



Army Welfare Housing Organisation

TENDER

FOR

**CONSTRUCTION OF PLOTTED DEVELOPMENT WORK
AT**

**KALINDIPURAM, PRAYAGRAJ (UP)
FOR**

ARMY WELFARE HOUSING ORGANISATION, NEW DELHI

CA NO.: AWHO/ PRAYAGRAJ/PLOT - DEV/03/2024

(COVER 1)

**(NIT, INSTRUCTIONS TO TENDERER, GCC, SCC, PARTICULAR
SPECIFICATIONS, FORMAT FOR GUARANTEE, LIST OF MAKES, TENDER
DRAWINGS)**

EMPLOYER:

**ARMY WELFARE HOUSING ORGANISATION
SOUTH HUTMENTS, KASHMIR HOUSE,
RAJAJI MARG, NEW DELHI-110011**

ARCHITECTS:

**M/S CIVIL CONSULTANTS
003, GAURI APARTMENT,
57 HILTON LANE, MEERA BAI MARG,
LUCKNOW-226001 (UP)**

CONSTRUCTION OF PROPOSED PLOTTED DEVELOPMENT WORK AT KALINDIPURAM,
PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANISATION, NEW DELHI
CA NO: AWHO/PRAYAGRAJ/PLOT - DEV/03/2024

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Tele : 011-23018762
 Email id : contract03@awhosena.org
cont22_sec@awhosena.org

E-TENDER

Army Welfare Housing Organisation
 South Hutments, Kashmir House
 Rajaji Marg, New Delhi - 110011

B/03020/Cont/Prayagraj/Plot-Dev/CA 03-2024/ /AWHO

Sep 2024

M/s_____

**CONSTRUCTION OF PLOTTED DEVELOPMENT WORK AT KALINDIPURAM,
 PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANIZATION NEW DELHI**
CA NO: AWHO/PRAYAGRAJ/PLOT- DEV/03/2024

Dear Sir(s)

1. Tender document in respect of above work are uploaded on the site <https://awho.ewizard.in> the tender is on Stage-1 of Two Cover e-tendering system. The contents of Cover I & Cover II are specified in NOTICE OF TENDER including Appendix 'A' thereto.
2. E-tendering shall be uploaded in 02 (two) covers system of Stage-1 as under:-
 - (a) **Cover 1.**
 - (i) Cover I shall contain tender documents as stipulated in NIT and instructions to the tenderers. Hard copies of all documents uploaded in Cover 1 shall reach the office of Accepting Officer within the 7 days after Bid Submission end date as specified in the NIT/Key dates published during the publication of tender.
 - (ii) **Correspondence with Bidders.** Necessary Correspondence, if required may be made with tenderers whose Cover 1 are opened. All such correspondence shall be made online through E-mail.
 - (b) **Cover 2.** Cover 2 shall contain the BOQ. In addition, Cover 2 will also contain other details as asked for and mentioned in the tender documents. The BOQ shall be validated and password protected before uploading by the bidder.
3. Bids will be uploaded by the bidder upto the Bid Submission End date and time. No tender/bid will be received in physical form and any tender/bid received in such manner will be treated as non bonafide tender/bid.
4. Bid will be opened on due date and time fixed for opening in the presence of tenderers/bidders or their authorised representatives, who have uploaded their quotation bid and who wish to be present at the time of opening the bids.

5. Your attention is also drawn to instruction on filling and submission of tender attached herewith. You may forward your points on tender documents in above email id and/or depute your technical representative for discussion on tender/drawings and to clarify doubts, if any, on the date of Pre-Bid Conference. You are requested not to write piece meal points and do forward your points in the consolidated manner.

6. Bidders/ tenderers are required to submit the scanned copies (in pdf file) of documents required as per eligibility criteria mentioned in instructions for filling the tender documents and Appendix 'A' to NIT along with EARNEST MONEY DEPOSIT(EMD) and tender fee mentioned therein and submit the physical documents in the head office of Army Welfare Housing Organisation, Kashmir House Rajaji Marg, New Delhi within the 7 days after Bid Submission end date as specified in the NIT/ Key dates published during the publication of tender. Inadequacy/deficiency of documents shall make the bid liable for rejection resulting in disqualification for opening of finance bid. Earnest money is to be deposited by all the tenderers. There is no exemption from deposit of earnest money for the tenderers who are enlisted with any govt organization like MES, DDA, CPWD and Railways etc.

7. Bidders/ tenderers shall forward copy of DDs / RTGs / E-payments in the AWHO account of EARNEST MONEY DEPOSIT(EMD) mentioned in Notice of Tender and shall ensure receipt of hard copy of EMD in the office of tender issuing authority before date & time fixed for this purpose. In case of failure to abide the finance bid will not be opened. The bank details of the AWHO are as under:-

Bank Account Name	Army Welfare Housing Organisation
Beneficiary A/c No	91222260001078
Type of Bank A/c	SB
Name of Bank	Canara Bank
Bank Address	Kashmir House, Rajaji Marg, New Delhi-110011
IFSC	CNRB0019122

8. The Bidders/ tenderers must ensure that the tender/bid on the proper form is uploaded in time as the Accepting Officer will take no cognizance of any quotations/offer received in any other electronic or physical form like email/ fax/ by hand/ through post from tenderer/bidder even if they are received in time.

9. In view of delays due to system failure or other communication related failure, it is suggested that the tender/bid be uploaded, if necessary, sufficiently in advance of the last due date and time fixed.

10. In case the Bidders / tenderers withdraws his offer within the validity period/extended date of validity of the Tender, the earnest money deposited along with tender shall stand forfeited.

11. PERFORMANCE SECURITY DEPOSIT

11.1 After acceptance of the Tender, the Bidders/ tenderers will be required to lodge with the Accepting Officer **PERFORMANCE SECURITY DEPOSIT @ 5% of CONTRACT Amount**. The amount is required to be lodged within 30 (Thirty) days of the receipt by the Bidders / tenderers of notification of acceptance of tender/bid, failing which action as stipulated in Condition **123 of GCC shall be taken**.

12. Particular attention of the Tenderers is also invited to the following:-

- (a) General Condition No.64, which provides for Contractor's All Risk Insurance cover to be arranged by the Contractor.
- (b) General Condition No. 122 which provides for **Nil** reimbursement/refund on account of adjustment for escalation /variation in prices of Material, FOL, Labour, Cement and steel etc.
- (c) General Condition No. 126: No payment of mobilization advance shall be payable to Contractor.
- (d) General condition 129 for the interim/Running payments.
- (e) No material (i.e. Cement, Steel etc.) shall be issued to the Contractor by Army Welfare Housing Organization.
- (f) Compensation for Delay: If the contractor fails to complete the works by the date stated as per Condition No. 17 of General conditions of Contract or within extended time under Condition No. 109, the contractor shall pay compensation as per Condition No. 121 of General Conditions of contract.
- (g) **Completion Period:** The period of completion for the entire work shall be **12 (Twelve) months** from date of commence of work.
- (h) General Condition of contract No 19, Contractor to submit the overall works program/time schedule utilizing a known CPM software package along with quoted tender document. Incase fails to submit, then Contractor's offer is liable to be rejected.
- (j) BLANK
- (k) Taxes and Duties. General Condition of Contract No 168 to 180, the rates quoted by the contractor shall be **inclusive of goods and service tax (GST)** and all other taxes like labour Cess etc.
- (l) General Condition of Contract No 114, the defect liability period for work shall be **60 (Sixty) months** from the actual date of final completion of work.
- (m) No Joint Venture shall be allowed to the Contractor.
- (n) **General condition 186 to 188 of contract**, stipulates Guarantees of contract for **Water Proofing Works for Ten Years as per format provided in Appendix E & F.**

13. ANY TENDERER, WHICH PROPOSES ALTERATIONS TO ANY OF THE CONDITION, SPECIFICATIONS LAID DOWN IN THE TENDER DOCUMENTS OR ANY NEW CONDITION, WHATSOEVER, IS LAIBLE TO BE REJECTED.

14. In case any tenderer, inspite of above clause proposes any new conditions or alteration to any condition/ specification which will have financial effect then the financial effect plus or minus shall be indicated by the tenderer against each such condition/ alteration proposed by the tenderer along with his bid. Accepting Officer shall decide the consideration of the proposed new conditions/ alterations with financial effect after opening of tender or otherwise.

15. The Contractor shall provide the necessary barricading to facilitate safety at site without any extra cost to AWHO if required at site.

16. BLANK

17. The approval of Uttar Pradesh (UP) RERA/ Sanction/ NOC from various statutory authorities if required, shall be obtained by Contractor if required. Statutory fee payment to local bodies/authority shall be reimbursed by AW HO as per challan/invoices/receipt raised by them. However, Architect shall assist for drawings preparation of documents as approved and required for the purpose.

18. Bidders are requested to get registered with the e-procurement portal of M/s ITI Ltd website <https://awho.ewizard.in>. As per the commercial bid of M/s ITI Ltd. registration fee and processing fee for the bidder is Rs 5,000/- and 0.1% (Minimum 750/- and Maximum 7,500/-) respectively. The contact numbers of M/s ITI Ltd is as under:-

- (a) Ms Kiran Rani, AGM
Regional Office – Flat No 201-202
Rohit House, 3, Tolstoy Marg
New Delhi – 110001, Phone – 23317195
Email: ro_dli@itilttd.co.in
eprochelpdesk.19@gmail.com
eprochelpdesk.18@gmail.com
(Mobile No – 8800530411)
- (b) Mr Amrender (Mobile No 8448288980)
- (c) Mr Abhishek (Mobile No 8210817180)
- (d) Mr Anshuman (Mobile No 9355030616)
- (e) Mr Ashutosh (Mobile No 9355030617)

Yours faithfully

(SIGNATURE OF CONTRACTOR)
DATE: _____

FOR ACCEPTING OFFICER

INSTRUCTIONS ON FILLING AND SUBMISSION OF TENDER

1. EARNEST MONEY DEPOSIT (EMD)

1.1 Demand Draft in favour of Managing Director, Army Welfare Housing Organisation shall only be accepted in acceptable form of Earnest Money.

NOTES: - Earnest Money Deposit (EMD) in the form of copy of DDs / RTGs / E-payments in the AWHO account, however, cheque/Bank Guarantee etc will not be accepted. **Non-Submission of Earnest Money Deposit (EMD) will render the bid disqualified for opening of Cover - II.**

2. PERFORMANCE SECURITY DEPOSIT:

In case, the tender submitted by contractor is accepted, the contractor will be required to lodge **“Performance Security Deposit”** for an amount **equivalent to 5% of the Contract Sum/Lump Sum** in favour of the Accepting Officer within 30 (Thirty) days of the receipt by the contractor of notification of acceptance of his tender/ bid. The Performance Security shall be in the form of ‘Bank Guarantee’ or FDR. Failure of the contractor to comply with the requirements of Performance Security shall constitute sufficient grounds for cancellation of the contract and award of work and forfeiture of the Earnest Money.

3. GENERAL INSTRUCTIONS FOR COMPLIANCE

3.1 The bids received only in the electronic form will be considered. All bids shall be submitted on '<https://awho.ewizard.in>' portal. Documents should be scanned and forwarded in 'pdf' form and 'xls' form as indicated.

3.2 Bids shall be uploaded on '<https://awho.ewizard.in>' portal on or before the bid closing date mentioned in the tender. No tender/bid in any other electronic or physical form like e-mail/fax/by hand/through post will be considered.

3.3 Bid should be DIGITALLY signed using valid DSC. All pages of tender documents including drawings, corrections/alterations/ amended drawings, corrigendum shall be signed /initialed by the lowest bidder after acceptance.

3.4 The tender shall be signed, dated and witnessed at all places provided for in the documents after acceptance. All corrections shall be initialed. The Contractor shall initial every page of tender and shall sign all drawings forming part of the tender.

3.5 Any tender/bid, which proposes alterations to any of the conditions whatsoever, is liable to be rejected.

3.6 In the submission/uploading of bid, a scanned copy of power of Attorney in favour of the person uploading the bid using his/her DSC shall be uploaded. In case the digital signatory himself is the sole proprietor, scanned copy of an affidavit on stamp paper of appropriate value to this effect stating that he has authority to bind the contractor (through partnership deed, general power of attorney or Memorandum and Articles of Association of the company) in all the matters pertaining to the contracts with AWHO/Union of India including arbitration clause. A scanned copy of the

documents confirming of such authority shall be attached with the tender/bid in 'PDF' form, if not submitted earlier. The person uploading the bid on behalf of another partner(s) or on behalf of a firm or company using his DSC shall upload with the tender/bid a scanned copy (in 'pdf' form) of /Power of Attorney duly executed in his favour by such other or all of the Partner(s) or in accordance with constitution of the company in case of company, stating that he has authority to bind such other person of the firm or the Company in case of company, stating that he has authority to bind such other person of the firm or the Company, as the case may be, in all matters pertaining to the contract including the Arbitration Clause.

3.7 Even in case of Firms or Companies which have already given Power of Attorney to an individual authorizing him to sign tender in pursuance of which bids are being uploaded by such person as a routine, fresh power of Attorney duly executed in his favour stating specifically that the said person has authority to bind such partners of the Firm, or the Company as the case may be, including the condition relating to Arbitration Clause, should be uploaded in 'pdf' form with the tender/bid; unless such authority has already been given to him by the Firm or the Company. It shall be ensured that power of attorney shall be executed in accordance with the constitution of the company as laid down in its Memorandum & Article of Association.

3.8 Hard copies of all above documents should be sent by the contractor to the Tender issuing authority within 7 days from the date & time fixed for the submission of bid.

3.9 Bid shall be uploaded online well in time.

3.10 The contractor shall employ Indian Nationals after verifying their antecedents and loyalty. Attention is also drawn to special condition 3 referred hereinafter and also conditions 47 of General conditions of contract.

3.12 Tenderers/ bidders who uploaded their priced tenders/bids and are desirous of being present at the time of opening of the tenders/bids, may do so at the appointed time.

4. BOQ (SCHEDULE- A):-

4.1 The tenderer shall quote his rates on the BOQ (BOQ I to X and General Summary) in EXCEL FILE only as per guide line of e-procure web portal. No alteration to the format will be accepted and such bid will be disqualified.

4.2 In case any tenderer wishes to revise/modify the rates quoted in the BOQ file, he can do so only in the BOQ files before uploading the tender through <https://awho.ewizard.in> site only before closing date & time.

4.3 After the uploading of tender, Department may upload the errata/ amendment through corrigendum. The tenderer/ bidder should submit their offer considering the errata/amendment carried out through corrigendum issued from time to time.

4.4 While uploading the bid, the tenderers/ bidders should specifically check whether any **revised BOQ** has been uploaded by department through corrigendum prior to **Bid submission start date**. Tenderers/bidders attention is specifically drawn to the fact that they should submit their offer on revised BOQ only. In case any tenderer/ bidder submits offer on pre-revised BOQ in lieu of Revised BOQ, **it will be considered as a willful negligence by the tenderer/ bidder and quotation shall be considered non-bonafide.**

4.5 In case the date of opening of tender indicated in Appendix 'A' is declared as closed holiday by govt of India due to any reason, then tenders will be opened on the next working day (Monday to Friday only).

4.6 The tender shall remain open for acceptance for a **period of 90 (Ninety)** days from the date on which the tenders are due to be opened.

4.7 Managing Director, AWHO does not bound himself to accept the lowest or any tender.

5. REVOKATION/REVISION OF OFFER UPWARD/ OFFERING VOLUNTARY REDUCTION AFTER CLOSING OF BID SUBMISSION DATE & TIME

In the event of tenderer/bidder revoking his offer or revising his rates upwards/offering voluntary reduction, after closing of bid submission date & time, his offer will be treated as revoked and the Earnest Money deposited by him shall be forfeited.

6. Preparation and Submission of Project Schedule & Modalities of Repairs

6.1 The Project planning for work covered in the scope of tender is based on CPM.

6.2 After the contract is awarded / accepted, the contractor in coordination with ARCHITECT & Project-in-Charge shall prepare and submit project schedule and modalities of repairs. The tenderer/bidder is expected to be fully conversant with the CPM technique and employ technical staff who can use the technique in sufficient details. Sufficient books and other literature on the subject are widely available in the market which the tenderer/ bidder may make use of.

6.3 The tenderer's/bidder's attention is drawn to special condition of the tender regarding preparation of the detailed network analysis and time schedule for the work and his liability for employing sufficient resources to adhere to this schedule. Any inability on the part of the tenderer/bidder in using the technique will be taken as his technical inefficiency and will affect his class of enlistment and future prospect/invitation to tenders for future works.

6.4 Department may issue amendments/ errata in form of CORRIGENDUM to tender/ revised BOQ to the tender documents. The tenderer/ bidder is requested to read the tender documents in conjunction with all the errata/ amendments/ corrigendum, if any, issued by the department.

7. These instructions shall form part of the contract documents.

(SIGNATURE OF CONTRACTOR)
DATE: _____

FOR ACCEPTING OFFICER

**CONSTRUCTION OF PLOTTED DEVELOPMENT WORK AT KALINDIPURAM,
PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANIZATION NEW DELHI**
CA NO: AWHO/PRAYAGRAJ/PLOT-DEV/03/2024

NOTICE INVITING TENDER

1. A tender is invited for the work as mentioned in Appendix 'A' to this NOTICE INVITING TENDER (NIT).
2. The work is estimated to cost as indicated in aforesaid Appendix 'A'. This estimates however is not a guarantee and is merely given as a rough guide and if the work cost more or less, a tenderer/bidder will have no claim on that account. The tender shall be based on as mentioned in aforesaid Appendix 'A'.
3. The work is to be completed within the period as indicated in aforesaid Appendix 'A' in accordance with the phasing, if any, indicated in the tender from the date of handing over site, which will be on or about two weeks after the date of acceptance of tender.
4. All the contractors are required to lodge Earnest Money Deposit of amount and in the form as indicated in Appendix 'A' to this NIT. There is no exemption from deposit of earnest money for the contractors who are enlisted with any govt organisation like MES, DDA, CPWD & Railways etc.
5. If the tender/bid submitted by a tenderer/bidder is accepted, the bidder will be required to lodge with the Accepting Officer/MD AWHO the amount of **Performance Security for an amount equivalent to 5% of the contract sum** in any of the forms prescribed in condition 123 of General Conditions of Contract within 30 days of receipt of the Letter of Acceptance. Failure of the successful contractor to comply with the requirements of condition 123 of General Conditions of Contract shall constitute sufficient grounds for cancellation of the contract and forfeiture of the Earnest Money.
6. Not more than one tender/bid shall be submitted/uploaded by one bidder firm. Under no circumstances will the blood relations or spouse who have business dealing with one another be allowed to tender/bid for the same tender as separate competitors. A breach of this condition will render the tenders/bids of both the parties liable for rejection.
7. Managing Director, Army Welfare Housing Organisation will be the Accepting Officer here in after referred to as such for purpose of the contract.
8. E-tendering shall be in 02 (two) covers system as under:-

(a) Cover 1.

