre to be contacted in case of failure or complaint.

The warranty card to be supplied by the manufactures with the system must contain the serial no. of PV modules, motor pump sets, electronics if any and the relevant date about the validity of warrantee. The full name and address of contact person(s) for after sale service and warranty obligation must also be stated on the warrantee card. The copy of the warrantee card will be provided to UPJN also. The manufacturer can also provide additional information's about the system and conditions of warranty as necessary.

## **11.0 CESSPOOL VEHICLE AND SLUDGE PUMP**

### **SUPPLY OF CESSPOOL VEHICLE**

#### **General**

The equipment shall be a Mobile Unit suitable for desludging, dislodging and removing obstruction and blockages from containments (pits/septic tanks etc.) by a High Vacuum suctioning the Sludge/slurry by Vacuum Suction System and discharging the collected sludge by Hydraulic Tipping of the Tank, alternatively through Blow-back Arrangement.

#### **System Description**

The Jetting and Suction Unit mounted on mobile unit will comprise of the following:

- Driving System
- Tank
- Exhauster / Compressor–Indian/ Imported make
- Hydraulic System & Controls- Indian/ Imported Make
- Accessories

#### **Driving System**

The Engine of the Truck/ Tractor will be utilized to drive the vacuum pump through a split- shaft power take-off unit installed between the vehicle gear box and the differential unit. The Hydraulic pump shall be driven through the side Power Take Off (PTO) of the truck/ tractor gear box.

#### **Tanker**

The cylindrical tank and Dishends shall be fabricated out of 5mm thick MS Plates conforming to IS:2062 grade. The tank shall have a capacity of 1000 & 4000 Ltrs. The tank will be mounted on an appropriate sub-frame, which in turn will be bolted to the truck/ tractor chassis. The tank exterior will be spray painted with a coat of superior quality anticorrosive primer and two coats of enamel paint of reputed make. The tank interior will be coated with two coats of anti-corrosive epoxy paint.

The tank has Blow– Back arrangement for discharge of material from the sludge tank using the Exhauster/Compressor mode. The Blow-back Arrangement will be more hygienic and cleaner way of evacuating the sludge from the tank by pressurizing the tank when the exhauster will run in compressor mode.

#### **Exhauster / Compressor / Imported Unit**

The Exhauster / Compressor shall be of proven design with rated capacity of 7000 LPM of air flow and will be capable of generating vacuum of up to 90% Vacuum during suction and alternatively pressure of upto 1.5 Bar under pressure mode during Blow-back. The unit will be utilized for operating under vacuum for suctioning sludge through a 80mm dia. suction hose and alternatively in pressure mode for discharging the sludge by Blow back arrangement from the tank. Under the pressure mode, compressed air can be injected in to the Sewer Manhole, Septic Tank, etc for agitating the sludge/ slurry before suction.

## Hydraulic System/Controls

The Hydraulic System includes hydraulic pump driven by vehicle PTO, hydraulic tipping cylinder, hydraulic tank, oil pipe and control valve. All the controls required for operation of the hydraulic system are grouped and mounted at a convenient place at the rear end so that the entire controls/ operations of the system is affected from a single location.

### Accessories

2Nos., 80 feet Long heavy duty, PVC flexible suction hoses of 80 mm internal dia meter and fitted with quick action couplings shall be provided along with the equipment.

Component	Specifications/ Description
Truck Chassis - Model &GVW	TATA/Ashok Leyland/Eicher Motororequivalent GVW-9Ton2Axle
Vacuum-cum- CompressorPump • Make • Displacement • Vacuum Pressure	Indian/ Imported Make 7000LPM 700 mmHg (90% vacuum) 1.50Bar
Suction Hose- • Internal Dia • Max.Length • Max.Depth	80mminternal dia 80feetlong 5 m depth
Cylindrical tankandDish ends- • Thickness • Material & • Grade	5 mm thick MS Plates IS:2062grade A
Hydraulic System/ Control- • Make	Indian/ Imported Make

### Sludge Pumps

Sludge pump (monoblock type) may be used from one of the following makes with rated power of 1, 2, 3 ,5 or 10 HP and corresponding capacity in liters as per 10 m and 5 m head height or as suitable according to the proposed design. It is encouraged to use most efficient pumps from performance vs electricity consumption point of view. The pumps should have feature of automatic self-priming and designed for automatic air release during priming. Also the impeller should be non-clogging type to be able to handle suspended solids.

Manufacturers:

1. Crompton
2. Kirloskar
3. Wilo
4. Grundfos
5. CNP

## 12. FAECAL SLUDGE & TREATMENT PLANT (FSTP)

### 12.01 WHAT IS FECAL SLUDGE/ SEPTAGE

The settled solid matter in semi-solid condition usually a mixture of solids and water settled at the bottom of septic tank is called Fecal Sludge/ Septage. It has an offensive odour, appearance and is high in organics and pathogenic micro-organisms. This semi-solid material is pumped from a septic tank, cesspool, or other primary treatment source. A septic tank will usually retain 60 to 70% of the solids, oil, and grease that passes through the system. Septage is further classified according to the environment in which it is generated.

#### Septage characteristics

Septage is highly variable and organic, with significant levels of grease, grit, hair, and debris.

The liquids and solids pumped from a septic tank or cesspool have an offensive odor and appearance, a tendency to foam upon agitation, and a resistance to settling and dewatering. *Septage is also a host for many disease-causing viruses, bacteria, and parasites. As a result, septage requires special handling and treatment.*

Factors that affect the physical characteristics of septage are: climate, user habits, septic tank size vs daily load, design, pumping/ cleaning frequency, water supply characteristics, garbage disposals, household chemicals, and water softeners. **Table 1** lists the characteristics and limits of domestic septage.

**TABLE 1: Physical and Chemical Characteristics of Septage  
CONVENTIONAL PARAMETERS**

Constituents (all units but for pH are in mg/l)	Average	Range
Biological Oxygen Demand (BOD)	6,480	440 - 78,600
Chemical oxygen demand (COD)	31,900	1,500 - 7,03,00 0
Total Solids	34,106	1,132 - 1,30,74 5
Total Volatile Solids	23,100	353 - 71,402
Total Suspended	12,862	310 -

Solids		93,378
Volatile Suspended Solids	9,027	95 - 51,500
Total Kjeldahl nitrogen	588	66 - 1,060
Ammonia nitrogen	97	3 - 116
Total phosphorus	210	20 - 760
Alkalinity	970	522 - 4,190
Grease	5600	206 - 23,368
PH		1.5 - 12.60

Source : Advisory note on Septage management in Urban India, MoUD Jan2013

## **CURRENT WRONG PRACTICES OF SEPTAGE DISPOSAL**

### **Burial & Disposal to ground water/ river streams.**

Septage burial includes disposal in holding lagoons, trenches, and sanitary landfills. There is a high odor potential during septage application until a final cover is placed on top. It is essential to select an appropriate site for disposal not only to control odors, but to avoid groundwater pollution/ contamination. It is seen that in many developing countries, people connect the septage overflow to ground water which contaminates the complete water table of a large area. Not only this, there are practices in which people put septage in rivers/ water streams which leads to a large scale water pollution which is a very dangerous situation for future generations.

### **Surface application**

Septage is applied to the land as a soil fertilizer/ conditioner. Application rates depend on the slope, soil type, depth of application, drainage class, and hydraulic loading. Septage must not be applied before or during rainfall or on frozen ground. Thus, an interim storage facility is needed. Most countries require septage to be treated and disinfected before application to avoid break-outs of diseases to public at large.