- (i) Cover I shall contain tender documents as stipulated in NIT and instructions to the tenderers. Hard copies of all documents uploaded in Cover 1 shall reach the office of Accepting Officer within the 7 days after Bid Submission end date as specified in the NIT/Key dates published during the publication of tender.
- (ii) **Correspondence with Bidders.** Necessary Correspondence, if required may be made with tenderers whose Cover 1 are opened. All such correspondence shall be made online through E-mail.

(b) **Cover 2**. Cover 2 shall contain the BOQ. In addition, Cover 2 will also contain other details as asked for and mentioned in the tender documents. The BOQ shall be validated and password protected before uploading by the bidder.

(c) Scanned copies of DDs towards tender cost, tender security and Earnest Money Deposit with enlistment details/ pre-qualification documents shall be uploaded under packet 1/cover-1 of the tender/bid on e-Tendering portal. DDs for tender security and earnest money are refundable in case T bid is not accepted resulting in non-opening of 'Q' bid. The applicant contractor shall bear the cost of bank charges for procuring and encashing the DDs and shall not have any claim from AWHO whatsoever on this account.

9.1 Tender form and conditions of contract and other necessary documents shall be available on <https://awho.ewizard.in> site for download and shall form part of contract agreement in case the tender/bid is accepted.

9.2 AWHO will return the Earnest Money wherever applicable to all unsuccessful tenderers/bidders by endorsing an authority for its refund on production by the tenderer/bidder a certificate of the Accepting officer that a bonafide tender/bid was received and all documents were returned.

9.3 AWHO will either return the Earnest Money to the successful tenderer/bidder by endorsing an authority for its refund on receipt of an appropriate amount of Performance Security or will retain the same in part or full on account of Performance Security if such a transaction is feasible.

9.4 Copies of the drawings and other document pertaining to the work signed for the purpose of identification by the Accepting Officer or his accredited representative, sample of materials and stores to be supplied by the contractor will also be available for inspection by the tenderer/bidder at the office of Accepting Officer and concerned Project-in-Charge during working hours.

10. The tenderers/bidders are advised to visit the site of work by making prior appointment with Projects Director who is also the Executing Agency of the work (see Appendix 'A'). The tenderer/bidders are deemed to have full knowledge of all relevant documents, samples, site etc. whether they have inspected them or not.

11. Any tender/bid which proposes any alteration to any of the condition laid down or which proposes any other condition or prescription, except for the conditions/specifications/ prescriptions permitted expressly in other parts of the tender documents, shall be liable to be rejected.

12. The uploading of bid implies that bidder has read the notice and the condition of contracts and has made himself aware of the scope and specification of work to be done and the conditions and rates at which stores, tools and plants etc will be issued to him and local conditions and other factors having bearing on the execution of the work.

13. Tenderers/ bidders must be in possession of a copy of the CPWD Specifications and latest Delhi Schedule of Rates (See Appendix 'A') including amendments and errata thereto.

14. Invitation for e- tender does not constitute any guarantee for validation of prequalification of bidder and subsequent opening of finance bid of any applicant/bidder, merely by virtue of enclosing DD. Accepting Officer reserves the right to reject the Cover - I and not open the finance bid of any applicant/bidder. Cover I of Bid shall be decided by the Accepting Officer based on, inter alia, capability of the firm as per criteria given in Appendix 'A' to this **NIT**. The applicant contractor/bidder will be informed regarding non-validation of his Cover I of bid assigning reasons thereof through the <https://awho.ewizard.in> website. The decision of MD, AWHO shall be final and binding. The contractor/bidder shall not be entitled to any compensation whatsoever for rejection of his bid.

15. Accepting Officer does not bind himself to accept the lowest or any tender/bidder or to give any reason for not doing so.

16. Bidders are requested to get registered with the e-procurement portal of M/s ITI Ltd website <https://awho.ewizard.in>. As per the commercial bid of M/s ITI Ltd. registration fee and processing fee for the bidder is Rs 5,000/- and 0.1% (Minimum 750/- and Maximum 7,500/-) respectively.

17. The tenderer/bidder regarding clarifications on provision in Tender documents and other request in connection with bidding process can contact on Tele No: **011-23018762** (Dy Dir Contracts), email to HQ AWHO (Email ID: - awhohq@gmail.com, contract03@awhosena.org & Mob No 9530758981 Lt Col Niranjan Singh (Retd), Dy Dir (Contracts).

18. This **Notice Inviting Tender (NIT)** including Appendix 'A' shall form part of the contract.

Signature of Contractor
Dated: _____

(Niranjan Singh)
Lt Col (Retd)
Dy Dir (Cont)
For Accepting Officer

APPENDIX 'A' TO NOTICE INVITING TENDER
CA No: AWHO/PRAYAGRAJ/PLOT-DEV/03/2024

1.	Name of work	CONSTRUCTION OF PLOTTED DEVELOPMENT WORK AT KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANIZATION NEW DELHI.
2.	(a) Estimated Cost of Work	Rs 7,50,00,000/- (At Par Market) (including GST)
	(b) Earnest Money	Rs 10,00,000.00 (Rs Ten Lakhs only) in the form of Demand Draft(DD)/DDs/RTGS/e-payments in the AWHO account from any Scheduled/Nationalized bank in favour of MD, AWHO payable at Delhi.
3.	Period of Completion and Defect Liability Period after completion	12 Months period of completion of works from Work Order No. 1 & 60-months Defect Liability Period from actual date of completion.
4.	Tender Fee / Cost (Non Refundable)	Rs.5000/- in the form of DDs/RTGS/e-payments in the AWHO account from any Scheduled/ Nationalized bank in favour of MD, AWHO payable at Delhi. (Note: In case of retendering, the contractor who had quoted in the previous call is not required to submit the cost of tender).
5.	Website/Portal Address	https://awho.ewizard.in
6.	Type of contract	The tender shall be based on item rate basis catered in BOQ (BOQ I to X and General Summary) to be quoted by tenderer considering all stipulated and conditions of tender. The tenderers are required to quote their rates and amount for the entire scope in the Schedule 'A'(BOQ).
7.	<u>Information & Details</u>	Refer Critical/Key dates shown on website
	(a) Bid submission start date	
	(b) Last date of bid submission	
	(c) Date of bid opening	
8.	Tender issuing and Accepting Officer	MD, AWHO, New Delhi
9.	Executing Agency	Project-in-Charge / Project Director, AWHO, Prayagraj

NOTE:-

Bidders/Firms may forward the Earnest Money Rs 10,00,000/- and Cost of tender Rs 5000/- in the form of DDs/RTGS/e-payment in the AWHO account as under: -

Bank Account Name	Army Welfare Housing Organisation
Beneficiary A/c No	91222260001078
Type of Bank A/c	SB
Name of Bank	Canara Bank
Bank Address	Kashmir House, Rajaji Marg, New Delhi-110011
IFSC	CNRB0019122

Copy of Earnest Money and Tender Fee / cost may be submitted/uploaded along with bid submission in Cover-I/Envelope-I as specified in Appendix 'A' to NIT.

10. Eligibility Criteria

10.1 The bidder should meet the criteria with regard to completion of works (works experience of similar nature) in Central Govt/ State Govt/ PSUs, annual turnover, Solvency capacity, working capital capacity as laid down hereinafter.

10.2 Bidder should not have any recovery outstanding in any Govt Department and should not be defaulter in re-payment of loan taken from any bank/ Organisation/ trust.

10.3 Clear Police verification/ Passport etc.: Bidder firms shall submit copy of Police verification/clearance certificate from Police authority of the area where the registered office of the firm is located or notarised copy of valid passport of proprietor/each partner/each Director. Proprietor/partners/directors of firm are not involved in anti-national/anti-social activities and have neither been convicted nor any proceedings are pending in court for such activities.

10.4 **Average Annual Turnover**: The bidder should have average annual turnover during the last three financial years ending 31 March of 2024 not less than **Rs 3.00 Crores**.

(a) At the time of submission of prequalification, the bidder shall upload Affidavit/Certificate from Chartered Accountant mentioning Financial Turnover and Net worth of last 3 years. There is no need to upload entire voluminous balance sheet. However, one page of summarized balance sheet (Audited) and one page of summarized Profit & loss Account (Audited) for last 03 years shall be uploaded.

10.5 Work Experience : Bidder shall have following work experience :

(a) Experience of having successfully completed similar nature of works during last 5 years ending last day of month previous to the one in which applications are invited should be either of the following:-

(i) **Two** completed works of similar nature costing not less than the amount equal to **Rs 4.50 Crore each**.

OR

(ii) **One** completed works of similar nature costing not less than the amount equal to **Rs 6.0 Crore**.

(b) Building/ plotted development work completed in Central Govt/ State Govt/ PSUs/ as private builder completed projects approved by RERA shall be considered. The work must have been executed through a proper agreement between the bidder and the Company.

(c) For the purpose of valuating the amount of completed works, the value of previously completed works be enhanced @ 5% per year to bring them at par with present cost.

(d) Definition of similar work is as under:-

(i) Building or development work like ancillary buildings, boundary walls, road, water supply electrification work etc. for building/multi storied towers.

(ii) In addition to above (i) bidder should also have experience of carrying out external water supply and external electrification works.

(iii) Production and verification of satisfactory performance report of respective qualifying work(s) with supporting documents shall be essential requirement during scrutiny of prequalification criteria. Certificates shall be accepted only after due scrutiny and verification from respective departments.

10.6 **Financial Soundness :**

(a) Bidder shall have the solvency value not less than **Rs 3.00 Crore**. The solvency shall be adjudged based on the solvency certificate issued by a Scheduled Bank.

(b) Bidder shall have working capital not less than **Rs 2.00 Crore**. The limit of working capital shall be adjudged based on the working capital certificate issued by a Scheduled Bank.

10.7 Necessary proforma for FORM OF SOLVENCY CERTIFICATE & WORKING CAPITAL CERTIFICATE FROM NATIONALISED/SCHEDULED BANK and DETAILS OF WORKS EXECUTED DURING LAST 05 YEARS IN CENTRAL GOVT/ STATE GOVT /PSUs, is enclosed as **Annexure –I**.

11. The contractor shall not sublet any portion of the contract without prior written approval of the Accepting Officer. However, in terms of **condition 23 of GCC**, some contract value can be approved for subletting by the Accepting Officer. The contractor shall be fully responsible for any sub-contract or contractors, who may carry out the sublet work. The Contractor shall not execute the work through power of attorney holder on his behalf to a third party/another firm except sons/ daughter of proprietor/partner/director and firm's own employees, Director, Project Manager. This shall be subject to conditions which may have been prescribed in the NIT forming part of tender documents.

12. **Documents to be uploaded by the bidders**

12.1 Application for the tender on Firm's letter Head. In this, the bidder shall explain with calculation details supported with documentary evidence as to how he is qualifying for this tender in terms of conditions given above. Tenderers/bidder is required to note that if they do not submit their calculation details and/or supporting documents correctly, AW HO will make calculation and the same shall be binding on the bidder. This is notwithstanding the fact that AW HO will check the details and calculations also in respect of the contractors who have given the calculations.

12.2 DDs toward cost of tender, security of tender (refundable) and Earnest Money Deposit.

12.3 **Documents is to be uploaded**: These shall include the following documents :

12.3.1 Cover -1

- (a) Copy of turn over certificate from CA for last (Three) financial years (FY) ending 31 Mar 2024 duly indicating the UDAI number and ICAI Membership number of the Chartered Accountant issuing the certificate along with notarized copy of relevant pages of balance sheet of those FYs showing the turn over (gross receipts).
- (b) Copies of completion certificates in three highest valued works (after adjusting the values as mentioned above) during last three years. This will be in tabular form giving name of work, details about client/Department viz, Address, Telephone, Fax No, E-mail ID etc, date of acceptance of tender/award of work/issue of Order, stipulated date of completion as per CA and actual date of completion. This signed by proprietor/all partner/authorized Director of Pvt/Public Ltd, as applicable. It should indicate whether extension was granted or compensation was levied. Attested copy of acceptance letter and completion certificate shall be enclosed of each work. In case performance report has been given by the client same shall also be submitted duly attested.
- (c) Affidavit on non-judicial stamp paper of Rs 100/-(minimum) in the form of hard copy declaring their turnover for last 3 (three) Years and details of works completed in Government Department/ PSUs.
- (d) List of Works in progress with Government Department/ PSUs, Private Bodies/ Clients, Local Municipal Bodies showing completed value and balance value to be completed in a self-explanatory tabular form duly signed by Proprietor/Managing Partner/authorized Director, as applicable.
- (e) Solvency Certificate and Working Capital Certificate issued by a Scheduled Bank (not more than three months old).
- (f) Scanned copy of Integrity Pact.
- (g) Scanned copy of GSTIN and EPFO registration/code.

12.3.2 E-tendering shall be issued in stage –I, 02 (two) cover system as under:-

(a) **Cover 1.**

- (i) Cover I shall contain tender documents as stipulated in NIT and instructions to the tenderers. Hard copies of all documents uploaded in Cover 1 shall reach the office of Accepting Officer within the 7 days after Bid Submission end date as specified in the NIT/ Key dates published during the publication of tender.
- (ii) **Correspondence with Bidders.** Necessary Correspondence, if required may be made with tenderers whose Cover 1 are opened. All such correspondence shall be made online through E-mail.

(b) **Cover 2.** Cover 2 shall contain the BOQ (BOQ I to X and General Summary). In addition, Cover 2 will also contain other details as asked for and mentioned in the tender documents. The BOQ shall be validated and password protected before uploading by the bidder.

(c) Scanned copies of DDs towards tender cost, tender security and Earnest Money Deposit with enlistment details/ pre-qualification documents shall be uploaded under packet 1/cover-1 of the tender/bid on e-Tendering portal. DDs for tender security and earnest money are refundable in case T bid is not accepted resulting in non-opening of 'Q' bid. The applicant contractor shall bear the cost of bank charges for procuring and encashing the DDs and shall not have any claim from AW HO whatsoever on this account.

12.4 Other documents:-

- (a) Declaration (in affidavit form) about existence of any Government dues/ recovery outstanding against the firm.
- (b) Declaration (in affidavit form) about the cases in which the bidder is involved in arbitration/litigation cases giving brief details of such cases.
- (c) Three photographs of Proprietor/Partners/Director of the firm.
- (d) Declaration (in affidavit form) about near relative(s) of the firm or their employees/ agents is/ are working as Gazetted/ Commissioned Officer/Junior Engineer in AW HO/ Ministry of Defense. If their near relative(s) is /are working in such capacity, bidder shall furnish details.
- (e) Copy of Police verification/ clearance certificate from Police authority of the area where the registered office of the firm is located or notarized copy of valid passport of proprietor/each partner/each Director.
- (f) Document regarding Constitution of firm. Affidavit of Sole proprietorship/copy of partnership deed (in case of partnership firms)/ Memorandum & Articles of Association (in case of Limited/ Pvt Ltd companies).
- (g) Copies of PAN Card of proprietor/ partners/ directors.
- (h) Certificate on confirmation of visit to site of work.

12.5 Hard copy of the documents as mentioned above will be submitted within 7 (seven) days of the last date & time of opening of (Cover 1). Balance documents may be submitted by the bidder later on.

13. Important Instructions:

13.1 Applications/bids not accompanied scanned copies of requisite DD towards cost of tender, security of tender and earnest money deposit (as applicable) shall not be considered for validation of prequalification of bidder and their finance bids cover 2 will not be opened.

13.2 Tenderers/bidders to note that they should ensure that their original DDs towards tender cost and earnest money deposit are received within 7(seven) days of bid submission end date. Non-submission of physical copies of cost of tender and security of earnest money deposit shall be considered as willful negligence of the bidder with ulterior motives and such bidder shall be banned from bidding in AW HO for a period of six months commencing from the date of opening of finance bid.

13.3 In case bidders upload quotation in pre-revised BOQ, the same shall be considered as a willful negligence by the bidder and their quotation shall be considered Non-bonafide.

13.4 Contractor shall upload copy of Goods and Service Tax (GST) registration certificate of their company. In case of failure to upload and submit the document, the firm shall be disqualified in technical bid evaluation.

13.5 Before issue of the Work Order after acceptance of tender, Contractor shall ensure that they have Provident Fund Code number, if applicable, and shall also ensure compliance of EPF & MP Act, 1952 (including its Amendments).

13.6 In case any deficiency is noticed in the documents required to be uploaded by the bidder as per NIT, a communication in the form of e-mail/ WhatsApp/ SMS/ speed post etc. shall be sent to the bidder after opening of cover-I and submit the documents as asked for within a period of 5 days from date of communication failing which financial bid (cover-2) shall not be opened and contractor shall not have any claim on the same.

13.7 In the uploading of bid, a scanned copy of Power of Attorney in favour of the person uploading the bid using his/her DSC shall be uploaded. In case the digital signatory himself is the sole proprietor, scanned copy of affidavit on stamp paper of appropriate value to this effect stating that he has authority to bind the firm in all matters pertaining to contract including the Arbitration Clause, shall be attached in 'pdf' form. In case of partnership concern or a limited company, digital signatory of the bid/tender shall ensure that he is competent to bind the contractor (through partnership deed, general power of attorney or Memorandum and Articles of Association of the Company) in all the matters pertaining to the contracts with Union of India including arbitration clause. A scanned copy of the documents confirming of such authority shall be attached with the tender/bid in 'pdf' form, if not submitted earlier. The person uploading the bid on behalf of another partner(s) or on behalf of a firm or company using his DSC shall upload with the tender/bid a scanned copy (in 'pdf' form) of Power of Attorney duly executed in his favour by such other or all of the Partner(s) or in accordance with constitution of the company in case of company, stating that he has authority to bind such other person of the firm or the company, as the case may be, in all matters pertaining to the contract including Arbitration Clause.