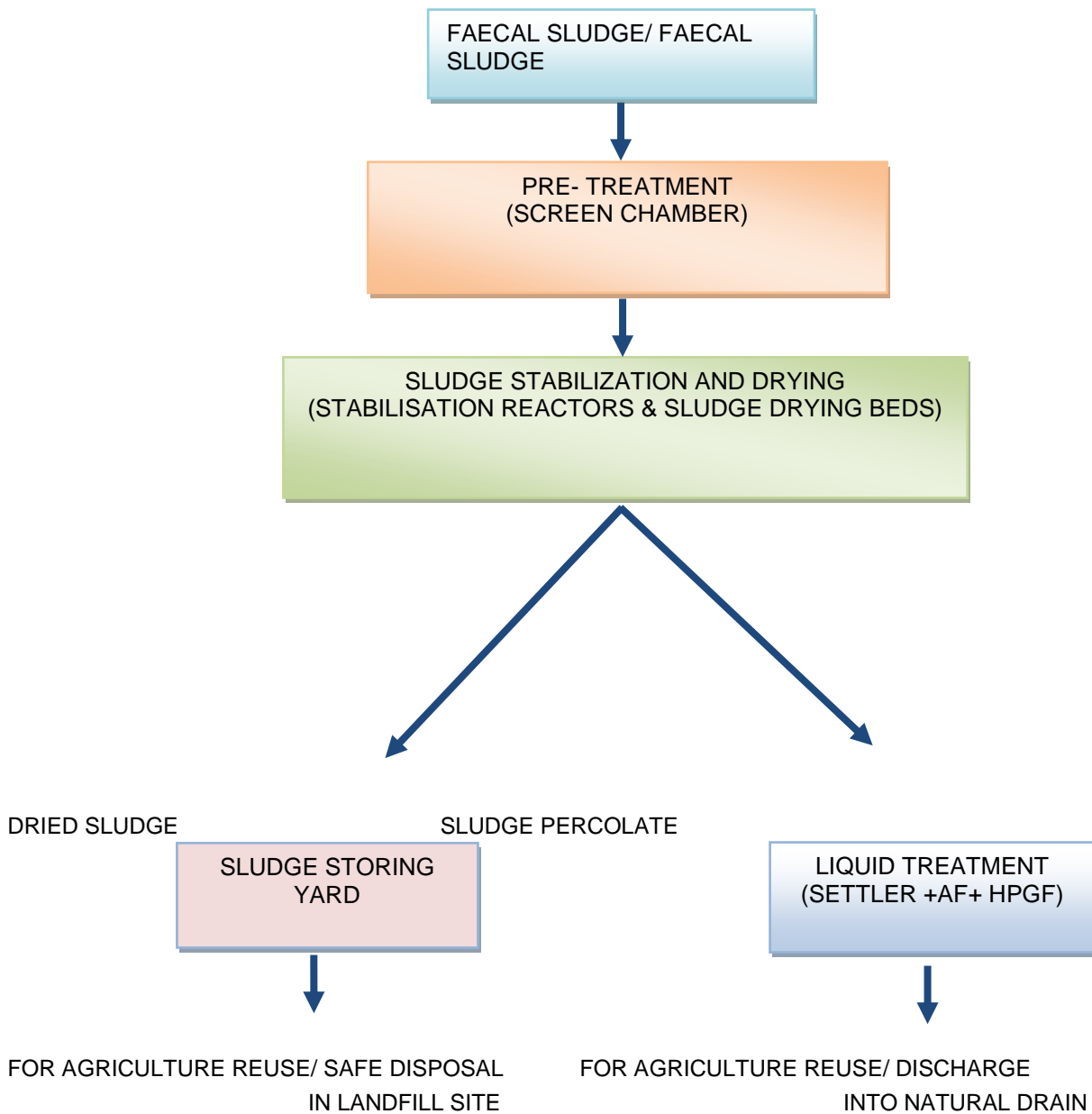
### **Correct methods of Septage Treatment**

Septage characteristics are highly variable and it hosts many disease causing bacteria, viruses and parasites as explained above, including solid content which is many times more than a normal STP influent that too in an already decomposed state which makes it difficult to treat as compared to an STP plant. As septage is also resistant to dewatering, conditioning agents are to be used based on the load and

its characteristics.

Septage treatment plants also use processes to dewater conditioned sludge such as screw presses, plate and frame presses, belt presses, rotary vacuum filters, Centrifugal filters, gravity and vacuum-assisted drying beds, and sand drying beds. Once the septage is dewatered, the liquid residual then undergo further biological & chemical treatments for further removal of organic matter and disinfection and then it is discharged or utilized. Septage solids are separately sent to either a landfill, composted, applied to the land, or incinerated. Specifically designed processes are required for the right treatment which are dependent on many factors as explained in Design Criterion below.

**Line Diagram Showing Treatment process.**





## **DESIGN CRITERIA**

The Design considerations cannot be generalized because of the wide range of combination of processes which largely depends on the factors mentioned below.

- Septage Characteristics
- Regular volume of Septage/ min – max range
- Land area available
- Local septage collection regulations
- Regional treated water quality regulations/ parameters
- Electricity Supply condition
- Local Weather conditions
- Annual Rainfall
- The above information is essential for design purposes and determining typical design values for treatment and disposal of water as well as sludge. Independent septage treatment plants use the below processes independently or in combination as per needs and other factors as explained in the design criterion before. In many situations it is required to design specific processes to get the right results as well as accommodate any shock periods when the daily volume is moderately low or high.

-

## **GENERAL STEPS FOR SEPTAGE TREATMENT PROCESSES**

- 1) Pre-treatment: Septage Screening/ Grit filtration
- 2) Primary treatment I: Sludge Stabilization/ Conditioning
- 3) Primary treatment II: Solid Liquid Separation- By Gravity or by electromechanical means
- 4) Secondary treatment: Liquid Biological and chemical treatment: Aerobic digestion, Anaerobic digestion, PGF or a combination of these.
- 5) Tertiary treatment: Sand/ ACF filter, Polishing Pond, UV etc. depending on the need as per regulations.
- 6) Solid Treatment- Co- Composting with organic waste or bulking agent/s for disinfection to be further used for soil conditioning.

1. Pretreatment: Septage Screening and grit Filtration: Faecal sludge contains many foreign particles such as plastic containers, fibrous material, metals, stones, sanitary napkins, and plastic bags etc. which are usually inorganic / inert in nature and can disturb further treatment. Hence it becomes necessary that such materials be removed from faecal sludge by the method of screening and grit filtration. Screening/ Grit chamber can be made in several different ways and with the use of several different materials like Concrete chamber mounted with M.S. or S.S. screening unit.

The desludging truck carrying faecal sludge will be directed to a receiving point inside the treatment facility. The faecal sludge received at the treatment facility will be discharged into the screen and grit chamber by means of gravity where it undergoes pre-treatment without any exposure to the desludging operator. Large and inorganic solids are trapped in this using a vertical screen and Grit chamber. The solids collected at this chamber is removed regularly and can be dumped along with municipal solid waste arrangement made by the corporation.

2. Primary treatment I: Sludge Stabilization/ Conditioning/ Homogenization: Every truck load can show huge differences in the characteristics of faecal sludge including PH Levels, composition of organic/ inorganic matter, stage of decomposition etc. These variations can affect the downstream processes hence it is necessary to stabilize/ homogenize the various sludge loads and aim at achieving a consistent characteristic of faecal sludge for further treatment.

This is normally done through stabilization tank where the liquid sludge (mixture of liquid and solids in slurry form) from the screen and grit chamber is further conveyed to a Sludge Stabilization Reactor through gravity for treatment. The objective of this step is to reduce the degradable biological and microbial pollutants that are present in solids for improving its dewatering ability.

The separated solids have already undergone partial digestion in the on-site containment unit at the household level, it is hence required that these solids be treated further using biological or chemical methods because it has moisture which is bound to it chemically or physically and which cannot be separated using a simple solid liquid separation devise. The moisture content is so significant that the solids in this state cannot be packed or distributed for reuse. It hence becomes necessary for the ease of handling, that the treated solids be dried to at least moisture levels of 40-50%.

Depending on the geometry of the stabilization reactor, it may have three/fourtanks/ chambers, where the first chamber of the stabilization tank acts as a homogenization reactor, where the organics are mixed thoroughly. The second/third chamber provides a digestion zone for anaerobic treatment of organics present in the faecal sludge. The third/fourth chamber is a designed to collect digested sludge and pump it to further treatment modules.

Stabilization treatment is also of key importance because it decreases odors, the levels of disease-causing organisms, and the potential for putrefaction of septage. Pretreatment/ stabilization is achieved by physical, chemical, or biological processes.

1. Primary treatment II: Solid-Liquid Separation: Unlike Sewage, faecal sludge contains many times more solids and can hinder the usual methods of biological treatment. It is estimated that it can contain anywhere between 1-8% of solids. It is hence recommended that these solids be separated as much as possible in the initial stage, so that the two streams – Water and solid can be separated and thus treated easily independently. The solids collected at the bottom of the stabilization reactor in the form of slurry are pumped out for further processing in next treatment module. The next module can be:

A. Sludge Drying Beds (SDB): The sludge drying beds are structures with sloped base for holding graded filter media. The sludge undergoes liquid-solid separation and also drying. The percolate from the sludge drying bed is collected and conveyed to the Integrated Settler and AF for further treatment. The dried sludge from the drying beds are removed periodically and transferred to the sludge storage shed located within the premises. The main benefit of using SDB is that it works purely on gravity and thus there is no problem of any mechanical failure. On the other hand the biggest disadvantage of using SDB is that it is a slow process and occupies a large area and cannot function during rainy season.

B. Screw Press with Drying/ composting beds: The Screw-press uses pump to pull the material to be separated and conveys it using the screw conveyor inside. The liquid phase is separated through the mesh of the cylindrical screen which encloses the screw conveyor. Along its path toward the exit, the material gradually separates progressively the less linked liquid and then the more strongly linked liquid until almost most of the liquid has been squeezed out and almost semi-dry like material has formed before the outlet. The semi-dry material is continuously expelled through the outlet diaphragm.

Once the sludge undergoes liquid-solid separation, the percolate/ waste water from the press is conveyed to the Integrated Settler and AF for further treatment. The semi-dried sludge coming out from the press is collected and transferred to dryingbeds for further drying or can be mixed with organic waste and composted to make a better soil conditioner, bio-char. The main benefit of using Screw press is that the process becomes faster and can function during rainy season as well.

3. Secondary treatment: Liquid Biological and chemical treatment:

*Integrated Settler & Anaerobic/Aerobic Digestion:*

The percolate from the sludge drying bed is subjected to anaerobic/aerobic treatment in the Settler integrated with AF. It is proposed to provide the settler before the anaerobic treatment to trap any solids getting into the treatment modules. Anaerobic Filter is mainly used for further removal of remaining organic matter in the sludge percolate. Sludge is retained here for 8 to 10 days in an enclosed vessel to achieve biological reduction of organic solids.

### *Planted Gravel Filter (PGF)*

The treated wastewater from the anaerobic reactor is further treated using aerobic treatment process using the Vertical/ Horizontal Planted Gravel Filter helps in the reduction of organic matter, removal of odour and color and hygienization.

### **Tertiary treatment:**

#### *Sand/ ACF filter*

Sand filtration is the primarily used to remove residual suspended matter in wastewater. In some cases, residual toxins may be present in wastewater and to filter them out, activated carbon is used to adsorb the toxins and remove them from wastewater.

#### *Polishing Pond*

Polishing is the tertiary and final effluent wastewater treatment stage before the wastewater can eventually be discharged into natural water bodies. Polishing process involves removal of remaining suspended solids and biological oxygen demand (BOD) that may be left after secondary effluent treatment. This helps in making the water more hygienic and environmentally safe before release.

The step in polishing treatment process is called lagooning. During the polishing treatment, the water is kept in natural condition with full exposure to air and sunlight in compartmentalized or singular open water bodies which are called polishing ponds. These ponds are usually from five to eight feet deep and the water is stored in these ponds for comparatively shorter duration which can vary from one to three days. During this time, sedimentation of non-degraded and degraded suspended particles at the bottom of the pond is facilitated in a natural way. Further, aquatic plants, invertebrates and weed eating fish are introduced in the polishing pond to absorb and consume any remaining particulate matter.

The water may still be very nutrient rich with especially high phosphorus and nitrogen content. This can promote growth of algal blooms. At the same time, fish helps in keeping algal growth in check by eating algae and unnecessary weeds. Eventually, chlorine may be added to water, within safe limits if allowed by local regulations, to kill off microbes thus disinfecting the water before eventual release.

Before eventually releasing the water into nature, it is recommended to test it for contamination. Once the water meets the strict regulatory criteria of governmental and environmental agencies, it can be safely released into natural environment, for example, water bodies. The water, thus released, may not still be suitable for direct human consumption but it can be used, for example, for irrigating agricultural land,

industrial use etc.

4. Solid Treatment- *Co- Composting with organic waste or bulking agents for disinfection:*

Septage solids are mixed with a bulking agent (e.g., wood chips, sawdust, and organic waste) and aerated mechanically or by turning. Biological activity generates temperatures that are sufficiently high to destroy pathogens. The composting process converts septage into a stable, humus material that can be used as a soil conditioning/ amendment. This process tends to create odors that can be a problem if not handled properly.

**END PRODUCT QUALITY SPECIFICATIONS:**

The treatment system has two end products namely:

a) Treated Water

b) Bio Solids

**Treated Water**

Water from liquid treatment modules are stored in a polishing pond/ collection tank from where it can be reused for irrigating plantations in nearby farm lands and also can be discharged into a nearby drain.

Central Pollution Control Board/State Pollution Control Boards/ Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986”.

**Treated Water Characteristics can be summarized as:**

Parameters	Characteristics
pH	5.5-9
BOD mg/L	<30
COD mg/L	<100
Total suspended solids mg/L	<50
Faecal coliform per 100 mL	<1000

A little Bio gas is also generated during the anaerobic digestion which will be vented out. It is expensive to capture this bio gas because the quantity is not much because the matter has already been decomposed for years already. The specifications of the end products are listed below:

**Bio Solids**

Bio solids are dried sludge from drying beds and which are stored for a period of 1-3 months for further stabilization and reducing of pathogens. Sludge removed from drying beds are stored as heaps in sludge storage yards, during which helminth eggs and other pathogens get deactivated or their effectiveness reduces. Bio solids can be used as a soil conditioner for farming as they are a rich source of Nitrogen,

carbon and phosphorous.

### Bio-Solids characteristics

Parameters	Characteristics
PH at 5 % suspension	5- 7
Moisture %	10 - 30 %
Organic carbon %	10 – 25 %
Organic Nitrogen	2- 5 %
Phosphorous	0.2 – 1%
Bulk Density (Specific gravity)	0.65 – 0.9

Source: *Faecal sludge management systems approach for Implementation and Operation*, IWA Publications, 2014

Below Table specifies the discharge norms in order to reuse treated wastes as a fertilizer or soil conditioner in agriculture.

Parameter	Concentration not to exceed (mg/kg) dry basis, except for pH and carbon to nitrogen ratio)
Arsenic	10
Cadmium	5
Chromium	50
Copper	300
Lead	100
Mercury	0.15
Nickel	50
Zinc	1000
C/N Ratio	20-40
<b>pH</b>	5.5-8.5

Source: *Compost Quality (FCO) as per SWM Rules, 2016 and Dept. of Fertilizers*.

Dewatered septage to be used as a fertilizer it should satisfy the following criteria of Class A Bio-solids of US EPA (CEPT, 2015).

- Faecal coliform density < 1000 MPN/g total dry solids
- Salmonella sp. Density < 3 MPN/ 4 g of total dry solids
- Helminth egg concentration of < 1/g total solids (WHO, 2006)
- E coli of 1000/g total solids (WHO, 2006).

### ADVANTAGES AND DISADVANTAGES of FSTP

When sewerage infrastructure is not laid and the treatment facilities are too distant or do not have adequate capacity, independent septage treatment plants can be of critical importance. Such treatment plants have to be designed exclusively for treating septage and have many unit processes to handle both the liquid and solid portions of septage.

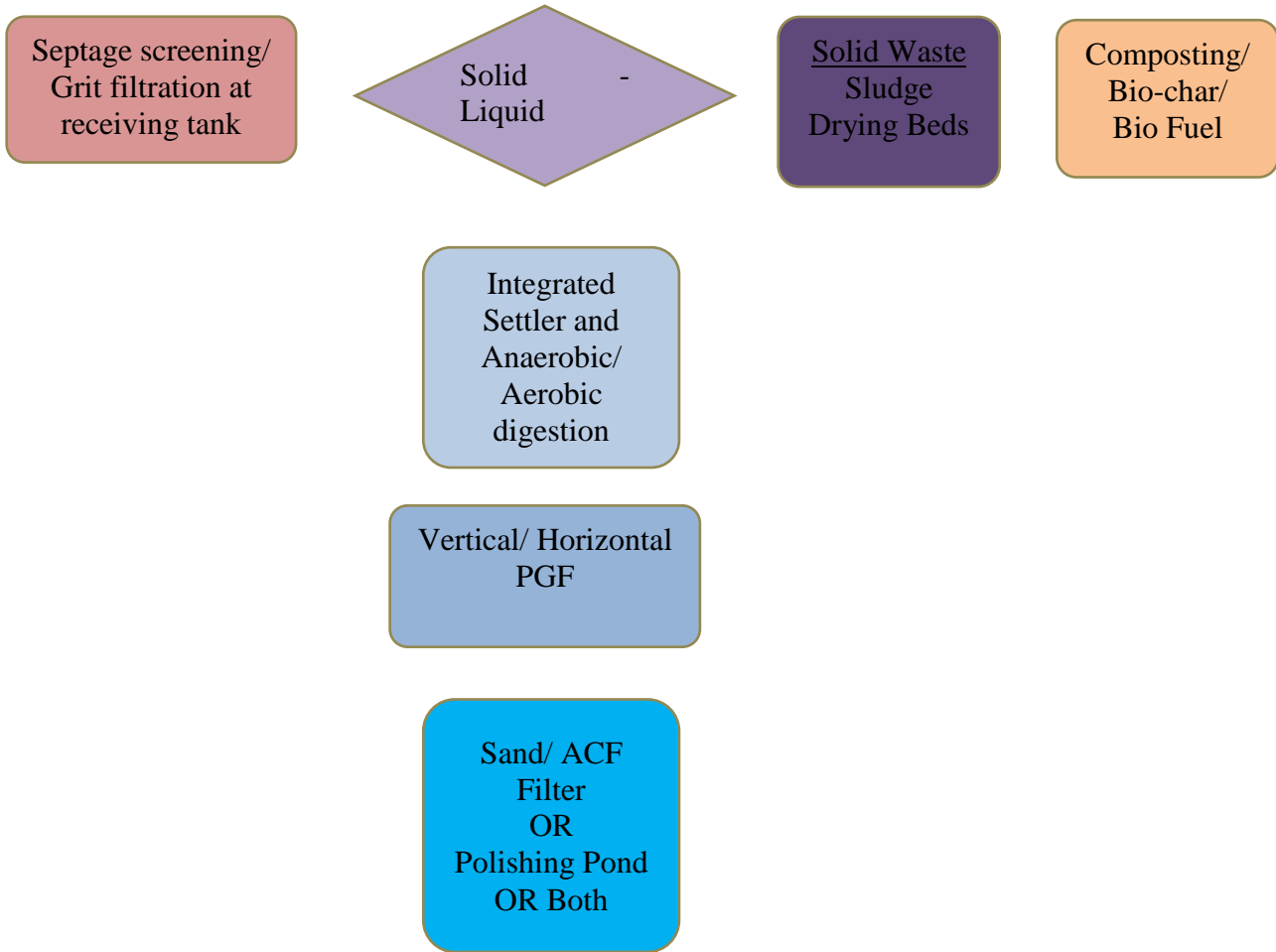
### **Advantages**

- Provides regional solutions to septage management.
- Can be operational in as less as 3 to 6 months depending on the size.
- Saves high cost of laying sewerage infrastructure in the large/ densely populated vicinity
- Saves the time and other problems that are created because of excavation of earth at various places which can be very complex in densely habited places