13.8 Even in case of Firms or Companies which have already given Power of Attorney to an individual authorizing him to sign tender in pursuance of which bids are being uploaded by such person as a routine, fresh Power of Attorney duly executed in his favour stating specifically that the said person has authority to bind such partners of the Firm, or the Company as the case may be, including the condition relating to Arbitration Clause, should be uploaded in 'pdf' form along with the tender/bid unless such authority has already been given to him by the Firm or the Company. It shall be ensured that power of attorney shall be executed in accordance with the constitution of the company as laid down in its Memorandum & Articles of Association.

14. Performance Security:

14.1 After acceptance of the Tender, the contractor will be required to lodge with the Accepting Officer **PERFORMANCE SECURITY DEPOSIT @ 5% of CONTRACT Amount**. The amount is required to be lodged within 30 (Thirty) days of the receipt by the contractor of notification of acceptance of tender/bid , failing which action as stipulated in Condition 123 of GCC shall be taken.

14.2 Necessary proforma for **Performance Security Bond** is enclosed as **Appendix 'A'** to GCC.

15 **Other Eligibility Criteria**

15.1 Contractor should have Expertise of working and requisite Technical Manpower for completing the work.

15.2 Contractor should have requisite number of Vehicles, Equipments, Plants and details of Engineering Establishment for completing the work. Tenderer should own or have assured access (through hire/ lease/ purchase agreement/ MoU/ other commercial means) to the requisite equipments, Plants and vehicles in good working condition (complete usage life not more than 7 years).

15.3 **Performance & Other Requirement:** Bidder shall fulfill the following requirement:-

- (a) There should not be poor/slow progress in running work. (If yes, submit details and reasons of delay to check that these are not attributable to him or are beyond his control).
- (b) There are no serious defect observed in works which stand un-rectified (If yes, submit details and reasons).
- (c) There are no cancelled/ abandoned contracts in which Govt unrealized recoveries exist (If yes, submit details and reasons).
- (d) He/They have not been blacklisted by any Govt Deptt (If yes, submit details and reasons).
- (e) There is no Government/AWHO dues outstanding against the firm (If yes, submit details and reasons).
- (f) Proprietor/partners/directors of firm are not involved in anti-national/anti-social activities and have neither been convicted nor any proceeding are pending in court for such activities.

15.4 **Disqualification:** Even though the tenderers meet the above criteria, they are liable to be disqualified if they have made misleading of false information in bidding documents submitted.

16. **Integrity Pact (IP) :** IP duly signed by Accepting Officer/Authorized Officer has been uploaded along with this tender **Annexure -II to Appendix 'A'** of NIT. The same shall be signed by bidder(s) on each page and scanned copy shall be uploaded as part of requalification of Technical bid (cover-1) and original IP duly signed on each page shall be forwarded by post along with tender fee and EMD. IP will be an integral part of the Contract and both parties are bound by its provision.

17. **Q-bid evaluation:-**

- (a) Arithmetical corrections shall be made as per General Condition of Contract 15.
- (b) For the purpose of evaluation "cost" shall be inclusive of all taxes and duties.
- (c) Bidder who has quoted lowest total cost (L-1) in BOQ (Schedule 'A') shall be considered successful bidder and all other bidders shall be considered unsuccessful. Offer of successful bidder (L-1) shall only be considered for acceptance. If L-1 backs out, retendering shall be resorted in a fair and transparent manner.
- (d) Completion Period as indicated in Tender Document has been accepted.

18. If bidders/ tenderers desire that any condition or stipulation given in the tender documents is to be modified/ amended or deleted, they may submit their comments/ suggestions before last working date of clarification as shown in critical date sheet in subject tender ID along with supporting documents, as applicable, for consideration by the Deptt for issue of corrigendum/amendments to tender documents. If deptt. considers comments/ suggestions to be appropriate, corrigendum/ amendments to tender documents shall be issued and also uploaded on E-Tender Portal. If deptt does not consider comments/suggestion suitable, corrigendum/amendments to tender documents shall not be issued/uploaded on e-tendering Portal and tenderers shall quote strictly complying with the various provisions given in the tender documents.

19 **Proprietary data**

All documents and other information supplied by the Employer or submitted by a Bidder to the Authority shall remain or become the property of the Authority. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. The Authority will not return any Bid or any information provided along therewith.

20 **Cost of Bidding**

The Bidders shall be responsible for all of the costs associated with the preparation of their Bids and their participation in the Bidding Process. The Employer will not be responsible or in any way liable for such costs, regardless of the conduct or outcome of the Bidding Process.

21 **Site visit and verification of information**

21.1 Bidders are encouraged to submit their respective bids after visiting the Project site and ascertaining for themselves the site conditions, soil condition, location, surroundings, climate, availability of power, water & other utilities for construction, access to site, handling and storage of materials, weather data, applicable laws and regulations, and any other matter considered relevant by them by carrying out necessary survey/investigation. Bidders are advised to visit the site and familiarize themselves with the Project within the stipulated time of submission of the Bid. No extension of time is likely to be considered for submission of Bids.

21.2 It shall be deemed that by submitting a Bid, the Bidder has:

- (a) Made a complete and careful examination of the Bidding Documents, Schedules annexed to contract agreement Document;
- (b) Received all relevant information requested from the Employer.
- (c) Accepted the risk of inadequacy, error or mistake in the information provided in the Bidding Documents or furnished by or on behalf of the Authority relating to any of the matters referred to in Clause 21.1 hereinabove. No claim shall be admissible at any stage on this account.
- (d) Satisfied itself about all matters, things and information including matters referred to in Clause 21.1 hereinabove necessary and required for submitting an informed BID, execution of the Project in accordance with the Bidding Documents and performance of all of its obligations there under;

(e) Acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the Bidding Documents or ignorance of any of the matters referred to in Clause 21.1 hereinabove shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations, loss of profits etc. from the Authority, or a ground for termination of the Agreement by the Contractor;

(f) Acknowledged that it does not have a Conflict of Interest; and

(g) Agreed to be bound by the undertakings provided by it under and in terms hereof.

21.3 The Employer shall not be liable for any omission, mistake or error in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to any error or mistake therein or in any information or data given by the Authority.

22. The contractor shall utilize the services of consultants for preparation of architectural details and structural details and preparation of architectural and structural drawings through reputed qualified and experienced consultants in this field as per requirement. The name of such consultants and drawings shall be got approved by the contractor from the Accepting Officer through ARCHITECT and Project-in-Charge after their Checking.

23. The contractor shall employ qualified and experienced agents for getting the works of various services executed wherever there is requirement for this purpose as approved by the Accepting Officer.

24. In case of rejection of technical /prequalification bid, bidder may appeal to MD, AW HO e-mail contract03@awhosena.org cont22_sec@awhosena.org & awhohq@gmail.com against rejection, whose decision shall be final and binding. However, contractor/ bidder shall not be entitled to any compensation whatsoever for rejection of technical/prequalification bid.

25 **JOINT VENTURE**: No Joint Venture shall be allowed to the Contractor.

26. Court of Delhi having original jurisdiction over the place from where tender has been issued shall alone have jurisdiction to decide over any dispute out of or in respect of issue related to bidding under this tender. After acceptance of tender, Condition 167(Jurisdiction of Courts) of General Conditions of Contract shall be applicable.

For Accepting Officer

No :

Army Welfare Housing Organisation
South Hutsments, Kashmir House
RajajiMarg, New Delhi-110011

Dated: 2024

Annexure 'I' to Appendix 'A' of NIT**FORM OF SOLVENCY CERTIFICATE FROM
NATIONALISED/SCHEDULED BANK**

This is certified that to the best of our knowledge and information that M/s / Shri / Smt _____ having address _____, a customer of our bank are/ is respectable and can be considered solvent up to Rs _____ (Rupees _____)/ financially sound for any engagement up to Rs _____(Rupees _____). This certificate is issued without any guarantee or responsibility on the bank or any of the officers.

(Signature)

Name, Designation and Personal Code No of
Signatory & Seal of bank with bank address and Code no.

Note: In case of partnership firm, certificate to include names of all partners as recorded with the bank

**FORM OF WORKING CAPITAL CERTIFICATE FROM
NATIONALISED/ SCHEDULED BANK**

This is certified that M/s / Shri / Smt _____ having address _____ have/has been maintaining a saving bank account/ current account/ fixed deposit account with this branch of bank since _____ and the firm is having working capital of approximately Rs _____ and/ or the firm is enjoying overdraft/ credit facilities up to limit of Rs _____. This certificate is issued without any guarantee or responsibility on the bank of any or the officers.

(Signature)

Name, Designation and Personal Code No of
Signatory & Seal of bank with bank address and Code no.

**DETAILS OF WORKS EXECUTED DURING LAST 05 YEARS IN CENTRAL GOVT/
STATE GOVT /PSUs**

Ser No	CA No and Name of Work	Address of Client incl email id and/ or FAX No.	Amount of CA	Final amount of Work	Date of Completion	Extension granted if any	Remarks
1	2	3	4	5	6	7	8

Notes:-

1. For submission of Tender bidders are requested to get themselves registered with <https://awho.ewizard.in> website along with class – II/III Digital Signature Certificate (DSC) issued by authorized CA under IT Act 2003 (including its Amendments).
2. For complete details refer our website <https://awho.ewizard.in> website.
3. Any change/ modification in the tender enquiry will be intimated through above mentioned website only. Bidders are therefore requested to visit our website regularly to keep themselves updated.
4. Application not accompanied by requisite value of DDs / RTGs / E-payments towards cost of tender shall not be considered. Price bid (Cover No 2) received without EMD in original up to the date of opening of Cover 1 will not be opened.
5. Full notice of tender & enlistment criteria are available in HQ AWHO, New Delhi and also on <https://awho.ewizard.in> website.

Signature of Contractor

Dated:

for Accepting Officer

File No. : _____

Army Welfare Housing Organisation
South Huments, Kashmir House
Rajaji Marg, New Delhi-110011

Dated: _____

Tele: 011- _____

Fax: 011- _____

Email: _____

Annexure -II to Appendix 'A' of NIT**INTEGRITY PACT**

Tele : 011-23018762
 Email id : contract03@awhosena.org
cont22_sec@awhosena.org
awhohq@gmail.com

Army Welfare Housing Organisation
 South Hutmants, Kashmir House
 Rajajimarg, New Delhi - 110011

CA NO.: B/03020/ PRAYAGRAJ/ PLOT - DEV/03/2024

Sep 2024

To

**NAME OF WORK: CONSTRUCTION OF PLOTTED DEVELOPMENT WORK AT
 KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING
 ORGANIZATION NEW DELHI**
CA NO: AWHO/PRAYAGRAJ/PLOT-DEV/03/2024

Dear Sir(s),

1. It is hereby declared that AWHO is committed to follow the principle of transparency, equity and competitiveness in public procurement.
2. The subject Notice Inviting Tender (NIT) is an invitation to offer made on the condition that the Bidder will sign the Integrity Pact, which is an integral part of tender / bid documents, failing which the tenderer / bidder will stand disqualified from the tendering process and the bid of the bidder would be summarily rejected.
3. This declaration shall form part and parcel of the Integrity Pact and signing of the same shall be deemed as acceptance and signing of the Integrity Pact on behalf of the AWHO.

Yours faithfully,

MD AWHO / Designated Officer
 (Nominated by MD AWHO)

INTEGRITY PACT

To,

Army welfare Housing Organisation
South Hutmants, Kashmir House
Rajaji Marg, New Delhi-110011

**NAME OF WORK: CONSTRUCTION OF PLOTTED DEVELOPMENT WORK AT
KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING
ORGANIZATION NEW DELHI**
CA NO: AWHO/PRAYAGRAJ/PLOT-DEV/03/2024

Dear Sir,

1. I/We acknowledge that AWHO is committed to follow the Principles thereof as enumerated in the Integrity Pact enclosed with the tender/bid document.
2. I/We agree that the Notice Inviting Tender (NIT) is an invitation to offer made on the condition that I/We will sign the Integrity Pact, which is an integral part of tender documents, failing which I/We will stand disqualified from the tendering process. I/We acknowledge that THE MAKING OF THE BID SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of the conditions of the NIT.
3. I/We confirm acceptance and compliance with the Integrity Pact in letter and spirit and further agree that execution of the said Integrity Pact shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by AWHO. I/We acknowledge and accept the validity of the Integrity Pact, which shall be in line with Para 13 of the enclosed Integrity Pact.
4. I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Pact, while submitting the tender/bid, AWHO shall have unqualified, absolute and unfettered right to disqualify the tenderer/bidder and reject the tender/bid in accordance with terms and conditions of the tender/bid.

Yours faithfully

(Duly authorized signatory of the Bidder)

INTEGRITY PACT

GENERAL

Whereas the MD AWHO hereinafter referred to as '**Principal/ Owner**' and the first part, has floated the Tender (**AWHO/PRAYAGRAJ/PLOT-DEV/03/2024**) and intends to award, under laid down organizational procedure, contract for **CONSTRUCTION OF PLOTTED DEVELOPMENT WORK AT KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANIZATION NEW DELHI**

CA NO: AWHO/PRAYAGRAJ/PLOT-DEV/03/2024

hereinafter referred to as works / Services and M/s..... represented by,(which term unless expressly indicated by the contract, shall be deemed to include its successors and its assignees), hereinafter referred to as the Bidder / Contractor and the second part is willing to carry out the works / services.

1. Whereas the Bidder is a Proprietorship Concern / Partnership Firm / Limited Liability Firm / Privet Limited Company / Limited Company constituted in accordance with the relevant law in the matter and the Principal / Owner is MD AWHO performing its functions on behalf of the AWHO.

OBJECTIVES

2. Now, therefore, the Principal / Owner and the Bidder agree to enter into this pre-contract agreement, referred to as **INTEGRITY PACT(IP)**, to avoid all forms of corruption by following a system that is fair, transparent and free from any influence / prejudiced dealings prior to, during and subsequent to conclusion of the contract to be entered into with a view to:-
 - 2.1 Enabling the Principal / Owner to get the desired works / services at a competitive price in conformity with the defined specifications of the services by avoiding high cost and the distortionary impact of corruption on public procurement.
 - 2.2 Enabling Bidders to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices and the Principal / Owner will commit to prevent corruption, in any form, by their officials by following transparent procedures.

COMMITMENTS OF THE PRINCIPAL / OWNER

3. The Principal / Owner commits itself to the following: -
 - 3.1 The Principal / Owner undertakes that, no official of the Principal / Owner, connected directly or indirectly with the contract will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favor or any material or for any person, organization or third party related to the contract; in exchange for an advantage; in the bidding process, bid evaluation, contracting or implementation process related to the Contract.
 - 3.2 The Principal / Owner will, during the pre-contract stage, treat all Bidders alike and will provide to all Bidders the same information and will not provide any such information to any particular Bidder which could afford an advantage to that particular Bidder in comparison to other Bidders.
 - 3.3 All the officials of the Principal / Owner will report to the appropriate authority of AWHO /Government office any attempted or completed breach(s) of the above commitments as well as any substantial suspicion of such a breach.
4. In case of any such preceding misconduct on the part of such official(s) is reported by the Bidder to the Principal / Owner willful and verifiable facts and the same is prima facie found to be corrected by the Principal / Owner, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Principal / Owner and such a person shall be debarred from further dealing related to the tender / contract process. In such a case while an Inquiry is being conducted by the Principal / Owner the tender process / proceedings under the contract would not be stalled.

COMMITMENTS OF BIDDERS

5. The Bidder commits himself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of his bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commits himself to the following: -
 - 5.1 Bidder will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favor any material or non-material benefit or other advantage, commission, fee, brokerage or inducement to any official of the Principal / Owner, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the Contract.
 - 5.2 The bidder further undertakes that he has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour any material or

non-material benefits or other advantage, commission, fees, brokerage or inducement to any official of the Principal / Owner or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other Contract with the AWHO for showing or forbearing to show favor or disfavor to any person in relation to the Contract or any other Contract with the AWHO.

- 5.3 The bidder will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.
- 5.4 The bidder will not accept any advantage in exchange for any corrupt practice, unfair mean and illegal activities.
- 5.5 The bidder would not enter into conditional contract with any Agent(s), broker(s) or any other intermediaries wherein payment is made or penalty is levied, directly or indirectly, on success or failure of the award of the contract.
- 5.6 The Bidder commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts. Complaint will be processed as per **Guidelines for Handling of Complaints** in vogue. In case the complaint is found to be vexatious, frivolous or malicious in nature, it would be construed as a violation of Integrity Pact.

6 **PREVIOUS TRANSGRESSION**

- 6.1 The Bidder declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact with any other company in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India.
- 6.2 If the Bidder makes incorrect statement on this subject, Bidder can be disqualified from tender process or the contract and if already awarded, same can be terminated for such reason.

7 **COMPANY CODE OF CONDUCT**

- 7.1 Bidder are advised to have a company code of conduct (clearly rejecting the use of bribes and other unethical behavior) and a compliance program for the implementation of the code of conduct throughout the country.