### **Disadvantages**

- Need vast knowledge of treatment process.
- Plant design should cater to variations in sludge characteristics and daily volume.
- Need a relatively large land area for the setup of the treatment system.
- Capital and operation and maintenance costs tend to be high.
- Some limitations of potential odor problems.

**PROCESS FLOW:**





## 12.02 TREATMENT OBJECTIVE

The objective is the treatment of the faecal sludge for safe disposal, decrease the pollution load, reduce in solids content, and create water and sludge reuse opportunities. The purpose of the safe disposal and treatment of the faecal sludge and water also contributes to a general improved health condition of water bodies. The treated wastewater should meet current disposal standards while the sludge used for fertilization should be helminth and pathogen free and not health threatening when used for farming purposes. The targets to meet are the following: BOD less than 30 mg/L and a COD less than 100 mg/L.

Besides these objectives, the FSTP is designed in a manner to ensure user friendly operation and maintenance such as low energy consumption. Low maintenance includes a large robustness towards external factors and fluctuating inflow characteristics and quantity.

Under this project, it is proposed to consider population method for taking faecal sludge quantity to treat in a day. The volume of containment unit method doesn't hold good since the desludging frequency will vary from house to house and cannot be assumed properly. The Collection based method also ignored since there is no proper collection is happening at this moment and it is impossible to project it for future years. With proper guidance and regulation it is estimated that maximum of 32 KLD of faecal sludge every day will be generated based on population method. Further considering a modular plant design aspect and also of population growth discrepancy it was decided to design a Faecal Sludge Treatment Plant of 32 cum/ KLD capacity per day.

## 12.03 CONCEPT

This faecal sludge treatment unit is designed for 32 cum capacity. The area proposed is calculated based on Total Solids content and Loading Rate of the sludge. The septage shall first be made to pass through the screen and the grit chamber for the retention of inorganic/ coarse materials/ solid waste present in the septage. Then the septage would be conveyed to Drying Bed or Solid-liquid separator.

The Drying beds are loaded with layers of sludge that are dewatered and stabilised through multiple physical and biological processes. When the sludge is deposited on the Drying Bed the solids (which form about 50% of the septage) are retained on the bed and the rest of the part which is the liquid percolate or effluent wastewater is conveyed to the registers by gravity. Alternatively 50-70% sludge is retained by soild-liquid separator and the effluent wastewater is conveyed to the registers. The final registers collects effluents from all the drying beds/ soild liquid separator and the wastewater is conveyed to for further treatment to get specified effluent norms as specified.

## 12.04 DESIGN DESCRIPTION FOR THE PROPOSED TREATMENT MODULES- CONCEPT

### *12.04.1 Screen and Grit chamber*

It is a physical method for separation of solid waste and inorganic solids like plastic, cloth, sand, slit etc. from the faecal sludge to prevent clogging of subsequent treatment modules and also enhancing the quality of treated end products. Screen chamber uses a series of vertical screens made from stainless steel and coated with anti-corrosive elements for this purpose. In the screen chamber proposed for this treatment facility there is one vertical screen with a 2.5 cm opening between vertical bars. The trash is collected in a tray by manually scrapping the screen with a rake or similar arrangement. The collected trash will be kept on perforated manhole cover to dry the liquid back to screening chamber for 5 to 10 min. Then dried solids stored and disposed along with municipal solid waste collection facility of the municipality.

Grit chambers are like sedimentation tanks, designed to separate the intended heavier inorganic

materials and to allow the lighter organic materials to pass through to the next treatment unit. Hence, the flow velocity is a decisive design consideration. The velocity should neither be too low as to cause the settling of lighter organic matter, nor should it be too high as to preclude the settlement of the silt and grit present in the sludge. A horizontal flow velocity of 15 to 30 cm /sec is used at peak flows. The detention time proposed in the grit chamber varies between 30 to 60 seconds.

***Design parameters for Screen chamber***

<b>Design parameter</b>	<b>Value</b>
Inlet flow [m <sup>3</sup> /s]	0.01
Velocity in the chamber [m/s]	0.3

### 12.04.2 *Integrated Settler and Anaerobic Filter*

The percolate from the Sludge Drying Bed/ solid-liquid separator is further subjected to treatment in Settler and Anaerobic Filter (AF). The incoming faecal sludge load has moderately high solids content, therefore it is proposed to provide a settler for sedimentation before it enters into the AF. As wastewater flows through the filter, particles are trapped and organic matter is decomposed by the biomass that is attached to the filter material.

<b>Expected output going from the settler and anaerobic filter<sup>2</sup></b>	
BOD outlet [mg/L]	59
COD outlet [mg/L]	182

<sup>2</sup> Values based on literature study and experience at other FSTP

### 12.04.3 *Planted Gravel Filter*

Organic load entering into the PGF is already within the required effluent (BOD < 30mg/L) requirement. In order to remove the odor and color and to enrich the wastewater with oxygen it is necessary to allow the wastewater to pass through aerobic treatment. PGF is made of planted filter materials consisting of graded gravel. The bottom slope is 1% and the flow direction is horizontal. The main plants used in this filter bed are *Canna indica*, *Reed juncus*, *Papyrus* and *Phragmites*. The plant selection is mainly based on their ability to grow in wastewater and have their roots spread wide. PGF also aids in reducing the nutrients such as Nitrogen, Phosphorous and potassium present in wastewater.

### *Planted Gravel Filter*



### 12.04.4 *Filter Media*

All filter media such as sand, gravel and other coarse aggregates to be used in the treatment module such as sludge drying beds, anaerobic filter and planted gravel filter to be washed thoroughly to remove silt and flaks before installing. Further details are as follows:

Sizes	<b>Fineness modulus</b>
6-8 mm aggregates	< 6
10-12 mm aggregates	< 7.2
50-70 mm aggregates	8.5-9
16-20 mm aggregates	<6.8
90-120 mm aggregates	>8

Coarse aggregates to be sourced from a single mine after inspection and seive test carried out as per instruction of the engineer. The below would be the range of recommended fineness modulus for various aggregates used.

The aggregates have to be cleaned and sampled for analysis of fineness modulus, only after the results are as per the requirement, would the aggregates be used for the desired purpose as per design.

Sand is to be sourced from natural sources such as river bed or ravines. The fineness modulus of sand to be used for sludge drying bed is to be between 3 - 4, with a majority of particles passing through sieve opening of 2.36 mm but straining on a 0.6 mm sieve. The sand has to be free from silt, this can be ensured by washing of sand thoroughly or through sieving and conducting onsite inspection as per directions of the engineer. Only sieved and/or washed sand with no clay content is to be used in the drying beds.

Cinder is the preferred filter material to be used in anaerobic filter, any other material can also be preferred which is economical, easily available, inert in sewage and does not disintegrate under continuous submerged conditions. The filter media must have a specific surface area of at least 100 m<sup>2</sup> per m<sup>3</sup> with a void ratio of at least 45%.

#### **12.04.5 Sand and Carbon Filter**

After the aerobic treatment the treated wastewater will be conveyed into pressurized sand and carbon filter for further treatment to reduce BOD levels < 10mg/l. The use of this unit depends on the requirement of desired quality of final treated wastewater. Pressurized Sand Filter is recommended for the removal of suspended & visible impurities like sand, silt, heavy metals etc. It reduces Turbidity and TSS of water. It contains Graded Sand media inside Pressure Vessel. Activated Carbon Filter removes Colour, Odour, organic matter, VOC, Chlorine and hundreds of manmade chemicals through Adsorption. It contains Activated Carbon (Higher the Iodine Value of Activated Carbon, better the quality) supported by Gravels & Pebbles inside Pressure Vessel.

#### ***Sand and Carbon Filter***



## **GENERAL:**

- 1- Land development for the FSTP including transporting the material up to a lead of 5 km and lift upto 3.00 m, laying in layers, spreading, levelling, breaking clods and dressing the bank work including watering and ramming and including royalty of material etc. complete.
- 2- Supply of all materials, labour, T&P etc. for proper completion of work.
- 3- R.C.C. work in cement and coarse sand, 15 to 20 mm gauge ballast M25 but excluding supply of reinforcement and its bending with 0.5 mm thick binding wire ( to be supplied by the contractor) including centering, shuttering and supply of all materials, labour, T&P required for the completion of the work including curing etc. all complete for Well curb, Well Steining, Raft, Platform, Beam , Column and Dividing Wall.
- 4- Construction of Coarse Screen Channel as per approved design / drawing.
- 5- R.C.C. work as per approved grade of concrete with cement, coarse sand and 20 mm gauge stone grit in slab, beam including the supply of reinforcement and including its proper binding the same with 0.05 mm thick binding wire to be supply also include supply of all labour, material, T&P etc. required for the proper completion of the work.
- 6- Two coats of enamel paint over metal surfaces (like gate, windows etc), properly finished; including supply of all labour, material, T&P required for proper completion of the work.
- 7- 20 mm thick D.P.C. with cement and approved coarse sand 1:2 including 5% water proofing material of standard quality; including supply of necessary bends, fixtures etc. complete.
- 8- Fixing of pump foundation, delivery pipe support, foundation of starter and repair of wall for fixing of panel and switch boards.
- 9- Selection of Power Source: The power source will be the local electricity grid and solar PV panels.
- 10- All as per Manual on Feacal Sludge Treatment, G.O.I.

## **SITE FORMATS**

Name of the Project:												
DAILY PROGRESS REPORT									Date:			
S. No	Activity	Start	Finish	Quantity	Unit	Work done till		Work done on		Cumulative work done		Overall Completion
						Target	Actual	Target	Actual	Target	Actual	

MANPOWER DEPLOYMENT STATUS			PLANT & EQUIPMENTS		MATERIAL RECEIPT		
S. No	Category	Nos.	Category	Nos.	Item	Quantity	Remarks
1	Mason		Excavator JCB				
2	Carpenter		Excavator POCLAIN				
3	Fitter		Dumper				
4	Plumber		Batching Plant				
5	Operator		Concrete Mixer				
6	Painter		Concrete Pump				
7	Electrician		Vibrator				
8	Mechanic		Welding Machine				
9	Welder/Rigger		De-watering Pumps				
10	Mate		Cube testing Machine				
11	Male Mazdoor		Compressor				
12	Tapker (Stone cutting)		Rock Splitter				
13	Helper		Cutting & Bending Machine				
	TOTAL						

REMARKS :



**INSPECTION SLIP FOR PLASTERING WORKS**

Structure / Building:		Date:		
Location:		Approximate Quantity:		Remarks
S. No.	Description of Item	Observation		
		Contractor's Engineer	Engineer In-charge	
1	Block masonry and concrete surface are found clean, free from duct loose material, oil, grease, mortar droppings, nails, steel wooden pieces, wire etc.			
2	Joints in blocks masonry are raked to a depth of 10mm			
3	Surface to be plastered is made sufficiently damp.			
4	Unavoidable projections in masonry and concrete is chiselled			
5	Hacking on concrete surface is sufficiently deep and distance between hacking is not more than 25-40mm			
6	Any leakage's observed before plastering.			
7	If yes, leakages have rectified.			
8	Joints between concrete surface and masonry are properly filled with cement mortar or sealant before applying plaster.			
9	Joints, concealing and repaired areas are covered with chicken mesh of 300mm wide.			

10	Mark up is made before plaster at interval not more than the size of bottom ----- to be used.			
11	Grading of sand, silt and dust are within the permissible limit.			
12	Thickness of single coat plaster is not less than 12mm and not more than 15mm			
13	Door frames are free from cracks, knots etc.			
14	6 Nos. hold fast fixed properly			
15	Frames are fixed in plumb			
16	All above points checked and permitted to start plaster			
	Observations			
	Plaster is in line and level, the difference in plumb is not more than 2mm			
	Neeru finish is of 2mm to 3mm and is applied over the plaster when it has just hardened			
	Curing is done on neeru plaster by slightly sprinkling water.			
	After neeru finish the room dimensions are checked and they are of size .....mm x .....mm x ..... Mm.			
Signature of Contractor's Engineer		Signature of Engineer In-charge		

## FORM WORK CHECK LIST

Name of Project :

Client :

Contractor : Inspection Required on :

Name of Building:

Concrete Element & Location : Date : / / Time: -

Approved Drawing No. : Inspection Request No.:

Y=Yes, N=No and Na= Not Applicable. Date : / / Time : -

S. No.	Name of Activities	Contractor's Engineer	Engineer In- charge
1	Formwork design/ drawing/ sketch approved including de-shuttering arrangements.		
2	Trial panel approved ( if required)		
3	Formwork alignment correct		
4	Formwork level correct		
5	Formwork dimensions correct		
6	Formwork member quality acceptable.		
7	False work member sizes correct		
8	Face boarding/ plywood/ metal thickness correct		
9	Joints between panels closed ( no gaps)		
10	Joints between panels flush ( no steps/ lips)		
11	Panel flatness acceptable		
12	Tie rod material sizes/ spacing/ material correct		
13	Tie rods tight, face cone flush		
14	Box outs, cast -in -items, ducts fixed correctly, securely		

15	Chamfers/ fillets sizes, straightness, fixing acceptable.		
16	Formwork clean		
17	Formwork release oil material approved		
18	Formwork release oil applied correctly		
19	Contraction / expansion joint preparation satisfactory		
20	Shutter vibrators (if required) location and fixing arrangements approved.		
INSPECTED BY:		APPROVED BY:	
(Contractor's Engineer)		(Engineer In-charge)	
Name:		Name:	
Sig. & Date		Sig. & Date	

**SLUMP TEST  
REGISTER**

Name of Project: Client :

Contractor :

S. NO.	Date/ Time	Mix/Grade of Concrete	Location of Concrete Pouring	Slump in mm	Contractor's Engineers Sign.	Engineer-In-Charge

## BRICK TESTING REGISTER

(DIMENSIONAL TOLERANCE)

Name of Project :

Client :

Contractor :

Date of Test:

1. Dimensions of Brick

Make:.....

Limits as per CPWD specifications for Class 10

Length of 20 bricks

Length :

Width of 20 bricks

Width :

Height of 20 bricks

Ht./ thickness :

INSPECTED BY:

APPROVED BY:

(Contractor's Engineer)

(Engineer In-charge)

Name:

Name:

Sig. & Date

Sig. & Date

## DAILY PROGRESS REPORT

Name of Project :

..... Client : M/s

.....,

Contractor : M/s .....

Name of Unit : .....

Date: / /

S.NO.	ITEM DESCRIPTION	UNIT	PREVIOUS QTY.	WORK DONE	CUM. QTY.	REMARKS
1	Excavation					
2	Anti Termite Treatment					
a)	Footing					
3	PCC					
a)	Footing					
4	RCC					
a)	Footing					
b)	Pedestals					
c)	Columns					
d)	Plinth					

e)	Walls					
5	RCC M-25					
a)	Pedestals					
b)	Column					
6	Shuttering					
7	Reinforcement					
8	Water proofing					
9	Brick work in foundation					
a)	Brick work in plinth					
b)	Brick work in SS					
10	Plastering					
11	Flooring					
a)	Mosaic					
b)	Kota stone					
c)	CC flooring					
d)	Granite					
12	External Finish					
13	Painting					



14	Doors & windows					
a)	Aluminium					
b)	Steel					

Labour deployed

MASON      CARPENTER      FITTER      HELPER      UNSKILLED

## BAR BENDING SCHEDULE

Name of Project :

..... Client : M/s

.....,

Contractor : M/s .....,

Name of Unit : .....

Date: / /

DRG. NO. : .....

MEMBER	BAR NO.	DIA OF BARS	NO. OF MEMBER	NO. OF MEMBER	TOTAL NO. OF BARS	CUTTING LENGTH	TOTAL LENGTH	SHAPES

Calculated by

Checked By

## CONCRETE POUR CARD

Name of Project : Inspection Required on :

Client : Date : / / Time: -

Contractor : Inspection Request No. :

Name of Building :

Concrete Element &

Location:

Approved Drawing No. : Y=Yes, N=No and Na= Not Applicable. / / Time: -

Date:

S.N	Name of Activities	Contractor's Engineer	Engineer in charge
1	Method statement approved		
2	Batching Plant/ mixers in working order		
3	Standby Batcher in working order.		
4	Water, coarse aggregates, cement, sand , admixture approved.		
5	Water, coarse aggregate, cement, sand, admixture stock sufficient.		
6	Concrete conveying arrangement available in working condition.		
7	Formwork approved		
8	Reinforcement approved		

*Scope of Work & Technical Specifications*

9	Concrete gang present: including carpenter, steel fixer, mechanics and electricians.		
10	Access provided		
11	Safety arrangements sufficient		
12	Lighting provided		
13	Communication between various points provided.		
14	Arrangements for arranging suspension stoppage of concrete provided.		
15	Curing arrangements made		
16	Laboratory notified.		
INSPECTED BY: (Contractor's Engineer)		APPROVED BY: (Engineer In-charge)	

**REINFORCEMENT INSPECTION CHECK LIST**

Name of Project : Inspection Required on :  
 Client : Date : / / Time: -  
 Contractor : Inspection Request No.:  
 Name of Building: Date: / / Time: -  
 Concrete Element & Location:  
 Approved Drawing No. : Y=Yes, N=No and Na= Not Applicable.