8 **SANCTION FOR VIOLATION**

- 8.1 Any breach of the aforesaid provisions by the Bidder or any one employed by him or acting on his behalf (whether with or without the knowledge of the Bidder) or the commission of any offence by the Bidder or any one employed by him or acting on his behalf, as defined in Chapter IX of the Indian Penal Code, 1860 or the Prevention of Corruption Act 1988 or any other act enacted for the prevention of

corruption (including its Amendments) shall entitle the Principal / Owner to take all or any one of the following actions, wherever required:-

- (i) Technical bid of the Bidder will not be opened. Bidder will not be entitled to or give any compensation. However, the proceedings with the other Bidder(s) would continue.
- (ii) Financial bid of the Bidder will not be opened. Bidder will not be entitled to or give any compensation. However, the proceedings with the other Bidder(s) would continue.
- (iii) The Earnest Money Deposit shall stand forfeited either fully or partially, as decided by the Principal/ Owner, in case contract is not awarded to the Bidder and the Principal/ Owner shall not be required to assign any reason therefore. For enlisted contractors an amount less than or equal to Earnest Money Deposit as decided by the Principal / Owner shall be deducted from any amount held with the Department / any payment due.
- (iv) To immediately cancel the contract, if already concluded / awarded without any compensation to the Bidder.
- (v) To encash the Performance Security furnished by the Bidder.
- (vi) To cancel all or any other Contract(s) with the Bidder.
- (vii) To temporarily suspend or temporarily debar / permanently debar the bidder as per the extant policy.
- (viii) If adequate amount is not available in the present tender / contract, the deficient amount can be recovered from any outstanding payment due to the Bidder from the Principal / Owner in connection with any other contract for any other works / services.
- (ix) If the Bidder or any employee of the Bidder or any person acting on behalf of the Bidder, either directly or indirectly, is closely related to any of the officers of the Principal / Owner, or alternatively if any close relative of an officer of the Principal / Owner has financial interest / stake in the Bidder's firm, the same shall be disclosed by the Bidder at the time of submission of tender. Any failure to disclose the interest involved shall entitle the Principal / Owner to debar the Bidder from the bid process or rescind the contract without payment of any compensation to the Bidder. The term 'close relative' for this purpose would mean spouse whether residing with the AWHO servant or not, but does not include a spouse separated from the AWHO servant by a decree or order of a competent Court; son or daughter or step son or step daughter and wholly dependent upon AWHO servant, but does not include a child or a step child who is no longer in any way dependent upon the AWHO servant or of whose custody the AWHO servant has been deprived of by or under any law; any other person related, whether by blood or marriage, to the AWHO servant or to the AWHO servant's wife or husband and wholly dependent upon AWHO servant.

(x) The Bidder shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal/ Owner and if he does so the Principal / Owner shall be entitled forthwith to cancel the contract and all other contracts with the Bidder.

8.2 The decision of the Principal / Owner to the effect that a breach of the provisions of this Integrity Pact has been committed by the Bidder shall be final and binding on the Bidder. Details of Nodal officer nominated by MD AWHO are as follows:-

Name : Lt Col Niranjan Singh, DY Director (Contracts)
E-Mail ID : awhohq@gmail.com &
Contract03@awhosena.org

Mobile No : 9530758981

8.3 In case of any complaint with regard to violation of Integrity Pact, either party can approach to the Nodal Officer and the other party. If any such complaint from bidder is received by the Principal / Owner, the Principal / Owner shall refer the complaint to the Independent External Monitors for their recommendations / inquiry report.

8.4 If the IEMs need to peruse the relevant records of the Principal / Owner and /or of the Bidder / Contractor in connection with the complaint sent to them, the Principal / Owner and/or the Bidder/ Contractor shall make arrangement for such perusal of records by the IEMs as demanded by them including unrestricted and unconditional access to the project documentation and minutes of meeting. If records / documents of Sub-Contractor(s) are also required to be perused by the IEMs, the Bidder shall make arrangement for such perusal of records by the IEMs as demanded by them. IEMs are under obligation to treat the information and documents of the Principal / Owner and Bidder / Contractor / Sub-Contractors with confidentiality.

8.5 The task of the IEMs, is to review independently and objectively, any complaint received with regard to violation Integrity Pact and offer recommendations or carry out inquiry as deemed fit. The IEMs are not subject to any instructions by the representatives of the parties and shall perform their functions neutrally and independently. The report of inquiry, if any, made by the IEMs shall be submitted to either of the following for a final and appropriate decision in the matter keeping in view the provision of this Pact:-

(a) MD AWHO in normal cases.

9. **EXAMINATION OF BOOKS OF ACCOUNTS**

In case of any allegation of violation of any provisions of this Integrity Pact or payment of commission, the Principal / Owner or its agencies shall be entitled to examine the Books of Account of the Bidder and the Bidder shall provide necessary information of the relevant financial documents in English and shall

extend all possible help for the purpose of such examination.

10 LAW AND PLACE OF JURISDICTION

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the Principal / Owner.

11 OTHER LEGAL ACTIONS

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

12 SIGNING OF INTEGRITY PACT ON BEHALF OF BIDDER

(a) **Proprietorship Concern** - The Integrity Pact must be signed by the proprietor or by an authorised signatory holding power of attorney signed by the proprietor.

(b) **Partnership firm** - The Integrity Pact must be signed by all partners or by one or more partner holding power of attorney signed by all partners.

(c) **Limited Liability firm** - The Integrity Pact must be signed by all partners or by one or more partner holding power of attorney signed by all partners.

(d) **Private Limited / Limited Company** - The Integrity Pact must be signed by a representative duly authorised by Board resolution.

13 Validity

13.1 The validity of this Integrity Pact shall be from date of its signing. It expires for the Contractor after the final payment under the contract has been made or till the continuation of Defect Liability Period, whichever is later and for all other bidders, till the Contract has been awarded.

13.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

.....
(For and on behalf of Principal/Owner)

.....
(For and on behalf of Bidder/Contractor)

WITNESSES

1.

.....

.....

(Signature, Name and Address)

2.

.....

.....

(Signature, Name and Address)

Place:

Date:

SCHEDULE "A"
SCOPE OF WORK & PREAMBLES

1. Army Welfare Housing Organization (AWHO) intends to develop it's 5 Acre of land in plots of various feasible sizes along with construction of proposed plotted development work at Kalindipuram, Prayagraj (UP) as per the details given in succeeding paragraphs and shown in drawings.
2. Demarcation of plots. Demarcation of plots complete in all respect shall be carried out as per layout plans / drawings and as per directions of Project-in-charge / Project Director at site. During detailed layout there may be minor changes in positioning of the plots / building for which no financial adjustments shall be admissible except for changes, if any, ordered in design and/ or depth of foundation to suit site requirement.
3. Construction of Ancillary Buildings. The tender is item rate contract between includes construction of ancillary buildings like Guard Room, Garbage Shed, UG Tank, Pump Room etc. as catered in BOQ. The ancillary buildings shall be constructed complete in all respect as shown in drawings, specified in this tender document and as directed at site by Project-in-Charge / Project Director . Quoted rates of bidder / tenderer for all items of BOQ I to X and General Summary shall be deemed to be included for entire works of civil, electrical, sanitary etc. complete in all respect and all as specified in respective sections of particular specification, shown in drawings and as directed by Project-in-Charge / Project Director at site.
4. External Works and Services.
 - (a) The execution of these items shall be carried out as specified in this tender document, shown in drawings and as directed as site by Project-in-Charge/Project Director Quoted rates of bidder/ tenderer shall deemed to be included for completion of relevant items in all respect. List of main Works and Services as catered in this tender document are appended below: -
 - (i) BOQ - I, Road and Pavement, Civil Work
 - (ii) BOQ - II, Boundary Wall & Gate, Civil Work
 - (iii) BOQ - III, Guard Room Civil Work, Plumbing & Electrical Works
 - (iv) BOQ - IV, Garbage Collection, Civil Works
 - (v) BOQ - V, Underground Water Tank / Water Sump, Civil Works
 - (vi) BOQ -VI, Drainage Works, Civil Work
 - (vii) BOQ - VII, Tube Wells (2 Nos)
 - (viii) BOQ - VIII, External Water Supply, Sewage, Storm Water Drainage, Fire Hydrant, Rain Water Harvesting System, Water Treatment Plant & Pumps
 - (ix) BOQ - IX, External Electrification
 - (x) BOQ - X, Landscape work and Plot Demarkation
 - (xi) General Summary
 - (b) The entire development works as mentioned above shall be on item rates basis in accordance with the rates to be quoted for the respective items in the BOQ. The entire work being done in accordance with the description of schedule 'A' / BOQ items, drawings, specifications and provisions of the contract.

5. Tenderers' quoted rates / prices of all items of BOQ shall be deemed to included full & entire completion of all works as described in description of relevant items here-in-this tender document and in accordance with good engineering practice and recognized principles. The tender specifications, drawings, CPWD specifications & IS provisions are to complement each other, and the tender specifications will have precedence over CPWD specifications in case of ambiguity. In case of any detail missing or incomplete, these documents shall supplement the drawback. Details of construction which may not have been inadvertently specified or shown on the drawing but are apparently and obviously required for making the building trades and services functional and are essential for completion of work shall be deemed to be included in the item rate per unit rates quoted by the contractor. The details of such work shall have appropriate quality and as per specifications of this contract. Decision of the Project-in-Charge / Project Director, Army Welfare Housing Organization shall be final and binding in this regard.
6. Provision and arrangement of all tools, plants, construction machinery such as shuttering, scaffolding, batching plant, concrete mixer, building hoist, Concrete Pumps, Boom placers, dewatering equipments, vibrators, compressors, welding sets, survey instruments, concrete testing laboratory equipment, weight, scales, hoisting equipments and any miscellaneous machinery required for efficient and proper execution of work for completion in time is deemed to be included in the item rates for **BOQ** quoted by the bidder / tenderer. The Architect and Project-in-Charge / Project Director / Project Director reserve the right to ensure their installations and use where they deemed to be necessary.

7. _____BLANK_____

8. **COMPLETION PERIOD:** -

All works under this contract may commence simultaneously as applicable as per site conditions / requirements and **the period of completion for entire work shall be 12 (Twelve) months** from the date of commencement. The work order shall be issued by the Project-in-Charge / Project Director within seven days from the date of signing of the acceptance letter by the Managing Director, AWHO. Date of commencement shall be within seven days from the date of issue of work order.

9. Temporary/ Ancillary Provisions: The contractor will also provide installation of temporary warning signs/ lamps on all location during the hours of darkness and kept it lit there at all times during these hours as directed by Architect and Project-in-Charge / Project Director.
10. **Guarantee/ Warranty:** All plant/equipments/machineries installed/ commissioned shall be guaranteed /carry warranty (as per applicability of guarantee/ warranty given in general as well as particular specifications for each plant/equipments/machinery) for a period of **sixty months (60) months from the certified date of completion of the installation by AWHO** against un-satisfactory performance and/ or breakdown due to defective design, material, manufacture, workmanship or installation. The guarantee/ warranty period given above is the minimum period for which a plant/ equipments/ machinery is required to be covered under guarantee/ warranty. The defect liability period as mentioned in other parts of the tender documents shall be deemed to be modified to this extent for such plants/ equipments/ machineries installed/ commissioned. The plant/ equipments/ machinery or component or any part thereof so found defective during the guarantee/warranty period shall be repaired or replaced free of cost to the satisfaction of the Project- in-charge/Project Director. In case it is felt by AWHO that undue delay is being caused by the Contractor in

doing this, the same will be got done by AWHO at the risk and cost of the contractor. The decision of Project-in-Charge / Project Director in this regard shall be final. Quoted rate shall be considered deemed to be included for this aspect.

11. Unforeseeable Difficulties: Except as otherwise specifically stated elsewhere in the Contract:

(a) The Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works.

(b) By signing the Contract, the Contractor accepts total responsibility for having foreseen all difficulties and costs of successfully completing the Works; and

(c) The Contract amount shall include all the works mentioned in scope of work, External Finishes, Internal Finishes, general specification, particular specifications, Concept / tender Drawings, tender documents etc. covered the entire area in all respect to make the buildings & complex fit for its intended purpose i.e. handing over for functional use and not be adjusted to take account of any unforeseen difficulties or costs. Employer shall not provide any material either on chargeable or on free issue basis to the contractor for execution of the project.

12. DISCLAIMER:

(a) The Contractor acknowledges that prior to the execution of this Agreement, the Contractor has, after a complete and careful examination, made an independent evaluation of the Request for Qualification, Request for Proposals, Scope of the Project, Specifications and Standards of design, construction and maintenance, Site, local conditions, physical qualities of ground, subsoil and geology, traffic volume & restrictions, suitability and availability of access routes to the Site and all information provided by the Employer or obtained procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. The Contractor confirms that it shall have no claim whatsoever against the Employer in regard the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it.

(b) The Contractor acknowledges and hereby accepts to have satisfied itself as to the correctness and sufficiency of the Contract Price.

(c) The Contractor acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth elsewhere in the tender document and hereby acknowledges and agrees that the Employer shall not be liable for the same in any manner whatsoever to the Contractor, or any person claiming through or under any of them.

(d) The Parties agree that any mistake or error in or relating to any of the matters set forth elsewhere in tender document shall not vitiate this Agreement, or render it voidable.

(e) In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth elsewhere in tender document, that Party shall immediately notify the other Party, specifying the mistake or error.

(f) Except as otherwise provided in this Agreement, all risks relating to the Project shall be borne by the Contractor; and the Employer shall not be liable in any manner for such risks or the consequences thereof

13. PREAMBLES AND NOTES: -

(a) All works mentioned in this tender document shall be executed / provided complete in all respect as specified under various sections of brief specification in the contract and as per latest CPWD Specifications and as shown on drawings.

(b) The rates quoted by the bidder / tenderer in BOQ for all items shall be as described in respective items, particular specification of contract and as per latest CPWD Specifications

(c) All manholes where the provision is made for entry of soil pipes from the Plot firstly, these manholes will be treated as 1st manholes.

(d) Quantities given in BOQ (BOQ I to X) are provisional. The payment shall be made for the actual quantities ordered and executed at the unit rates quoted against each item.

(e) During execution of works certain items of BOQ (Sch 'A') may not be executed at all. The contractor shall have no claim for omitting these items in part / totally.

(f) Scope of work also includes that the Procurement / Storage of materials, Workmanship, Execution of all works, Necessary Facilities at site etc. shall be catered out as per norms of "PRAYGRAJ DEVELOPMENT AUTHORITY" and NGT standard condition. Main point of works / norms is appended in brief as below:-

(i) Before starting of construction, a board of required size shall be put up at the site on which name of approving Authority, permit number, approval date, validity date and name of architect are to be mentioned.

(ii) Government Orders in force time to time shall be complied.

(iii) Indian Electricity Rules shall not be violated and the conditions mentioned on NOC(s) issued by the different departments shall also be followed.

- (iv) Tarpaulin covering shall be provided on scaffolding around the area of construction and the building. No person including Contractor, Owner can be permitted to store any construction material particularly sand on any part of the street, roads in any colony or nearby area.
- (v) The construction material of any kind that is stored in the site will be fully covered in all respects so that it does not disperse in the air in any form.
- (vi) All the construction material and debris shall be carried in the trucks or other vehicles which are fully covered and protected so as to ensure that the construction debris or the construction material does not get dispersed into the air or atmosphere, in any form whatsoever.
- (vii) The dust emissions from the construction site should be completely controlled and all precautions taken in that behalf.
- (viii) The vehicles carrying construction material and construction debris of any kind should be cleared before it is permitted to ply on the road after unloading of such material.
- (ix) Every worker working on the construction site and involved in loading, unloading and carriage of construction material and construction debris shall be provided with mask to prevent inhalation of dust particles.
- (x) Necessary facilities shall be provided for all medical help, investigation and treatment to the workers involved in the construction of building and carry of construction material and debris relatable to dust emission.
- (xi) Transportation for construction material and debris, waste to construction site, dumping site or any other place shall be carried out in accordance within rules and in terms.
- (xii) Appropriate measures and strictly compliance with by fixing sprinklers and creations of green air barriers on construction site including compulsory use of wet-jet in grinding and stone cutting shall be taken in accordance of requirement.
- (xiii) Wind breaking walls shall be provided around construction site.
- (xiv) It shall be ensured that C&D waste is transported and disposed to the C&D waste site only and due record in that behalf shall be maintained.
- (xv) Use of covering sheets should be done for trucks to prevent dust dispersion from the trucks, implemented by district offices.
- (xvi) Periodical auto maintenance report to avoid vehicular pollution and to manage transportation route for vehicles in a well-planned manner to avoid traffic havocs shall be ensured.

- (xvii) The entry and exit points design should not disturb the existing traffic.
- (xviii) Inspection & Maintenance has definite utility on emission performance, Regular vehicle inspection to be done by the contractor to enhance the efficiency of work and to reduce the risk of unwarranted air pollution.
- (xix) Fitness certification is a statutory requirement for commercial vehicles and public transport vehicles. Periodicity for certification.
- (xx) Pollution Under Control (PUC) certificates are required to be obtained every three months for all categories of vehicles. In case of diesel vehicles, free acceleration smoke is measured.
- (xxi) Life of vehicle should be inspected to avoid further air pollution.
- (xxii) Overloading is another big challenge and shall be dealt by the proponent as well as State Authorities by installing check booth at entry points. Necessary measures shall be adopted by the Contractor.

14. **Approvals:** The Contractor shall liaise with UPPCL, JAL KAL Deptt and the Ganga Pollution Control Unit, Prayagraj for obtaining the exact points of tapping / jointing and for obtaining the clearances / permissions from the concerned department / authorities for external electric supply, external water supply and sewage disposal etc. as required at site for completion of work. Architect shall provide all necessary documents, however, a statutory fee as appreciable and payable to the Authorities shall be paid by AWHO after providing receipts / vouchers / challans by the Contractor.

15. **Bill of quantities (BOQ)**

Notes:

- (i) BOQ contains BOQ I to X .
- (ii) BOQ mentioned in this tender document shall mean BOQ I to X.
- (iii) Lowest rate quoted by the bidder for same item in any part of the Sch 'A' / BOQ shall be considered for calculating / working out the cost of the lump sum amount of the tender. The lowest rate quoted for the same item in any part of the Sch 'A' / BOQ shall be payable. Hence, to avoid ambiguity at later stage, bidders/ tenderers should quote same rate for same item in any of the BOQ.
- (iv) Quantity of all items mentioned in all BOQ are provisional and shall be paid on actual basis as per works executed at site.