S	Name of Activities	Contractor's Engineer	Engineer In-charge
.N			
1	Working drawings checked and approved		
2	Location revision being used		
3	Bar schedules approved		
4	Reinforcement steel material approved		
5	Bar bending and cutting satisfactory		
6	All corroded bars rejected		
7	Bar sizes correct		

*Scope of Work & Technical Specifications*

8	Bar spacing correct		
9	Bar lap lengths correct		
10	Bar laps at correct locations		
11	Bar ties as specified and pre-coated binding wire used.		
12	Bar assembly rigid and adequately supported.		
13	All bars crossing tied up with binding wire		
14	Cover to bottom bars correct		
15	Cover to top bars correct		
16	Cover to side bars correct.		
17	Cover blocks approved including fixing		
18	Only approved cover blocks used.		
19	Quality & size of Binding wire approved.		
INSPECTED BY:		APPROVED BY:	
(Contractor's Engineer)		(Engineer In-charge)	

## POST CONCRETE CHECK LIST

Name of Project :

Client :

Contractor :

Inspection Required on :

Name of Building:

Concrete Element & Location :

Date : / / Time: -

Approved Drawing No. :

Inspection Request No.:

Y=Yes, N=No and Na= Not Applicable.

Date : / / Time : -

S. NO.	Name of the Activities	Contractor's Engineer	Engineer in charge
1	Concrete started on		
2	Concrete completed on		
3	Curing satisfactory		
4	Cube strength		
5	Concrete surface condition		
6	Any repairing required		
	Remarks for Rectification by ENGINEER-IN-CHARGE		
	Concrete Quality Acceptable : Yes/ No		

INSPECTED BY:

(Contractor's Engineer)

Name:

Sig. & Date

APPROVED BY:

(Engineer In-charge)

Name:

Sig. & Date



**SCHEDULE –VII**

**FORMAT FOR ELECTRICAL LOAD LIST & POWER CONSUMPTION**

Sr. No.	Description of Equipment	Eff. %	Calculated KW	Actual KW	Working KW				Stand by KW		Total KW		Average Operation hrs/day	Energy consumed BKWH/day	Energy consumed BKWH/year
					No. of Motors	Total KW	Eff. of Motor	Absorbed Power BKW	No. of Motor	Total KW	No. of Motor	Total KW			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Mechanical Screens														
3	Flat Belt Conveyor														
4	Pumps														
5	Service Water Pumps														
6	Auto Valves/Sluice Gates														
7	Plant Area Lighting														
	TOTAL														
	ADD LINE LOSSES & 5% OF ABOVE														
	GRAND TOTAL														

Notes:

Bidder should note that Column No. 16 shall add up to the Guaranteed Power Consumption of the Bidder. A year shall consist of 365 days.

In case of discrepancy, the data given in the above Table shall be considered as final and any information missing in the above Table shall be loaded to the Financial Bid of the Bidder.

Bidder is required to fill up the above Table for all Plants separately and compulsorily without which the bid shall be liable to be rejected.

Company Seal

Signature of the Bidder



# U.P. JAL NIGAM

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## E-TENDER

FOR

“Construction of FSTP Plant of 7 town / cities (GONDA, FAIZABAD, BAHRAICH, AKBARPUR, SITAPUR, HARDOI & FARUKHABAD) (32 KLD capacities each) under AMRUT”

ON

LUMPSUM CUM ITEM-RATE BASIS

Part – III  
(FINANCIAL)

---

General Manager, Gomti pollution control unit, U.P. Jal Nigam, Lucknow

## SCHEDULE – A

### The List of Cities / Town for FSTP

S.No.	City / Town	Septage Generated (Cum per day)
1	Akbarpur	32
2	Faizabad	32
3	Baharaich	32
4	Gonda	32
5	Farrukhabad	32
6	Hardoi	32
7	Sitapur	32

### **Brief Details of Works and its Location**

Construction of 32 cum. FSTP Plant of 7 town / cities (GONDA, FAIZABAD, BAHRAICH, AKBARPUR, SITAPUR, HARDOI & FARUKHABAD) (32 KLD capacities each) along with boundary wall, approach road and installation of solar panel system etc. including required survey & design work and handing over to respective Urban Local Bodies.

I / We have read understood and accept for compliance, the above mentioned instructions and conditions of this schedule and have taken these factors into account while quoting rates in Schedule “G”.

Signature.....

Name of Contractor.....

Address.....

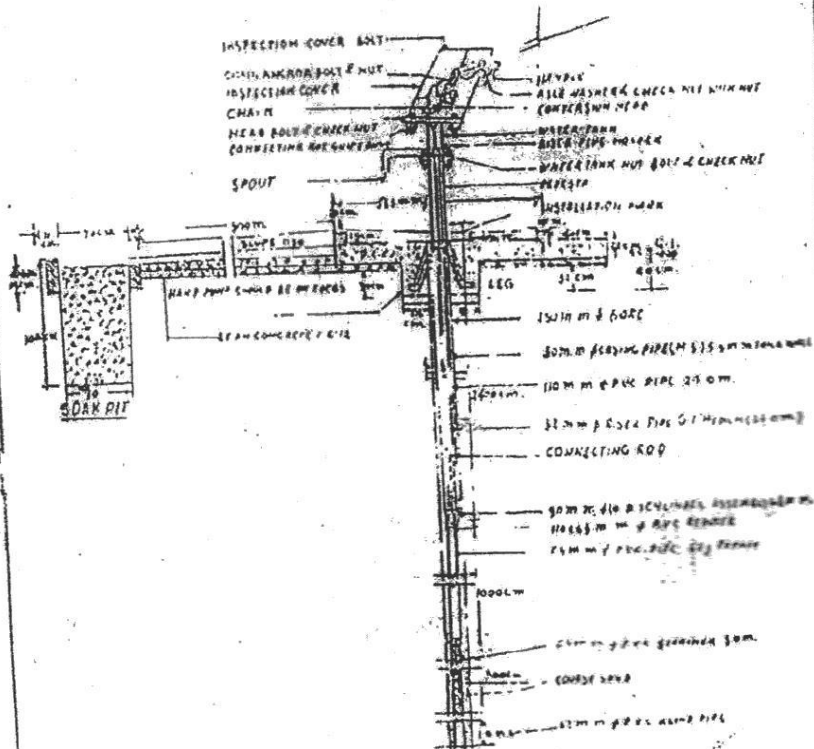
## **SCHEDULE – B**

(DRAWINGS)

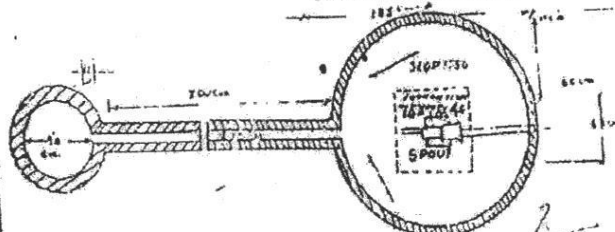
All necessary actual drawings, **indicative** drawings such as Index Plan, B.O.Q. etc. are being attached.