SCHEDULE - 'B'**LIST OF MATERIALS TO BE ISSUED TO THE CONTRACTOR BY ARMY WELFARE HOUSING ORGANISATION
ON PAYMENT****NAME OF WORK: CONSTRUCTION OF PROPOSED PLOTTED DEVELOPMENT WORK
AT KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANISATION, NEW
DELHI**

-NIL-

SCHEDULE 'C'**NAME OF WORK: CONSTRUCTION OF PROPOSED PLOTTED DEVELOPMENT WORK
AT KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANISATION, NEW
DELHI**

-Nil-

SCHEDULE 'D'**NAME OF WORK: CONSTRUCTION OF PROPOSED PLOTTED DEVELOPMENT WORK
AT KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING ORGANISATION, NEW
DELHI**

-Nil-

(SIGNATURE OF CONTRACTOR)
DATED :

FOR ACCEPTING OFFICER

TENDER

To

MD AWHO,

Having examined and perused the following documents: -

1. NIT & Instruction to Bidder
2. Scope of Work
3. Particular specifications
4. Special Conditions of the Contract
5. Payment schedule
6. Site Plan, Tentative Layout plan, Line Plan and other Drawings as per List of Drawings
7. Schedule 'A' BOQ (BOQ I to X) and Notes.
8. Schedule of Rates (DSR) 2021 and CPWD Specification 2019 (updated), together (here-in-after and in General Conditions of Contract referred to as the 'AWHO Schedule') as applicable to the above said schedule.
9. General Conditions of Contracts .
10. **Electricity and Water Supply:** Electricity and Water Supply will not be supplied by AWHO. should this Tender be accepted, I/We agree:-
 - (a) that the sum of Rs 10,00,000/- (Rupees Ten Lakh only) forwarded as Earnest Money shall either be retained by the AWHO on account of the Performance Security or shall be repaid on receipt of the full amount of Performance Security within the time specified in Condition 123 of GCC.
 - (b) To execute all the works referred to in the said documents upon the terms and condition contained or referred to therein and as detailed in General Summary here-in-after and to carry out such variation/ deviations as may be ordered vide condition **90 to 92** of General Conditions upto maximum to Ten Percent of contract amount and further agree to refer all disputes as required by the clauses **162 to 167** of General Conditions to the sole arbitrator to be appointed from panel of Arbitrators available with Delhi International Arbitration Centre (DIAC) through the appropriate court which shall be final & binding on both the parties. The arbitration shall be in accordance with the rules of arbitration covered under the Arbitration and Conciliation Act 1996.

TENDER (CONTD...)

FOR THE LUMPSUM OF Rs _____
 (RUPEES _____ ONLY)

SIGNATURE _____ (Name _____)
 _____) IN THE CAPACITY OF _____ DULY AUTHORISED TO SIGN THE
 TENDER FOR AND ON BEHALF
 OF _____

(IN BLOCK LETTERS)

WITNESS _____
 SIGNATURE _____

DATE _____
 POSTAL ADDRESS _____

NAME _____
 ADDRESS _____

TELEGRAPHIC ADDRESS _____

TELEPHONE NO. _____
 FAX NO. _____
 MOBILE NO: _____
 Email Id : _____

ACCEPTANCE

_____ alterations have been made in these documents and as evidence that these alterations were made before the execution of the contract agreement; they have been initialed by contractor and Lt Col Niranjan Singh, Dy Director (Contract). The said officer is hereby authorized to sign and initial on my behalf the documents forming part of this contract.

The above tender was accepted by me on behalf of the president of India, for amended contract

sum of Rs. _____ (Rupees _____)

_____ only
 on _____ day of _____.

Signature _____ dated this _____ day of _____)

Appointment : The Managing Director ,Army Welfare Housing Organisation
(For and on behalf of the AWHO)

GENERAL CONDITIONS OF CONTRACT

Interpretations

1. In construing these clauses, specifications and **Contract Agreement**, the following words shall have the meaning herein assigned to them except where the subject or context otherwise requires :-
 - a) **AWHO.** means Managing Director, Army Welfare Housing Organization and shall include his (their) legal representatives/assign(s) or successor(s).
 - b) **Contractor.** Means the individual or Firm or Company, whether incorporated or **otherwise**, under-taking the works and shall include legal personal representatives of such individual or the persons comprising of such Firm or Company, or the successors of such individual or firm or Company and the permitted assigner of such individual or Firm or Company.
 - c) **Project Management Consultant (ARCHITECT)/Consultant Architect (CA) TO BE PROVIDED BY CONTRACTOR.**
ARCHITECT **as the case may be** shall be responsible for supervision of works as per the clauses of this contract and assist the Project Director in administering the contract as per terms of **his / their** employment with the **AWHO**.
 - d) **Project Director (PD).** Means the accredited representative of **AWHO** and shall be overall Engineer-in-charge of the work. He shall administer the contract as per contract agreement clauses. He shall ensure that the ARCHITECT supervises the work as per clauses of the contract.
 - e) **This Contract.** Means the documents forming the tender and acceptance thereof, together with the documents referred to therein including these clauses, special conditions, Preamble to Schedule 'A', Schedule 'A', 'B' & 'C', General Summary of Schedule 'A', tender forwarding letter, instructions to tenderers, annexures, appendices, tables, forwarding letter of tender by the Contractor, Particular Specifications, list of approved makes, drawings and Design Development Report, amendments (if any) etc., as applicable and taken together shall be deemed to form one contract and shall be complementary to one another.
 - f) **Site.** Means the land and/or other places on, in, into or through which work is to be executed under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out this contract.
 - g) **Working Day.** Means **any day** other than that prescribed by the Negotiable Instruments Act as being a holiday and consist of the number of hours for labour as commonly recognized by good employer in the trade and in the district where the work is carried out.
 - h) **Day Work.** Means items of labour and/or materials, which in the opinion of the Project Director are not capable of being evaluated by the accepted methods of measurements or assessment.
 - j) **IS.** Means Indian Standard as issued by the Bureau of Indian Standards. Wherever reference is made to "IS" it shall mean the relevant "IS" Code on the subject with latest edition as amended till date of submission of tender.

k) Contract Sum. Shall mean as under: -

(i) In the case of lump sum contract, the sum for which the tender is accepted.

(ii) In the case of Item Rate contract, for works by measurement, the total cost of the work arrived at after extension of the quantities shown in Schedule-A by the item rates quoted by the Tenderer for the various items i.e. the sum for which the tender is accepted.

l) Schedules. Various schedules under this tender are as under :-

(i) Schedule 'A'. Schedule containing description of works in various sections **where in the** rates are to be quoted by the Tenderer.

(ii) Schedule 'B'. **Brief details of Material to be issued by AWHO.**

(iii) Schedule 'C'. Brief Details of tools and plant to be issued by AWHO.

(iv) Payment Schedule /Yardstick for interim payment for various sections of work of Lump sum sections described in Schedule A (wherever applicable).

m) **Tender Documents.** Shall mean the form of tender, the applicable Schedules 'A', 'B', 'C' and/or General Summary, these conditions and all other documents specified in Condition(s) above, as issued/sold to contractors for the purpose of quoting.

n) **Approved and Directed.** Shall mean the approval or direction of the **AWHO** and Project Director or person deputed by the **AWHO** for the particular purpose.

o) **Week.** Shall mean seven days without regard to the number of hours worked or not worked in any day in that week.

p) **Day.** Shall mean a Calendar day of 24 hours irrespective of the number of hours worked or not worked in that day.

2. **General Property, Ownership and Possession.** The assets being created under this contract as stipulated in the schedules will be the "Property" solely belonging to the "**AWHO**". The ownership of the site and property will solely rest with the **AWHO** throughout the performance of this contract from the beginning upto its completion or determination or termination or cancellation and beyond. The use of site or the assets under construction or part thereof by the Contractor is purely to facilitate his performance under the contract and does not confer on him the right of possession or tenancy.

3. Words importing persons include firms and corporations. Words importing the singular only also include the plural and vice versa where the context requires.

Laws Governing the Contract

4. The Contract shall be governed by the Indian Laws for the time being in force and **stipulations of Real Estate Regulatory Authority Act 2016, as applicable.**

5. This Contract is confidential and must be strictly confined to the purpose of the contract. The original and duplicate copies of the Contract Agreement shall be signed by **AWHO** and the Contractor or their accredited representative. The original shall be kept in the safe custody of **AWHO** and the duplicate. Copy shall be handed over to the Contractor.

6. The Contractor, on signing thereof shall be furnished by **AWHO**, free of cost, with one certified true copy of the contract Agreement and two copies of all drawings issued during the progress of the work. Any further copies of such drawings required by the Contractor shall be paid for by him. The Contractor shall keep one certified true copy of the contract agreement and all drawings on the work site and **AWHO/ARCHITECT** or his representative shall at all reasonable time have access to the same.

Scope of Contract

7. The Contractor shall execute the work as per schedule 'A' including testing, commissioning where required, other minor works as per terms and condition of the contract and hand over the said work in every respect in accordance with this contract and with the directions of and to the entire satisfaction of the Project Director and ARCHITECT.

8. The contract shall include all labour, materials, tools, plant equipment and transport which may be required for the full and entire execution and completion of the works and shall unless otherwise stated, include wastage on materials, carriage and cartage, carrying of empties, Hoisting, setting, fitting and fixing in position, testing, commissioning and handing over of aforesaid work in accordance with good engineering practice and recognized principles.

9. The Contractor shall provide everything necessary for proper execution of the works according to the intent and meaning of the specifications and drawings taken together whether the same may not be particularly shown or described therein provided that the same can reasonably be inferred there from and if the Contractor finds any discrepancy in the specifications and drawings, or between the drawings, he shall immediately and in writing refer the same to the ARCHITECT and Project Director who shall decide which is to be followed subject to provisions of **Condition No. 13 & 14** hereinafter.

10. The Contractor shall be deemed to have satisfied himself as to the nature of the site, local facilities of access to site and all matters affecting the execution and completion of the works. No extra charges consequent on misunderstanding or otherwise will be allowed.

11. The Contractor shall be deemed to have satisfied himself as to all matters affecting the full and entire execution and completion of works.

12. **AWHO** shall make available to the Contractor for his information prior to the tender submission date, all relevant data like soil strata, survey etc. which may be requested by him. The Contractor shall be deemed to have inspected and examined the site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation) :-

- a) The form and nature of the site, including sub-surface conditions.
- b) The hydrological and climatic conditions.
- c) The extent and nature of the work and goods necessary for the execution and completion of the works and the remedying of any defects.
- d) The laws, procedures and labour practices of the State.
- e) The contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.
- f) Road connectivity and approach to the site, AND
- g) Transportation of material.

Discrepancies and adjustment of Errors

13. The several documents forming the contract are to be taken as mutually explanatory & complementary to one another. In case of discrepancy/ambiguity the following order of precedence shall be observed:-

- a) Provision as contained in Notes to Schedule 'A' & Description in Schedule-A.
- b) Provision as contained in Scope of Work.
- c) Provision as contained in the Design Basis Report (DBR).
- d) Provision as contained in Design Development Report.
- e) Provision as contained in Particular Specifications.
- f) Provision as contained in the Schedule of Finishes.
- g) Provision as contained in the CPWD Standard Schedule of Rates Drawings (detailed drawings being followed in preference to small scale drawings and figured dimensions in preference to scale drawings).
- h) Specifications given in latest DSR/IS Codes
- i) General Conditions of Contract.

14. **If there are varying or conflicting provisions made in anyone of the aforesaid documents forming part of the contract, the Managing Director, Army Welfare Housing Organization shall be the sole deciding authority with regard to intention and interpretation of the document and his decision in this respect shall be final and binding.**

15. Any error in description, or rate in Schedule-A or any omission thereof shall not vitiate the contract or relieve the Contractor from execution of whole or any part of the works comprised therein according to the drawings and specifications or from any of his obligations under the contract. Any error in quantity, rate or amount in Schedule-A and general summary shall be adjusted in accordance with the following rules :-

- a) In the event of a discrepancy between description in words and figures quoted by a tenderer, **the description in words shall prevail.**
- b) In the event of an error occurring in the amount column of Schedule-A as a result of wrong extension of unit rate and quantity, **the unit rate quoted in words by tenderer shall be regarded as firm** and the extension shall be amended on the basis of the rate.
- c) All errors in totaling in the amount column and in carrying forward totals shall be corrected.
- d) The totals of various sections of Schedule-A as amended shall be carried over to the General Summary and the contract sum amended accordingly. The contracted sum so altered shall, for the purpose of the tender, be substituted for the sum originally tendered and considered for acceptance instead of the original sum quoted by the Contractor. Any rounding off of totals in various sections of Schedule-A or in General Summary by the tenderer shall be ignored.

Lump sum Contracts Based on Drawings and Specifications and Item Rate Contracts.

16. The Contractor shall be deemed to have calculated his own details from the drawings and specifications before quoting unit rates against different items of various parts of Schedule-A. Notwithstanding any errors or inaccuracies in the unit rates quoted by the Contractor, these rates shall be deemed to include for the full and entire completion of the items of Work in accordance with the provisions of the contract and no adjustment shall be made on account of any error in those rates.

Date of Commencement and Completion

17. The Contractor shall commence the work at the site on the 'Date of Commencement' given in the work order issued by the Project Director within 07 days from the date of issue of acceptance letter. Date of commencement in such cases shall be within fifteen days from the date of issue of work order. Contractor shall there upon proceed with the work and complete the same on or before the "Date of Completion" given in the work order. Date of completion is the date or dates for completion of the whole or any part of the works, set out in or ascertained in accordance with the individual work order or the tender documents or any subsequent amendment there to as provided in the conditions.

Joint Bank Account

18. BLANK.

Construction Programme/Time Schedules for Execution of Work

19.

- a) Contractor shall furnish an overall Construction Programme/Time schedule utilizing a known CPM software package like MS Project/Primavera (latest Version) **along with quoted tender document.**
- b) **In case of failure of submission of the Construction Programme/Time schedule along with the quoted tender document contractor's offer is liable to be rejected at the discretion of Managing Director AWHO. Construction Programme / Time schedule received along with quoted tender will be reviewed by ARCHITECT/ CA & Project Director with the contractor and finalized / approved within four weeks from the date of commencement of work. The finalized / approved construction programme / Time schedule shall be binding on the contractor to progress the work.**

20. Construction programme/ Time schedule shall supported with the following sub schedules:-

- a) Manpower Schedules.
- b) Plant and Equipment Schedules.
- c) Materials Schedules (Inc! status and Mobl Programme).
- d) Material Samples Schedules.
- e) Shop drawings (Inc! status and delivery).

21. Contractor shall submit daily site report to the Project Director and ARCHITECT will include, but not limited to :-

- (a) Record of site progress.
- (b) Number of Employees, workmen, labour engaged at the site.
- (c) Number of men employed on individual trades.
- (d) Plant and machinery at site. (e) Notification of accidents.
- (f) Material received at on the previous day.
- (g) Events influencing the progress of work.
- (h) Major activities planned for the day and for next working day.

22. A detailed monthly report will be prepared and submitted to the ARCHITECT/PD by the Contractor and review done jointly for augmenting resources to ensure completion within the laid down time period. The detailed progress report shall be presented and discussed by the Contractor with MD / Dy MD/Officer detailed by MD, AWHO at HQ AWHO, Delhi once in three months. If work is lagging behind then the Contractor shall propose remedial measures/ alternate plan to achieve the completion of work stage wise / as a whole, as per time frame agreed upon.

Assignment and subletting

23. Whole of the works included in the contract shall be executed by the Contractor and the **Contractor shall not directly or indirectly transfer, assign or sublet the contract or any part thereof. However, the Contractor may assign or sublet the labour element required for any activities of the contract.** No undertaking shall relieve the Contractor from the full and entire responsibility of the contract or from active superintendence of the works during the entire period of the contract.

Emergency work

24. Emergency works means, any urgent measures which, in the opinion of the Project Director, become necessary during the progress of the works to obviate any risk of accident or failure or which become necessary for security, or rectification to essential services during the defects liability period, works become necessary and the Contractor is unable or unwilling at once to carry out the same, Project Director shall order such works to any other agency at the risk and cost of Contractor. All expenses incurred on these works shall be recoverable from the Contractor in accordance with condition No. 147 to 149 stated hereinafter and if necessary be set off against any sum payable to him under this contract or any other of his contracts with **AWHO**.

Mandatory Requirement

25. The Contractor shall **strictly adhere** to the provisions of any act of the legislature relating to the works and to the regulations and Bye-laws of any authority and of any water, electricity and other companies and/or Authorities with whose system the structure is proposed to be connected and shall, before making any variation from the drawings or specifications that may be necessitated by so conforming, give to the ARCHITECT and **AWHO** written notice specifying the variation proposed to be made and the reason for making it and comply with instruction thereon. Contractor shall not proceed with the work unless the written instructions are given by **AWHO**.

26. The Contractor shall bring to the notice of **AWHO** through the ARCHITECT all notices required by the said acts, regulations or bye-laws to be given to any public office. All fees that may be properly chargeable in respect of such works shall be considered as per conditions on 'Taxes and Duties' specified hereinafter.

Indemnity of Employer

27. **The Contractor shall indemnify the Employer / AWHO and ARCHITECT or any agent, servant or employees of AWHO against any action, claim or proceeding relating to the infringement or design rights or any alleged patent and shall defend all actions arising from such claims and himself pay any royalties, license fees, damages cost of all and every sort or other charges which may be payable in respect of any articles or material or part thereof legally incurred in respect thereof and included in the contract.** In the event of any claim being made or action being brought against **AWHO** and ARCHITECT or any agent, servant or employee of **AWHO** in respect of any matters aforesaid, the Contractor shall immediately be notified thereof. Provided that such indemnity shall not apply when such infringement has taken place in complying with the specific directions issued by **AWHO** but Contractor shall be paid as per 'Tax & Duties' **conditions** given in the Contract Agreement.

28. The Contractor shall indemnify **AWHO** against all claims, which may be made upon the Employer under Real Estate Regulation Act - 2016 and any other claim under defect liability period.

29. The Contractor shall indemnify **AWHO** against all claims, which may be made upon the Employer under the Workmen's Compensation Act or under common law in respect of any Employee of the Contractor or any sub-contractor.

30. The Contractor shall also be responsible for all type of injuries to persons, animals or things which may arise from the operation or neglect of himself or of any nominated sub-contractor's employees whether such injury or damage arises from

carelessness, accident or any other cause whatsoever in any way connected with carrying out of this contract. The Contractor shall indemnify the **AWHO** and save him from any harm in respect of all and any expense, arising from and such injury or damage to persons, animals or things as aforesaid and also in respect of any claims made in respect of injury or damage under any Acts of Government or otherwise and also in respect of any Award of compensation or damage consequent upon such claims.

31. The Contractor shall be responsible for all structural and **other** damage to any property, which may arise from the operation or neglect, carelessness, defective work or any other cause whatsoever in any way connected with the carrying out of this contract. This clause shall be deemed to include INTERALIA, any damage to roads, streets, footpaths, bridges or ways as well as damage caused to the building and works forming the subject of this contract by inclemency of weather. The Contractor shall indemnify **AWHO** for any harm or damage to any member of the public or other third party in respect of anything which may arise in respect of the works or in consequence thereof and in respect of any cost, charge/expense arising out of any claim or proceedings and also in respect of any Award or compensation or damage arising there from and shall reinstate all damage of every sort mentioned in this clause so as to make good or otherwise satisfy all claims for damage to the property of third parties.

32. The **AWHO** shall be at liberty and is empowered to deduct the amount of any damage, compensation, costs, charges and expenses arising or occurring from or in respect of any such above said claim or damage from any sum or sums due or to become due to the contractor, for which the Employer will be the sole deciding authority.

33. **The Contractor shall give affidavit on non-judicial stamp paper of Rs.100.00 duly notarized towards indemnifying AWHO against any action as elaborated in condition no. 27 to 32 above within thirty days from the date of acceptance of contract.** Contractor shall be entitled for claiming his RA bills only after submission and acceptance of indemnity bond by the employer.

Admission to site

34. The **AWHO**, the ARCHITECT and their representatives shall at all reasonable times have free access to the works and/or the workshop, factories or other places where materials are lying or from which they are being obtained and the Contractor shall give all necessary facilities to **AWHO**, Project Director/ARCHITECT and/or his representative for inspection and examination and test of the materials and workmanship. No person unless authorized by **AWHO**, Project Director/ARCHITECT except the representative of public Authorities shall be allowed on the works at any time.

35. The officials of **AWHO** connected with the contract shall have the right of entry to the site at all times.

36. The Contractor will not be permitted to enter (other than for inspection purposes) or take possession of the site until instructed to do so by the Project Director. The portion of the site to be occupied by the Contractor and the area of land allotted for the purpose of accommodation of labour, erection of temporary workshop, stores, **site lab** etc. will be clearly defined by Project Director & ARCHITECT and the Contractor will, on no account, be allowed to extend his operations beyond these areas.

37. The Contractor shall provide, if necessary or if required on the site, all temporary access there to and shall thereafter adopt and maintain the same as required from time to time and shall take up and clear away as and when no longer required and make good the same.

38. The **AWHO** reserves the right to use the premises or any portion of the site for execution of any work not included in this contract which he may desire to have carried

out by other persons/agencies and the Contractor shall allow all reasonable facilities for the execution of such work but is not required to provide any plant, material, or labour for the execution of such work except by special arrangement with **AWHO**. Such work shall be carried out in such a manner as not to impede the progress of the works included in the contract and the Contractor is not to be responsible for any damage or delay, which may happen to or be occasioned by such work.

39. The **AWHO** reserves the right of taking over any portion of the site, which he may require and the Contractor shall at his own expense clear such portion forthwith.

Fencing of Site

40. Without prejudice to safety requirements as per relevant labour and other applicable enactments, the Contractor shall provide barricades of C.G.I sheets fixed by means structural steel frame work to define the area of construction in this contract at his own cost. No payment shall be made on this account.

41. **The Temporary barricades shall be provided by the contractor all as required and specified in this tender document and as directed at site by Architect and Project-in-Charge / Project Director.**

42. Temporary barricades shall be erected before commencement of construction of buildings under this contract. During construction period these barricades shall be maintained by the contractor and shall be dismantled and cleared from site immediately after the work is completed. The dismantling work shall commence only after the written permission of Project Director. After dismantling of the temporary barricades the dismantled material shall 'become the property of the Contractor' and the post holes shall be made good to the satisfaction of Project Director.

Temporary Workshops, Stores, Sample Room & Site Office etc

43. The Contractor shall provide, erect and maintain at his own expense temporary workshops, his temporary site office, stores and site laboratory as required for proper and efficient execution of the works inside **AWHO**, proposed site of work. This work shall be completed at the earliest but not later than three months from the date of commencement of work. The planning, siting and erection of these buildings shall be got approved from Project Director and they shall at all times be kept tidy in clean sanitary conditions to the entire satisfaction of Project Director and at the Contractor's expense.

44. **The lump sum rate quoted shall be deemed to include the expenses of various temporary structures, as mentioned at condition No. 43 above.** On final completion of works or if necessary on the completion of the defects liability period as decided by the **AWHO**, the whole of such temporary building shall be removed and cleared away and the site reinstated and left clean and tidy to the entire satisfaction of the **AWHO** and **at Contractor's expense**.

Nuisance

45. The Contractor will not at any time do, cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to the Owners, tenants or occupiers of other properties near the site and to the public in general.

Working Hours

46. The Contractor shall work only on and during the hours of working days unless he **obtains prior** written approval of the Project Director to do otherwise. If such approval is given no liability in respect of any excess cost arising thereof shall be incurred by **AWHO**.

47. Labour

a) Labour Laws to be complied by the Contractor :-

- (i) The contractor shall obtain a valid license under the contract labour (Regulation & Abolition) Act 1970 and the contract labour Act (Regulation & Abolition) Central Rules 1971 and amended from time to time, and continue to have a valid license until the completion of the work including defect liability period. The contractor shall also adhere the provision of the child labour (Prohibition and Regulation) Act. 1986 and as amended from time to time.
- (ii) The contractor shall also comply with the provisions of the building and other Construction Workers (Regulation of Employment & Clauses of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996, as amended from time to time.
- (iii) Any failure to fulfill above requirement shall attract the penal provisions of this contract arising out of the resultant for non-execution of the work before the commencement of work. No labour below the age of 18 years shall be employed on the work.

b) Payment of wages :-

- (i) The contractor shall pay to labour employed by him either directly or through subcontractors, wages not less than fair wages as defined in the Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.
- (ii) The contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with said work, as if the labour had been directly employed by him.
- (iii) In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with the Labour Regulations in regard to payment of wages, wage period, deductions from wages recovery of wages not paid and deductions unauthorised made, maintenance of wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.
- (iv) The Project Director concerned shall have the right to deduct from the money due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfillment of the clauses of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or nonobservance of the Regulations.
- (v) Under the provision of Minimum Wages (Central) Rules, 1950, the contractor is bound to allow to the labours directly or indirectly employed in the works one day rest for 6 days continuous work and pay wages at the same rate as for duty. In the event of default, the Project Director shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labours and pay the same to the persons entitled thereto from any money due to the contractor by the PO concerned.
- (vi) The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made there under from time to time.
- (vii) The contractor shall indemnify and keep indemnified **AWHO** against payments to be made under and for the observance of the laws aforesaid and the Contractor's Labour Regulations without prejudice to his right to claim indemnity from his sub-contractors.
- (viii) The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

c) Labour Safety Provision :-

(i) The contractor shall be fully responsible to observe the labour safety provisions. The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, lights, watchmen etc. during the progress of work as directed by Project Director.

(ii) In case of all labour directly or indirectly employed in work for the performance on the contractor's part of this contract, the contractor shall comply with all rules framed by Govt. from time to time for the protection of health and sanitary arrangements for workers.

d) Observance of Labour Laws :-

(i) The contractor shall be fully responsible for observance of all labour laws applicable including local laws and other laws applicable in this matter and shall indemnify and keep indemnified **AWHO** against effect or non- observance of any such laws. The contractor shall be liable to make payment to all its employees, workers and sub-contractors and make compliance with labour laws. If **AWHO** or the client! owner is held liable as "Principal Employer" to pay contributions etc. under legislation of Government or Court decision in respect of the employees of the contractor, then the contractor would reimburse the amount of such payments, contribution etc. to **AWHO** and / or same shall be deducted from the payments, security deposit etc. of the contractor.

(ii) The contractor shall at all times indemnify **AWHO** / owner against all claims, damages or compensation under the provision of ESI Act, 1948 or any modifications thereof or as consequence of any accident or injury to any workman or other persons in or about the works, whether in the employment of the contractor or not, against all costs, charges and expenses of any suit, action or proceedings arising out of such incident or injury and against all sum or sums which may with the consent of the contractor be paid to compromise or Compound any such claim.

48. Labour Records:

The Contractor shall be fully responsible to maintain labour records as per labour laws and remain liable for the payment and shall pay or cause to be paid all wages or other moneys to his work People or Employees and for those employed by his Sub-Contractors (engaged directly or indirectly as per condition 51) from time to time on or in connection with the said work under the acts or enactments relating thereto and the rules formed under as If the labour had been directly employed by him.

49. Labour Cess :-

a) The rates of the contractor shall be inclusive of labour cess. **AWHO** shall make a recovery @ 1% on account of labour cess from each RA bill of the contractor and labour cess so recovered/deducted shall be deposited with the Labour Board of the concerned state. In case the Labour Board is not established in the state, recovery made by **AWHO** on account of labour cess shall be retained under suspense account and will be deposited with the Labour Board at later date as & when the Labour Board is constituted in the state. Every contractor, sub-contractor, affiliates, their legal assigns or heirs as the case may, shall be responsible for registration of every Building worker who has completed eighteen years of age but has not completed sixty years of age and who has been engaged in any Building or Other Construction.

Work for not less than Ninety Days during the preceding twelve months; with the Board/ Funds as applicable under various sections of "THE BUILDINGS AND OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CLAUSES OF SERVICE) ACT, 1996 and THE BUILDING AND OTHER CONSTRUCTIONWORKERS' WELFARE CESS ACT, 1996.

b) The contractor shall also be responsible for maintaining register of beneficiaries i.e. the workers in such form as may be prescribed by the competent authority & the same shall be kept open at all reasonable times for inspection of relevant authority and

officials of client / **AWHO**.

- c) The contractor shall be further responsible for maintaining such register & records; giving such particulars of Building workers employed by him, the work performed by them, the number of hours of work which shall constitute a normal working day, the wages paid to them, the receipts given by them and, such other particulars in such form as may be prescribed by the authority or **AWHO**.
- d) In the event of contractor failing to comply with the above clause(s) in part or in full, **AWHO**, without prejudice to any other rights or remedy available under law or any other clause(s) of contract, shall be at absolute liberty to forfeit any sum or sums that are payable or could become payable on account of execution of contract work and decision of Project Director shall be final & binding in this regard on the contractor.

50. **Recovery of Compensation Paid to Workmen.** In every case in which by virtue of the provisions sub-section (1) of Section 12, of the Workmen's Compensation Act, 1923, EMPLOYER is obliged to pay compensation to a workman employed by the contractor, in execution of the works, EMPLOYER will recover from the contractor, the amount of the compensation so paid; and, without prejudice to the rights of the EMPLOYER under sub- section (2) of Section 12, of the said Act, EMPLOYER shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due to the contractor whether under this contract or otherwise. EMPLOYER shall not be bound to contest any claim made against it under sub-section (1) of Section 12, of Labour Regulations, or under the Rules framed by Government from time to time for the protection of health and sanitary arrangements for workers employed by EMPLOYER's Contractors, EMPLOYER will recover from the contractor, the arnount of wages so paid or the amount of expenditure so incurred; and without prejudice to any other right or remedy available under this contract, EMPLOYER shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by EMPLOYER to the contractor whether under this contract or otherwise EMPLOYER shall not be bound to contest any claim made against it under sub-section (1) of Section 20, sub-section (4) of Section 21, of the said Act, except on the written request of the contractor and upon his giving to the EMPLOYER full security the said Act, except on the written request of the contractor and upon his giving to EMPLOYER full security for all costs for which EMPLOYER might become liable in consequence of contesting such claim.

51. **Ensuring Payment and amenities to workers if contractor fails.** In every case in which by virtue of the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and of the Contract Labour (Regulation and Abolition) Central Rules, 1971, EMPLOYER is obliged to pay any amounts of wages to a workman employed by the contractor in execution of the works, or to incur any expenditure in providing welfare and health amenities required to be provided under the above said Act or under the Contractor's Labour Regulations, or under the Rules framed by Government from time to time for the protection of health and sanitary arrangements for workers employed by EMPLOYER's Contractors, EMPLOYER will recover from the contractor, the amount of wages so paid or the amount of expenditure so incurred; and without prejudice to any other right or remedy available under this contract, EMPLOYER shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by EMPLOYER to the contractor whether under this contract or otherwise EMPLOYER shall not be bound to contest any claim made against it under sub-section (1) of Section 20, sub-section (4) of Section 21, of the said Act, except on the written request of the contractor and upon his giving to the EMPLOYER full security for all costs for which EMPLOYER might become liable in contesting such claim.

52. **Safety Precautions**

The **contractor** shall during the progress of works comply **at his own expense** with **all Act of Rules provisions in force in the Republic of India** for protection of health and sanitary arrangement and safety provisions for workers employed/plant and equipment deployed and shall at his own expense provide for all facilities in connection therewith. Safety Code and Model Rules for the protection of health & sanitary arrangements for works as prescribed viz first aid facilities, drinking water, washing facilities, latrines and urinals, provision of shelter

during rest, creches, canteens, anti-malaria precautions etc. Special attention shall be paid by the contractor for safety arrangements at site such as wearing of Helmets by all concerned and for working at height such as safety belts and security surveillance/watching of various activities, etc. at height. List of items which must be available for use at site is given below:-

- a) Helmets
- b) Gloves
- c) Safety belts
- d) Safety shoes
- e) Gum boots
- f) Safety goggles
- g) Safety ribbons
- h) Fire buckets
- i) Glow shine board / benches/ belts.
- j) Blank**
- k) Safety nets (Jaal)
- l) Flood lights
- m) Reflector
- n) First aid box

Right of Inspection

53. The **AWHO**, Project Director and the ARCHITECT concerned with the Contract shall be entitled, at any time, to inspect and examine any materials intended to be used in or on the works, either on the site or at the Factory or workshop or other place(s) where such materials are assembled, fabricated or manufactured or at any places(s) where these are lying or from which these are being obtained and the Contractor shall give such facilities as may be required for such inspection and examination.

Materials to be Supplied/Provided by the Contractor

54. The Contractor shall, at his own cost and expense, provide all materials and equipments required for the works, unless otherwise specifically mentioned elsewhere in the contract.

55. All materials to be provided by the Contractor shall be brand new of approved quality and makes conforming to latest IS and ISI marked wherever applicable and all materials and workmanship shall, as far as possible, be of the respective kinds described in the specifications, drawings and/or Schedule of Quantities and in accordance with Instructions of the ARCHITECT and Project Director. The Contractor shall, upon the request of the ARCHITECT or Project Director furnish him with all bills, invoices, test certificates, accounts receipts and other voucher/documents in original for defacing and to prove that the materials comply therewith.

56. The Contractor shall at his own cost and expense supply to Project Director samples of materials proposed to be used in the works. The samples must be produced at least six weeks before they are to be incorporated in works. The Project Director shall within fifteen days of supply of samples or within such further period as he may require, inform the Contractor whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to Project Director for his approval fresh samples through the ARCHITECT complying with the specification and approved makes laid down in the contract. Such approved samples are prominently marked and kept in a sample room by the Contractor at the work site. Record of approval of all samples duly signed and dated by the ARCHITECT, Project Director and the Contractor shall be kept by the Project Director.

57. No material shall be brought by the Contractor to site unless samples are approved.

58. The procurement of the material shall strictly be monitored by the ARCHITECT and Project Director. The procurement of material shall be commensurate with the relevant and related activities of project execution as detailed in the project management chart! Schedule. The Project Management scheduling has been covered in detail under particular specifications.

Testing of Materials

59. The Project Director/ARCHITECT shall be entitled to have all the requisite tests carried **out from approved laboratory as specified in IS code** or any materials supplied by the Contractor (other than those for which satisfactory proof has been furnished) at the cost of Contractor and the Contractor shall provide at his expense all facilities which the Project Director or ARCHITECT may require for the purpose. The cost of materials consumed as well as cost of testing from approved laboratory shall be borne by the Contractor and expenses are deemed to be included in quoted rates.

Rejection of Materials

60. The ARCHITECT/Project Director shall have full powers to reject and instruct the Contractor for removal of any or all the materials brought to site by the Contractor which are not brand new and not in accordance with the contract specifications or does not conform in character or quality to sample approved under condition No. 54 to 59 above. In case of default on the part of the Contractor in removing rejected materials, Project Director shall be at liberty to have them removed by other means at the Contractor's risk and cost. The Contractor shall bring materials conforming to quality and character under condition No.56 above to substitute the rejected materials.

Care and Custody

61. Materials required for the works, whether brought by the Contractor or supplied by **AWHO** shall be stored by the Contractor only at places approved by the ARCHITECT/Project Director. Storage and safe custody of materials shall be at the risk and the responsibility of the Contractor. The Contractor shall be liable for any loss or damage to such materials due to the neglect, theft or fire and shall make good at his cost and expense.

62. Where in any running bill the Contractor has claimed payment and the ARCHITECT has included the value of any unfixed materials intended for incorporation in works then these materials shall become the property of the **AWHO** and they shall not be removed except for incorporation in the works without the written authority of the Project Director.

Surplus Material

63. Whenever the works are finally completed and advance if any in respect of any such materials is fully recovered, the Contractor shall at his own expense forthwith remove from the site all surplus materials arranged by him. Before removal of such stores from site, he shall obtain clearance in writing from the ARCHITECT and the Project Director.