TYPE DESIGN OF DEEP WELL HAND PUMP IN ALLUVIAL FORMATION

30



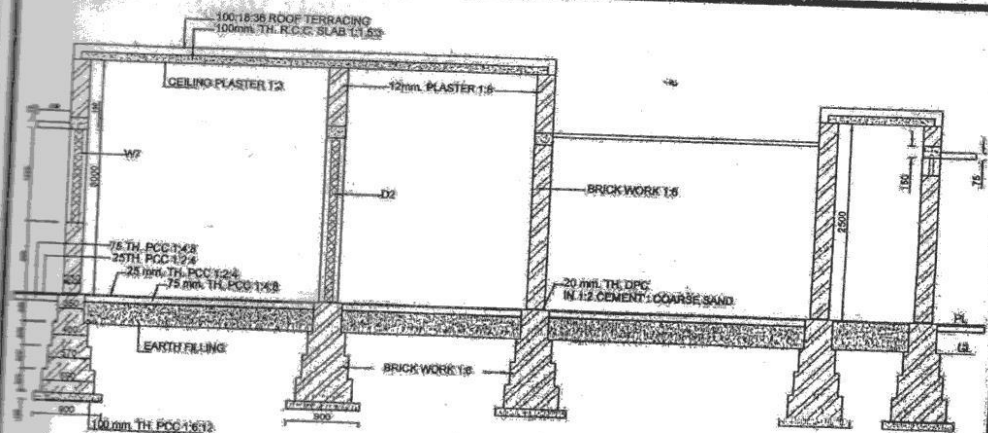
SECTIONAL ELEVATION



PLAN

SCALE	1:20
DESIGNED BY	P. J. NIGAM
CHECKED BY	
DATE	

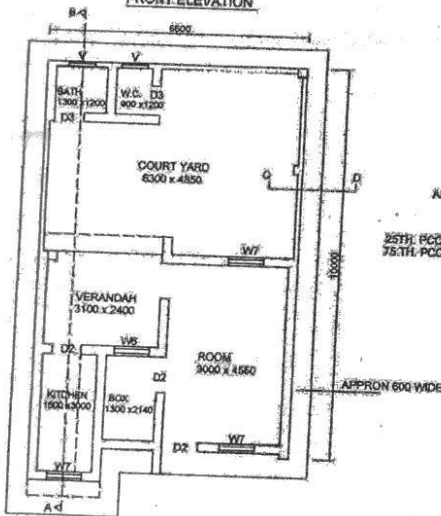
Drawn by: P. J. NIGAM  
 P. J. NIGAM  
 P. J. NIGAM  
 P. J. NIGAM



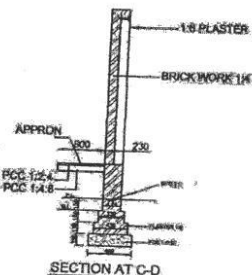
SECTION AT A-B



FRONT ELEVATION



GROUND FLOOR PLAN - STAFF QUARTER



SECTION AT C-D

SCHEDULE OF DOOR/WINDOW			
NO.	WIDTH	HEIGHT	DESCRIPTION
D2	900	2000	SINGLE SHUTTER
D3	900	2000	SINGLE SHUTTER
W7	900	1300	SINGLE SHUTTER
W8	900	1200	SINGLE SHUTTER

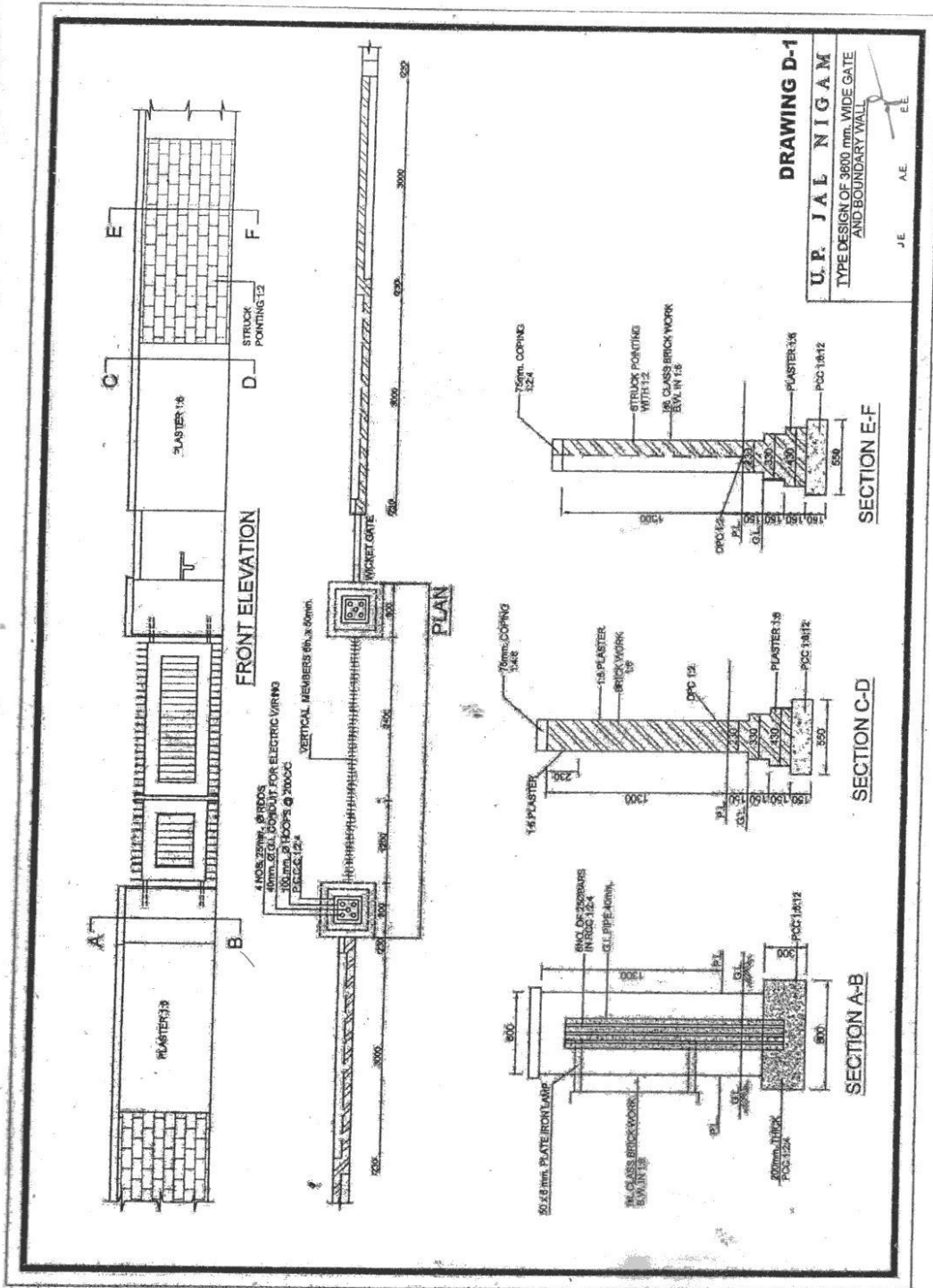
NOTES -

1. ALL DIMENSIONS ARE IN METERS.
2. THE DETAIL DRAWING OF ALL R.C.C. WORK SHALL BE PREPARED AT THE TIME OF CONSTRUCTION. FOUNDATION AS PER SITE CONDITION OF SOIL TO EXAMINE, IN CASE MAKE MEASUREMENTS IN STRUCTURAL DETAILS IN CONSULTATION WITH COMPETENT AUTHORITY.
3. ALL WORKS TO BE CARRIED OUT AS PER SCHEDULE SPECIFICATION BRICK WORK IN FOUNDATION IN 1:4.
4. SHOOTING AS SPECIFIED IN ALL ROOM VERANDAH LAWN ETC. WHERE EVER REQUIRED.
5. SCHEDULES & ALUMINUM TO BE PROVIDED IN CONSULTATION WITH AUTHORITIES CONCERNED BUT TO BE KEPT IN LEVEL OF DOOR & WINDOW.
6. PLUMB LEVELS AS PER SITE.
7. FOUNDATION P.C.C. IN 1:2:12.

DRAWING D-7

U.P. JAL NIGAM

J.E. A.E. E.E.





## **SCHEDULE – C**

List of departmental drawings annexed with tender document:

NIL, No Drawings are issued by the department, all design & drawing shall be produce by contractor and execution will only start after their approval by competent Authority

## **SCHEDULE - D**

(LIST OF SAMPLES TO BE SUBMITTED)

Tenderer whose offer is accepted has to submit the following samples seven days before starting up the work.

1.	Cement	01 bag
2.	Hard stone grit 12mm to 20mm	0.1cum
3.	Coarse sand	0.1cum
4.	1 <sup>st</sup> class brick and over burnt bricks	100 nos. each
5.	Brick ballast 40mm	0.1 cum
6.	Fine sand of fineness modulus (1.25)	0.1cum
7.	Mild Steel Tore/TMT in 1.00 length	4 Nos.

In addition to the above the contractor may be required to submit any other sample that may be required by the Engineer before the commencement or during the progress of the work. The contractor shall submit list of manufacturers to be finalized by the engineer in charge. The materials of only approved manufacturers shall be brought at site for use in work. The contractor shall have to maintained small laboratory at site of work, for testing routine samples i.e. sieve analysis, slump test, cube testing, silt content etc. Contractor shall have to submit test report of Cement, Steel & Pipes etc.

## **SCHEDULE - E**

### (TESTS)

All the necessary and required tests before commencement of the work, during the construction and after the construction regarding material and work shall be conducted as per latest I.S. specifications or as desired by the Engineer as per terms and conditions of the contract documents.

## **SCHEDULE - F**

### **(TIME OF COMPLETION)**

The complete work as specified herein shall be completed in all respects, passed to the satisfaction of Engineer and tested as per latest U.P. Jal Nigam / U.P PWD / U.P. Irrigation Department or I.S. specification / codes and provisions on the subject within 15 (fifteen) calendar months and 03 (three) months Trial Run and Stabilization period from the date of written order to the contractor for commencement of the work.

The defect liability period is 12 (twelve) months after Trial Run and Stabilization period and concurrent with Operation & Maintenance period.

Operation & Maintenance period is 05 years.

Execution period is 15 months including three months trail & run and Operation & Maintenance period for 05 year and successfully handing over to respective Local Body.

**SCHEDULE – G**  
**(Financial Bid)**

**IMPORTANT NOTES:**

1. Contractors are requested to read carefully the specifications and General conditions of works included in this contract before quoting their rates in BOQ / Schedule G.
2. The contractors are also requested to first visit the site of work to make themselves well acquainted with the nature of works, the local conditions, which may include cartage of materials even by head load & boat other than the normal conventional modes, all topographical, geological and hydrological aspects including soil and sub soil water conditions as no extra payment will be made on account of them.
3. No materials will be supplied by the department, see Schedule-I.
4. Quantities given in the BOQ / Schedule-G are approximate and may vary to any extent.
5. The rate tendered herein shall apply for finished item of works and shall include supply of all materials, labour, T&P etc and finishing the work in real workmanship manner weather specifically mentioned in the specifications or not.
6. The contractor shall provide caution signs/lights near excavations, trenches, fencing (barricading arrangement) etc. and employ watchmen during nights and off working days and hours to avoid any accident and shall make his rates sufficiently comprehensive to meet such expenditure.
7. The contractor shall provide all appliances, pumps, engines, machinery, suction and delivery pipes, fasteners, fuel, electricity, petrol or diesel, lubricants, cotton waste etc. and all labour, skilled and unskilled for proper pumping of sub soil water or any other flow to be pumped during execution of work and contractor shall make his rates sufficiently comprehensive to cover the cost of such works. All works shall be carried out in dry and clear trench conditions.
8. The rates shall be quoted on percentage plus or minus basis against total amount of work as mentioned in BOQ. The above quoted percentage plus or minus on total amount of work will be applicable on every individual item of BOQ. In case any difference is found in words and figures for any quoted rates the rates quoted in words will be deemed as correct rates. The rates should be written legibly without any cutting. In case cutting is necessary it should be initialed. There should be no over-writing. All rates should be written in same ink and handwriting. The rates dictated against schedule G / BOQ will only be considered for tender evaluation

9. Since the work is of state of the art nature, contractor should have sufficient T&P and skilled masons, and labour etc. required for carrying out the work within specified period as the work is of very urgent nature and time bound.

10. The contractor should make sufficient provision in his rates to safe guard the electric pole, water pipe, sewer pipe, shift/ reinstate the water conduits (including all required materials, labour, T&P etc) met with during the excavation, diversion, cleaning, repair, strengthening, reinstatement of the drain, construction of manhole or any masonry structures damaged or dismantled during execution of works as there will be no extra payment on this account other than mentioned in the schedule “G”

11. While dismantling the bituminous surface, P.C.C. and other Roads, dismantled material should be properly stacked at convenient or suitable safe site for temporary reinstatement of Roads. If any damaged or short fall in the materials is found to temporarily reinstate the Roads, the contractor has to supply the required materials at his own cost for completion of work in all respect.

12. All the labour and employees at site for execution of work shall be duly insured. Contractor will be fully responsible for any accident due to toxic gases and other type of accident which may occur during execution of work. No compensation for accident on any ground will be paid to the contractor by the department. However, the contractor shall indemnify the department against such accidents.

13. The contractor shall provide on his own cost (for which no payment will be done by department) the following equipment. The equipment shall always be maintained in good condition.

- a. Theodolite/ Autolevel- 1Nos
- b. Leveling staff -2Nos.
- c. Steel tape 50m – 2Nos.
- d. Torch 5 Cell- 4 Nos

14. (i) All materials shall be supplied strictly as per relevant Indian Standard Specifications with its/their latest amendments wherever applicable.

(ii) The materials will be required to be packed strictly as per provisions of relevant I.S. code.

(iii) Materials with “ISI certification mark”, shall only be accepted. For materials not available with ISI mark, it shall be accepted “as per BIS”.

(iv) The supplier and/or the manufacturer should have adequate testing facilities at site to carry out tests as laid down in the relevant Indian Standard Specifications

15. The contractor must seek clarifications regarding any ambiguity, whatsoever, immediately but not later than 7 days in advance from the date of opening of tender

in writing (in three copies), otherwise the departmental interpretation in this regard will be binding upon him with no liability to the department in this regard.

16. Tenders are likely to be rejected for failure to observe any or all the instructions not followed in letter and spirit.

17. The project is to be completed on turn-key basis and hence the whole cost complying with the provisions of the contract shall be included in the items provided in the Price Bid.

18. The method of measurements of completed work shall be as specified in the relevant codes of B.I.S. (Bureau of Indian Standards).

19. The interim payments would be released to the Contractor in accordance with the schedule for payment enclosed with this volume.

20. The items included in Financial/Price Bid are to be covered by relevant specification of supply, civil works and commissioning etc. given in bid document in various chapters and at various places and should be read carefully. Single item specifications may be found at different places and need to be clubbed where otherwise not stated, may be considered to be covered by latest edition of Manual of Govt. of India and relevant Indian Codes of Practice.

ii) The measurement and bills shall be based on the basis of actual quantities and Schedule of Payment.

iii) If any item is deleted, the contractor will not be entitled for any payment of that item.

21. Contractor/bidder must quote there *rates/percentage +/- of departmental rates only at comprehensive Schedule G*. Rate/percentage quoted at individual Schedule will be not to be considered and solemnly rejected

22. Construction of 125mm thick CC road (M-20) over 100 mm thick compacted WBM / GSB including supply of all materials, labour, tools and plants etc. complete.

23. All RCC works must not be less than M-25 grade.

## **SCHEDULE – H**

(ADDITIONAL ITEM RATES)

All extra or additional work done or substituted work in place of work omitted by order of Engineer shall be valued at the rates and price set out in the contract, if in the opinion of the Engineer same shall be applicable. If the contract does not contain any rates or prices applicable to the extra or additional work, then the rates shall be minimum of the following:

- (a) Derived from the tendered/contract rates of the contract of similar class of work.
- (b) Derived from the UP. Jal Nigam schedule of rates of the year in which the work actually done

If the rates cannot be decided as above for additional/extra work, then such class of work shall be agreed upon between the Engineer and contractor in writing prior to the work being taken up in hand but it shall be based on U.P Jal Nigam/U.P PWD/U.P Irrigation/CPWD schedule of rate.

## **SCHEDULE – I**

(DEPARTMENTAL ISSUE RATES OF MATERIALS)

All material shall be arranged by the contractor at his own cost required for completion of the work in all respect.

## **SCHEDULE – J**

### (CONSUMPTION OF MATERIALS)

On completion of each class of work or of each section, the consumption statement shall be prepared for such materials by the contractor himself. In order to determine excess or short consumption of materials, the actual quantities used by the contractor shall be compared to the theoretical worked out quantities. However if there is any excess or short consumption of materials, the following procedures shall be adopted unless otherwise specified.

No action shall be taken if the actual consumption does not exceed or is short by  $\pm$  3% of the theoretical consumption as the case may be. The variation will not be taken as a matter of routine and will have to be properly justified in each case by the Engineer-in-charge. If the actual consumption exceed theoretical consumption by more than the permissible limit as mentioned earlier, recovery shall be made for the excessive consumption of material at penal rate of twice the rate from the tenderer. It shall be the responsibility of the tenderer to bring such a case to the notice of the Engineer-in-charge for further action whose decision in all such cases shall be final.

In cases of material arranged by contractor, where the actual consumption is short of the theoretical consumption and beyond the permissible limits defined earlier, the recovery of cost of materials thus saved shall be made from the tenderer at double the market rate and in case of material supplied by the department, if actual consumption is short of theoretical consumption beyond permissible limits the recovery of the material shall be made at double the issue rate. It shall also be determined whether the stability of the structure or the work is adversely affected by short consumption of materials and in cases where it is likely to be so, the work shall be rejected. The decision of the Engineer in-charge in the regards shall be final.



## SECTION - II

### SCHEDULE OF PAYMENT FOR CIVIL WORKS

#### 32 Cum. FSTP Plant

S.No	Description of Item	Payment (%)
1	Completion of Survey and Basic Engineering Package (BEP) and preparation of Good for construction drawings	10%
2	On Completion of Core Civil works for FSTP	40%
3	On Completion of additional works for FSTP	20%
4	On commissioning of FSTP	10%
5	On completion of trial run of FSTP	10%
6	On completion of One year of Maintenance FSTP	10%

## SECTION - II

### SCHEDULE OF PAYMENT FOR SOLAR SYSTEM

<b>S.No</b>	<b>Description of Item</b>	<b>Payment (%)</b>
1	Supply & Installation of Solar Power Plant	80%
2	After successful commissioning	10%
3	After One year of Maintenance	10%

## **SECTION - II**

### **SCHEDULE OF PAYMENT FOR OTHER CIVIL WORKS**

Payment for Construction of Boundary wall, Approach Road and Gate Etc. will be done as per measurement.