Contractor's All Risk Insurance Cover (CAR Policy)

64. A Contractor's All Risk Insurance cover shall be arranged by the Contractor within one month of the acceptance of contract. The Insurance cover shall be for the 100% of total amount of contract accepted & valid upto last day of defect liability period. The insurance cover shall include the risk of terrorism, damage and major perils Natural Calamities (AOG) i.e. earthquake, fire and shock, cloud burst, flood etc including debris removal and all third party liabilities. All the expenditure for the above insurance cover shall be borne by the Contractor. The insurance cover shall be in the name of Managing Director, Army Welfare Housing Organization on account of contracting Firm. In case the completion period gets extended under condition No.1 09 or for any other reason including the period when the work is running under compensation then the Contractor at his own expense shall arrange extension of insurance cover period of this policy till last day of **defect liability period**.

65. In case the contractor fails to submit Contractor's All Risk Insurance Cover (CAR Policy) with specified period, the **AWHO** will be at the liberty to obtain the same from any of the insurance company at the cost of contractor. The expenses so incurred towards the policy shall be intimated to the contractor and will be recovered from due payment of the contractor.

Plant Equipment and Transport

66. The Contractor shall at his own cost and expense arrange all tools, plants, equipment and transport required for execution of the work. The minimum requirement of tools and plants at

site to be provided by the contractor. The Centering and shuttering are to be arranged in sufficient quantity so that structural slabs, columns, beams and all the required works can be carried out simultaneously as per CPM chart.

67. All tools, plants and equipment brought to site shall not be removed from without prior written approval of the Project Director. But whenever the works are finally completed, the Contractor shall forthwith remove from site all tools, plant, equipment but before removal of tools, plant and equipment from site he shall obtain clearance in writing from the Project-in-Charge / Project Director .

Electricity and Water Supply

68. Water and electricity shall not be provided by **AWHO** to the Contractor. However, necessary **assistance be** given in the form of recommendation letter to the authorities concerned. If any connection in respect of electricity and (or) water supply is obtained from any government authorities then Contractor shall ensure that the bills for water and electricity consumed as raised by the authorities concerned are paid regularly. Contractor shall submit NO DUES Certificate from the authorities concerned before issue of completion certificate.

Site Drainage and Protection of Trees

69 The Contractor shall remove all water, which may accumulate on the site during the progress of the works, or in foundation trenches and excavation from any source, to the satisfaction of Project Director and at the Contractor's expenses. All soil, filth or other matter of an offensive nature taken out of any trench, sewer, drain, cesspool or other place shall not be deposited on the surface, but shall be at once carted away by the Contractor to some pit or place provided by him at his own cost. Trees designated by **AWHO** as useful shall be protected during the course of the work and earth level within one meter of each such tree shall not be changed. Wherever necessary, such trees shall be protected by providing temporary fencing.

Contractor's Supervision

70. The Contractor shall give all necessary personal superintendence during the execution of the works and as long thereafter as the ARCHITECT and Project Director may consider necessary until the issue of final **completion of work by the AWHO**.

71. Where the Contractor is not a qualified engineer or even if he is so qualified and he cannot, in the opinion of the ARCHITECT and Project Director give his full personal attention to the works, he shall, at his own expense employ Civil Engineering Graduate with minimum experience of ten years as his accredited Agent for overall supervision of the works and to receive instructions from the ARCHITECT and Project Director who may verify his qualification and experience by **referring to original** degree which shall be made available by the Contractor. The Engineer so employed shall make himself conversant with the procedure regarding administration of contract by **AWHO and be available at site on all working hours**.

72 Over and above the Graduate Civil Engineer as indicated in Condition No. 71 above, the Contractor shall also employ One Graduate Civil Engineer with minimum 7 years experience for supervision of works under execution by the Contractor. One Diploma Civil Engineer with minimum 5 years experience shall be employed at site for supervision of defect rectification during defect Liability Period.

73 For all contracts, where the work of internal/external electrification is included Contractor shall employ one Graduate Electrical Engineer with experience of 5 years or Diploma in Electrical Engineering with 8 years experience for supervision of internal/external electrification work. Similarly, when the work for **PHE ,especially** fire fighting, external water supply etc. commences, one diploma holder Mechanical/PHE Engineer with experience of 5 years shall be deployed.

74 For the contracts, where the accepted amount is more than **Rs. 25.00 Crores**, then over and above two Civil Engineers as indicated in condition No. 71 & 72 above, an additional

Engineer at the rate of one **Graduate Civil Engineer with 5 years experience** or Diploma Civil Engineer **with 10 years experience** should be employed for every additional contract amount of Rs. **25.00 Crores** or part thereof, by the Contractor at site. For the first increase upto Rs 25.00 Cr, it may be diploma holder but for the next increase of Rs 25.00 Cr or part thereof it must be a degree holder and thereafter the same system shall be followed.

75 Contractor shall ensure that the Civil Engineers as described in condition No. 71 & 72 above are placed in position from the date of commencement of works. The other additional Engineers as required, as per condition No. 74 above should also be placed in position latest within one month of the commencement of the work.

76 If the Contractor fails to appoint a suitable Engineer for over all supervision as described in condition No. 71 to 75 above, Managing Director, AWHO shall have full powers to suspend the execution of works, until such date, suitable Engineers for over all supervision is/are appointed and the Contractor shall be held responsible for the delay so caused to the works.

77. If the Contractor fails to employ the qualified engineers as described in condition No. 71 to 75 above and Employer / **AWHO** decides to progress the work, the Architect/the Project Director shall impose **penalty** for non-employment of each **Graduate Engineer at the rate of Rs. 90,000/- per month and Diploma Engineer @ Rs. 70,000/- per month**. If minimum number of Graduate Civil Engineer and Diploma Engineers as mentioned in the Contract Agreement are not required at site in the initial stages of execution of work or when the progress of the work is slow or at any other stage, the Contractor will provide the staff at site for supervision of work as mutually agreed with the Project Director and the approval of the **AWHO**. For this reduction in staff, no recovery shall be made from the Contractor. In case of any disagreement on this issue between the Project Director and the Contractor, the matter will be brought to the notice of HQ, **AWHO**, where the decision of the Managing Director will be final and binding. The average number of staff which is spared in the initial stages of the project is to be deployed during the finishing stages when the requirement of engineers is more.

78 Orders given to the Contractor or his Engineer as described in **Condition No. 71** above, who will be nominated by the Contractor before commencement of work, shall be considered to have the same force as if they had been given to the Contractor himself.

79. Project Director and ARCHITECT shall ensure suitability of the Engineer staff employed by the contractor for the execution of work. Necessary checks and instructions shall be exercised by the Project Director for ensuring the same. All Engineers for supervision appointed by Contractor shall be in attendance at the site during all working hours and shall supervise the execution of the works with such additional assistance in each trade as the ARCHITECT or Project Director may consider necessary.

80. The Contractor or his accredited Engineer shall attend, when required and without making any charge for doing so, either at work site or at the office of the Project Director or office of ARCHITECT at site or **AWHO** at New Delhi to receive instructions from the ARCHITECT/Project Director or **AWHO**.

81. Project Director shall also ensure the span of employability of the Engineer staff employed by the contractor. Preferably the continuity of employed staff shall be maintained by the contractor. In case the Contractor desires to remove/replace any engineer during the currency of the work, the contractor shall inform in advance to the Project Director and arrange immediate replacement and proper handing over/taking over of duties as arranged between the outgoing/incoming engineer.

Dismissal of Contractor's Employees

82. The Employer shall have full power and without giving any reason, direct the contractor to immediately cease to employ in connection with this contract any agent, servant or employee whose continued employment in his opinion is undesirable. The

Contractor shall not be allowed any compensation on this account.

Setting Out of Works

83. The Contractor will prepare all necessary dimensioned drawings, levels and other information which are necessary to set out the works. Work shall not commence till the setting out is approved by Project Director. Only Total Station Instrument shall be used for survey and layout.

84.

(a) The Contractor shall set out the works and shall provide and fix all setting out apparatus required and solely be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof as per drawings. The contractor is to construct and maintain proper benchmarks to indicate the intersection of all main walls in order that the lines and levels may be accurately checked at all times. The Contractor shall provide suitable stones with flat tops and build the same in concrete for temporary or permanent benchmarks.

The Contractor shall take in writing the approval of the ARCHITECT and the Project Director for setting out and taking levels before starting the work.

(b) The Contractor shall submit three copies of following shop drawings within 60 days of commencement of particular item/stage of work to ARCHITECT who will review and coordinate them with information contained in related documents and transmit his **comments/recommendation to Project Director for approval** :-

- (i) Internal Plumbing, Water Supply etc.
- (ii) Internal Electrification including conducting and wiring and light and fan positions.
- (iii) External Sewerage System.
- (iv) External Water Supply System.
- (v) Fire Suppression System.
- (vi) Strom Water Drainage System

Approval by Stages

85. All work, **embedded or concealed**, embracing more than one process shall be subject to examination and approval at each stage thereof as stipulated by the **Project Director in consultation with ARCHITECT**. All such stipulated stages of work shall be recommended by ARCHITECT and passed by Project Director in stage passing register. The Contractor shall give reasonable notice in writing to the ARCHITECT and Project Director when each stage is ready. In default of such notice received, the ARCHITECT shall be entitled to appraise the quality or reject the particular stage of work and in the event of any dispute, the decision of AWHO thereon shall be final and binding. Record of such approval will be maintained at site by the ARCHITECT and contractor and kept in safe custody of the Project Director. Interim approvals do not absolve the responsibility of the Contractor from his liability for the work to be as per specifications and quality on completion. No work shall proceed beyond stilt level or as applicable unless the approval has been obtained by the concerned department of State Authorities.

Maintenance of Site Documents.

86. The following documents and any other, as required, are to be maintained at site by the Contractor. These documents shall be kept under the custody of Project Director as per the approved performa:-

- (a) Site Order Book
- (b) Works diary.
- (c) Material Testing Register.
- (d) Material Passing Register.

- (e) Stage Passing Register.
- (f) Level Register.
- (g) Sample Approval Register.
- (h) Concrete Cube Test Register.
- (i) Slump Test Register.
- (j) Cement and Steel Test Register.
- (k) Deviation Register.
- (l) Extra Item Register.
- (m) Work Hindrance Register.
- (n) Concrete Mix Design Register.
- (o) Water Cement Ratio Register.
- (p) Silt Content Register.
- (q) Visitor's Register.

A master ledger of these registers/documents shall be maintained in the office of Project Director. Each register will be serial numbered and authenticated by the ARCHITECT & Project Director before being put in use. These registers/documents will be accountable and have to be handed over to **AWHO after issue of final completion certificate.**

Covered or concealed work

87. The Contractor shall give reasonable notice in writing to the ARCHITECT & Project Director whenever any work is to be permanently covered or concealed, whether by earth or other means and in default of doing so, shall, if required by the ARCHITECT & Project Director, uncover such work at his own expense.

Extra Soil for Filling

88. Extra soil required for filling etc. shall be obtained by the Contractor from his own Sources from outside **AWHO** plot, in respect of which prior written approval shall be obtained from the ARCHITECT and Project Director. Good soil obtained from excavation/cutting slopes etc to be used first and there after extra earth required for filling purposes may be allowed to be brought from outside.

ARCHITECT's Instructions

89. The Contractor shall carry out and complete the said work in all respect in accordance with the contract conditions and with the directions of and to the satisfaction of the ARCHITECT and the Project Director/**AWHO**. The ARCHITECT **through Project Director may**, from time to time, issue further detailed drawings and or written detailed directions/instructions and explanations within the meaning of contract agreement subject to the **Condition No. 90** here in after which are, here under, collectively referred to as "ARCHITECT'S INSTRUCTIONS" in regard to :-

- (a) The variation or modification of the design, quality or quantity of works or the addition or omission or substitution of any work, shall only be with the prior approval of the **AWHO**.
- (b) The removal and/or re-execution of any works executed by the Contractor.
- (c) The opening up for inspection of hidden work covered up.
- (d) The amending and making good any defects detected.

Variations (Deviations/Extra Works)

90. No alteration, omission or variation shall vitiate this contract but in case the ARCHITECT/ Project Director/**AWHO** thinks proper at any time during the progress of the works to make any additions, alterations or omissions from the work or any alteration in the kind or quality and quantity of the materials to be incorporated therein, the PD, with approval of the Accepting Officer, shall give notice thereof in writing well in advance under his hand to the Contractor and the Contractor shall alter, add to or

omit from, as the case may require, in accordance with such notice. The value of such extra alteration, additions or omissions shall in all cases be determined by the Employer in accordance with the provision of **Condition No. 91 & 92** here in after and the same shall be added to or deducted from the contract amount accordingly, subject to the condition that the contract sum will not thereby vary **on the whole by more than 10% (ten per cent)**. The overall variation limit of 10 % also includes the financial effect of change/deletion of quantities of measurable schedule as mentioned in Schedule 'A' preamble, subject to the following restrictions:-

- (a) The Deviation limit referred to above is the net effect (algebraical sum) of all additions and deductions ordered.
- (b) The Deviations ordered on items of any individual trade included in the contract shall not exceed plus/minus 25% of the value of that trade in the Contract as a whole or half of the Deviation Limit, whichever is less except in the case of Prime Cost and Provisional Items where the parties to the contract may agree to at different percentage for any particular trade item. Individual trade means the different Annexures into which the scope of work has been divided under scope of work, or, in the absence of any such division, the individual Sections of CPWD Standard Specification and DSR.
- (c) The value of additions of items of any individual trade not already included in the contract shall not exceed 10% of the Deviation Limit.

Pricing of Variations /(Deviations Order) DOs

91. For any variation in Schedule 'A', the value of items of work ordered as variations shall be ascertained by measurement or lump sum assessment. For the items with the same specification covered/given in the CA /DSR/Market rates, the following precedence shall be followed:-

- (a) Quoted rates in respective Schedule of the CA.
- (b) **DSR rates.** Following percentage shall be applicable for the DSR-2021 rates as considered in the bid :-
 - (i) **B/R, Civil Works.** At applicable rate in CPWD Schedule for Delhi, **DSR-2021 minus 20% (minus 20 Percent).**
 - (ii) **Electrification work.** At applicable rate in CPWD schedule of rates for Delhi, **DSR-2021 minus 20% (minus 20 Percent).**
 - (iii) . The applicable rates of DSR shall only be considered

92. In case any work, the rate for which cannot be obtained by the method referred to in Condition 91 above, has been ordered on the Contractor, the rate shall be decided by the Employer on recommendation of ARCHITECT and Project Director on the basis of the actual cost to the Contractor at site of works (for this, Contractor shall produce sufficient proof) plus 15% (fifteen percent) to cover all overheads and profits of Contractor .Overhead includes plants, equipment, water, electricity and transportation charges etc.

93. Deviation in the contract may normally comprise of :-

- (a) New items of work i.e. items completely new and in addition to the items in contract. These are commonly known as extra or additional items.
- (b) Substituted item i.e. item which substitute the existing ones or are taken up in lieu of those already provided in the contract. **These can also be** with slight modification or partially omitting items of work, in the contract.
- (c) Deviation in quantity of items i.e. where there is increase or decrease in the quantities of items of work in the agreement. In order to exercise control over the project cost, no additional work which have additional financial cost, shall be executed unless written financial approval is issued by MD, **AWHO**. **If any additional work** is executed by contractor without written order, then additional cost will be at the behest of contractor. In case of decrease in scope of work, the quantum of deduction shall be derived by **AWHO** as per the provisions of condition No. 91 & 92 for extra items, variations etc. to the extent applicable for reduced scope of work and same shall

be final and binding on the Contractor.

94 The **AWHO** shall have the right to opt for any variation of the form, quality or quantity of works or any part thereof that may, in its opinion, be necessary/appropriate for that purpose OR for any other reason, it shall have the authority to instruct the Contractor to do any of the following :-

- (a) Increase or decrease the quantity of any work included in the contract as per condition 90.
- (b) Omit any such work.
- (c) Change the character or quality or kind of any such work.
- (d) Change the levels, lines, position or kind of any such work.
- (e) Execute additional work of any kind necessary for the completion of the works.
- (f) Change any specified sequence or timing of construction of any part of works.

If the Contractor considers any assigned work to be outside the scope of the Contract, he shall immediately bring it to the notice of the EMPLOYER/Project Director in writing with financial implications thereof. He shall proceed with the work only after obtaining necessary change order **approved by AWHO**, otherwise no claim shall be entertained in this regard.

95. The following certificate must be recorded on each RA bill by ARCHITECT & PO :-

- (a) "Certified that no extra/substituted items have been executed by the Contractor without taking prior written approval from **AWHO**".
- (b) Certified that the financial effect for the approved extra/substituted items have been considered/catered for in the costing of such items and approval of the AWHO obtained.

96.

(a) Deviation shall be avoided under all circumstances. No deviation is permitted except under specific written authority of **AWHO in writing**. To minimize large scale deviation after call of tenders, detailed estimate (based on adequate plans, design and Architectural working plan/elevation and other detailed drawings) should be prepared before tender is issued. Changes in the specification from those, indicated in the contract documents shall be made with the specific orders of MD, **AWHO in writing**. Project In charge at HQ **AWHO** shall be responsible for assessing the anticipated deviation and to initiate deviation items statement for the work to be done.

(b) In regard with the deviations, **AWHO** shall have the power :-

- (i) To make alterations in, omission from additions to or substitution for, the original specifications, drawings, design and instruction that may appear to him to be necessary or advisable during the progress of work.
- (ii) To omit a part of the work in case of non-availability of a portion of the site or for any other reason whatsoever.
- (iii) The Contractor shall be bound to carry out and complete the works in accordance with instructions given to him in writing by **AWHO** and such alterations, omissions, additions and substitutions shall form part of the Contract as if originally provided therein and any altered, additional or substituted work which the Contractor may be directed to do shall be carried out by the Contractor on the same clauses in all respects on which he agreed to do the original work. However, any work which radically changes the original nature of the contract shall not be ordered by **AWHO** as a deviation.
- (iv) In the event of any deviations resulting in increase in the cost over the Contract sum being ordered, the time of completion of the work shall not be extended under normal circumstances. However, if the deviation is ordered at a later stage or results in additional cost, which in the opinion of the **AWHO** justifies any extension of time, it may be granted by **AWHO** at the request of the Contractor. The decision of **AWHO** will be final and binding.

Action in case work not done as per Specifications

97. All works under **or during the course** of execution or executed in pursuance of the contract, shall at all times be open and accessible to the inspection and supervision of the Project Director, his authorized subordinates in charge of the work and all the superior officers, officer of the Quality Assurance Unit of the **AWHO** or any organization engaged by the **AWHO** for Quality Assurance, and the contractor shall, at all times, during the usual working hours and at all other times at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and 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 had been given to the contractor himself. If it shall appear to the Project Director or his authorized subordinates in-charge of the work or to the officer of Quality Assurance or his subordinate officers or the officers of the organization engaged by the **AWHO** for Quality Assurance his subordinate officers, that any work has been executed with unsound, imperfect, or unskillful workmanship, or with materials or articles provided by him for the execution of the work which 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 which shall be made within sixty months of the final completion of the work from the Project Director specifying the work, materials or articles complained of notwithstanding that the same may have been passed, certified and paid for forthwith rectify, or remove 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 charge and cost. In such case the Project Director may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates **decided by technical committee appointed by AWHO for this purpose** during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and/or get it and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of the Project Director to be conveyed in writing in respect of the same will be final and binding on the contractor.

Action in case of Bad Work

98. If it shall appear to the Project Director or his authorized representative in charge of the work or to any other inspecting agency of Government! State Government! Owner where the work is being executed, that any work has been executed with unsound, imperfect, or unskillful workmanship or with materials of any inferior description, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract, the contractor shall on demand in writing which shall be made within sixty months of the final completion of the work from the Project Director specifying the work, materials or articles complained of notwithstanding that the same may have been passed, Certified and paid for forthwith rectify, or remove 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 Project Director in his demand aforesaid while the contractor failure to do so shall continue, the Project Director may rectify or remove and re-execute the work or remove and replace with others, the material or articles complained of as the case may be at the **risk and cost** in all respects of the contractor.

Defective Work

99.

(a) The ARCHITECT or Project Director shall, during the progress of the works, have power to order in writing from time to time the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the drawings and specifications or instructions and Contractor shall forthwith carry out such orders at his own cost. In case of defaults on the part of the Contractor to carry out such order, the

Project Director shall have the power to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereof as certified by the ARCHITECT shall be borne by the Contractor or may be deducted by the Employer from any money due or that may become due to the Contractor against this contract or any other contract with Army Welfare Housing Organization.

(b) The Contractor is responsible and shall ensure that there is no leakage or seepage in roofs, ceilings, walls, basement or floors or in the water supply, electrical or sewage system. Contractor shall redo the complete stage of work to the satisfaction of ARCHITECT and Project Director. If these defects are not rectified in a reasonable time then the **AWHO** shall be at liberty to recover an amount equivalent to the cost of redoing the complete stage of work from any money due or that may become due to the Contractor against this contract or any other contract with Army Welfare Housing Organization or from his performance guarantee or any other guarantee furnished by the Contractor.

Orders under the Contract

100. All directions, notices etc. to be given under the contract shall be in writing, typescript or printed and if sent by registered post or **Speed Post** to the last known place of abode or business of the contractor, it shall be deemed to have been served on date when in the ordinary course of post it would have been delivered to him. Registered email address of Contractor, ARCHITECT, Project Director & HQ **AWHO** shall also be considered as authorized means of communication for all purposes.

Failure to comply

101. If the Contractor after receipt of written notice from the ARCHITECT or Project Director or Employer requiring compliance, fails to comply within ten days with such further drawings and or ARCHITECT's instructions, **the ARCHITECT and /or Project Director** with prior approval of the **AWHO** may employ and pay other persons to execute any such work whatsoever that may be necessary to give effect thereto and all costs incurred in this connection thereof shall be recoverable from the Contractor in this contract or any other contract with **AWHO**.

Valuation and measurements

102. The ARCHITECT or rep of Project Director will measure the work and keep record in measurement books as under :-

- (a) In case of Lump sum, Dwelling Unit/buildings/block wise :-
- (i) Total number of flats/buildings/blocks executed as described in Schedule- A of the contract
- (ii) All alterations, additions and of omissions ordered on the contractor in the kind or quality and actually executed, to determine the financial liability for payment/recovery.
- (b) For all items under measurable schedule, the entries for all items executed shall be recorded schedule wise and should be aided by description/diagrams/sketches/drawings indicating the location of items executed at site.
- (c) In case of item rate contract for all items executed at site the entries in the measurement books shall be aided by description/diagrams/sketches layout drawings indicating the location of items executed at site.

103. The original measurement books will be in the custody of the Project Director and shall be submitted to Head Quarter Army Welfare Housing Organization along with the final bill. Photocopy of all measurement books shall be kept by the Project Director till the project is completed in all respects. On request, photocopies of all pages of measurement books shall be given by Project Director to the Contractor for his records and preparation of RA bills and final bill etc.

104. The ARCHITECT/PD may, from time to time, give reasonable notice in writing to the Contractor, that he requires the work to be measured in terms of contract and the Contractor shall forthwith attend or send a qualified agent to assist the ARCHITECT or the ARCHITECT's representative in taking such measurement as per Good Engineering practices and shall furnish all particulars and give all assistance required by either of them. The measurements shall be taken jointly by the ARCHITECT or any person or persons duly authorized by him, Contractor's representative and Project Director's representative immediately on completion of the said item of work. The Contractor shall, without any extra charge, provide assistance with every appliance and other things necessary for measurements. Measurements shall be entered in the measurement books as applicable. Each page of measurement book after recording the entries should be initialed by the representative of ARCHITECT, Contractor and Project Director.

105. The page where a set of entries is completed should be signed in full by the representatives of the ARCHITECT, Contractor and Project Director. Below the signatures, the name of the signatories should be indicated in capital letters and dated. These pages shall also be counter signed by Project Director with date. If the Contractor objects to any of the measurements recorded, a note to that effect will be made in the measurement book as applicable against the item or items objected to, and such note shall be signed and dated by the Contractor, ARCHITECT and Project Director with dates. The disputed items shall then be referred to the AWHO and the decision of the AWHO in such disputed cases shall be final and binding.

106. Should the Contractor not attend or neglect to send such Agent then the ARCHITECT shall have power to proceed by himself to take measurement and in that case, the measurement shall be taken by the ARCHITECT and the Project Director or their authorized representatives and the Contractor shall have no right to dispute. In such cases of reservation from the Contractor not to participate in to the measurement of works, the Project Director shall intimate the contractor in writing and keep the record of the same. All measurements shall be taken in accordance with standard methods of measurement as given in relevant IS unless stipulated to contrary in the tender documents.

107. If any alterations or additions (other than those authorized to be executed for an agreed sum) have been covered up by the Contractor without his having given notice of his intention to do so, the ARCHITECT shall be entitled to appraise the value thereof and in the event of any dispute, the decision of the AWHO thereon shall be final and binding.

108. The measurement and valuation in respect of the contract shall be completed within **two months of the final completion** of the contract works as per contract provisions.

Time essence of Contract & Extension for Delay

109.

(a) **Time is essence of work of the contract.** Contractor shall plan the work in such way to ensure the completion of work within the time allotted as per contract.

(b) The time allowed for execution of the Works as specified in the work order issued by Project Director or the extended time in accordance with these clauses shall be the essence of the contract. The execution of the works shall commence from such time as mentioned in work order issued by Project Director to commence the work. If the Contractor commits default in commencing execution of the work as aforesaid, the AWHO shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money & performance guarantee absolutely.

(c) The Contractor shall submit Construction Programme /Time Schedules (CPM / PERT/Quantified Bar chart) along with quoted tender and the same shall be reviewed in consultation with the ARCHITECT / CA & Project Director after acceptance of Contract. The finalized schedule / chart shall be in direct relation to the time stated in the contract for completion of stages of the works. It shall indicate the forecast (mile stones) of the dates of commencement and

completion of various items trades, sections of the work and may be amended as necessary by agreement between the Project director and the Contractor within the limitations of time stipulated in the contact documents .

(d) The physical progress report including photographs shall be submitted by the contractor on the prescribed **format at intervals (not exceeding one month)** . The compensation for delay as per **Condition No.121** shall be levy able at intermediate stages , in case the required progress is not achieved to meet the above time lines of the completion period and / or milestones of time and progress chart, provided always that the total amount of Compensation for delay to be paid under this clause shall not exceed 10% of the tendered value of work". If the work(s) be delayed by :-

(i) Force-majeure (or)

(ii) Any other cause which, in the absolute discretion of the **AWHO** is beyond the Contractor's control, then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Project Director within 07 days but shall nevertheless use constantly his best endeavour to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Project Director to proceed with the works.

(Note: The term "Force-Majeure" shall mean a case of war, flood, drought, fire, cyclone, earth quake, or any other climatic caused by nature effecting the execution of work).

(e) Request for extension of time, to be eligible for consideration, shall be made by the contractor in writing within fourteen days of the happening of the event causing delay in the prescribed form. **The Contractor shall also**, indicate in such a request the period for which extension is desired. In any such case **AWHO** may give a fair and reasonable extension of time for completion of work. Such extension shall be communicated to the Contractor by the Project Director in writing within a reasonable time from the receipt of such request.

Certificate of completion

110. The work shall be completed in all respect to the entire satisfaction of the ARCHITECT and Project-in-Charge / Project Director . Completion certificates shall be initiated / recommended by Project-in-Charge / Project Director and issued by HQ, AWHO. Completion certificate shall be issued in following stages:-

(a) Physical Completion:- On physical completion of work as per contract provision, the contractor shall apply for final approval of Buildings and external services of works for the entire scheme from respective sanctioning authorities and obtain the necessary NOC/permission/ approval etc. The contractor shall comply with the following before applying for completion certificate:-

(i) Clearance of all debris, construction & waste materials.

(ii) Neatness & cleanliness from dirt, paint marks, sketches etc.

(iii) Workability in all respect of external electrical works, sanitary and plumbing works, pumps, fire hydrant system and all mechanical equipments etc.

(iv) NOCs for external services are obtained to accord permission/approval etc.

(v) All defects notified are rectified to the entire satisfaction of Architect & Project-in-Charge / Project Director .

(vi) As far as external electrification works is concerned the commissioning, energizing and handing over the certificate of completion shall be as follows :-

(aa) Commissioning, Energizing and Handing Over. The Contractor shall be responsible for liaison with competent authority of Electricity Board and Govt. Inspectors for inspection and testing of the work executed under the contract during execution and

after completion. The contractor shall prepare necessary as built drawings and test certificates of completed work for submission to the authorities. The contractor shall give in writing to the Project Director, Architect and appropriate authorities of electricity board sufficiently in advance as required by electricity board of the date when he proposes to commission and energise the entire external electrification work executed under this contract. Further, the contractor shall follow up till the installation is approved and entire external electrification work executed under this contract is commissioned and taken over by electricity board as per the procedure followed by State Government of UP. Contractor shall obtain handing over certificate from electricity board and hand over to the Project-in-Charge / Project Director / Project Director.

(ab) Immediately after the whole work of External Electrification executed under this contract is completed, tested, commissioned and energized by electricity board and taken over by the electricity board as per condition hereinbefore, the Contractor shall give notice thereof to the Architect with a copy to the Project Director and Employer along with certificate of handing over of the entire installation to electricity board in original. If satisfied the Architect shall issue a certificate indicating the date on which the installation after commissioning has been handed over to electricity board. This certificate shall be countersigned by the Project-in-Charge.

(b) **Provisional Completion Certificate:** - On physical completion of work as per contract provision, Contractor shall apply for provisional completion certificate. After due scrutiny by Architect and Project-in-Charge / Project Director / Project Director, completion certificate shall be issued within 30 days of receipt of contractor's letter. Contractor shall also comply with the followings before applying for completion certificate :-

- (i) Clearance of all debris, construction & waste materials, T&P, machinery, temporary hutments/structures, labour camps etc. from the site.
- (ii) Neatness & cleanliness and all other miscellaneous works etc.
- (iii) Workability in all respect of external and internal electrical works, sanitary and plumbing works, fire hydrant system all mechanical equipments etc.
- (iv) NOCs for all services like Fire Fighting, Sewage/ Water Treatment Plant etc. are obtained.
- (vi) Guarantee for water proofing treatment, anti-termite treatment etc. are submitted to Project Director on a non-judicial stamp paper of value Rs. 100/- as per **Appendix 'C'**, **'D'**, **'E'** & **'F'** for 10 years from the date of execution of work or completion of defect liability period, whichever is later.
- (vii) Over and above Guarantees as mentioned at serial (v) here in before, the bank guarantees for the value 10% more than the cost of water proofing, Anti termite treatment work (as assessed by Project-in-Charge / Project Director for a period of 10 years shall also be furnished by the contractor from any nationalized bank as given in the list of bank at Appendix G.

(C) **Final Completion Certificate:** -

Contractor is responsible to obtain the Occupation certificate from concerned authority and hand over to PD. After due scrutiny by Architect and Project-in-Charge / Project Director, completion certificate shall be issued within 30 days of receipt of contractor's letter. Final completion certificate shall be issued after complying the followings :-

- (i) Completion and Occupation certificate is obtained from concerned local statutory authority.

- (ii) All defects at the time of Provisional completion and subsequently notified are rectified to the entire satisfaction of Project-in-Charge / Project Director.
- (iii) The Defect Liability Period as mentioned in **Condition No. 114** hereinafter shall commence from the date of issue of final completion certificate. "No dues" certificate obtained from the contractor shall be submitted to EMPLOYER by Architect/PD before processing the final bill.

Handing Over of Ancillary Buildings

111. After the issue of provisional completion certificate as per **Condition No. 110 (a)** above, Ancillary Buildings are to be handed over to AWHO. Project-in-Charge / Project Director shall indicate to the contractor, the dates on which particular ancillary buildings are to be physically handed over. The ancillary building kept ready in all respects before the scheduled date of handing over as indicated by the Project-in-Charge / Project Director. Contractor's and the Architect's representative shall make note of defects pointed out by the allottees and the contractor shall ensure that these defects are also rectified within the time given by the Project-in-Charge / Project Director.

112. BLANK.

113. BLANK.

Defect Liability Period

- 114. Defect Liability Period shall be **60 (Sixty) months** from the date of final completion of work.
- 115. Defect Liability covers rectification of any structural defects or any other defects including leakage/ seepage of ancillary buildings and external services for a period specified and cropped up due to use of substandard material or poor workmanship or provision of services during construction. This will include all defects notified by the Architect / PD during Handing / Taking over and also defects which develop subsequently during the defect liability period.
- 116. The defects must be rectified within fifteen days from the date it is brought to notice of the Contractor and in the event of Contractor's failure to rectify within such time, giving due notices the Project Director may employ any other person/agency to rectify or make good such defects at the risk and cost of the defaulting Contractor.
- 117. In addition, the aggrieved allottees shall be entitled to receive appropriate compensation in the manner as provided under the UPRERA Act as notified by the Govt of India vide gazette notification no 1075 dated 19 Apr 2017. The liability for such compensation and all expenses consequent there on or incidental there to shall be borne by the Contractor and shall be recoverable from him by the employer and shall be deducted from his bills or Retention Money or by encashing performance guarantee or from any other amount of the Contractor available with the employer.
- 118. The Contractor shall indemnify the Employer against all claims which may be made upon the Employer for compensation etc under the UPRERA Act.
- 119. The Contractor shall employ a team of tradesmen as and when required covering all trades along with necessary materials and spares to facilitate prompt **attention to the defects**. One diploma engineer with minimum five years' experience shall be employed by the Contractor for defect liability period at site to receive complaints / instructions from Architect / Project-in-Charge / Project Director / Project Director. A site office to be established with dedicated telephone line and minimum maintenance stores to be placed at site by the Contractor.

120. The composition of tradesmen will vary according to the nature of recurring defects noticed in the buildings and external services. The nature of their work being in the form of after sales services and the defects rectified being such that they could have been executed properly in the first instance. No extra payment **shall be** admissible on this account.

Certificate for satisfactory completion of defect liability period shall be issued by AWHO or his authorized representatives at the end of the defect liability period. This certificate issued by AWHO or his authorized representatives, confirming that all defects pointed out have been rectified satisfactory by the contractor during the defect liability period.

Compensation for Delay

121.

(a) Compensation for Delay in completion of Stages. The contractor is to execute work of adequate value progressively so as to complete the entire work within the stipulated completion time, failing which he is liable for compensation for delay as given in this clause. The Contractor shall execute the work progressively so that the minimum value of work at different stages is executed within the stage wise terms as given below and entire work is completed within the stipulated completion period. If the contractor fails to execute stage wise value of work with respect to time as given below, he shall pay compensation at the rate of 0.50% per week of contract/Phase amount with maximum limit of 10% of contract/Phase amount. This compensation will be deducted from amount due to the Contractor. However, the compensation amount may be refunded to him on achieving timely completion of particular stages as under:-

Stage: I

15% of period of completion of Particular Phase - Minimum value of work executed to be 10% of total contract amount (excluding cost of material brought at site).

Stage: II

50% of period of completion of particular phase - Minimum value of work executed to be 45% of total contract/phase amount (excluding cost of material brought at site and not incorporated in work).

Stage: III

90% of period of completion of particular phase - Minimum value of work executed to be 90% of total contract/phase amount (excluding cost of material brought at site and not incorporated in work).

(b) Compensation for Delay in Completion as a Whole. If the Contractor fails to maintain the required progress in terms of Condition No. 17 or relevant clause of GCC & Special conditions and schedule A notes of Contract, to complete the work and clear the site on or before the contract/extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the **AWHO** on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as **AWHO** (whose decision in writing shall be final and binding) may decide on the amount of

contract/phase value of the work for every completed day / week (as applicable) that the progress remains below that specified in Condition No. 17 or the relevant clause in GCC & Special Clauses of Contract or that the work remains incomplete. This will also apply to items or group of items for which a separate period of completion has been specified.

(c) Compensation for delay of work @ **0.5% per week delay** to be computed on per day basis **provided** always that the total amount of compensation for delay to be paid **under this condition shall not exceed 10% of the contract/phase Value of work.** The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with **AWHO.**

(d) In addition to the compensation for delay in stages and delay in completion as a whole, any compensation made upon under UPRERA Act or/and any litigation /court case to be borne by the Contractor on account of delay in completion of work.

122. Escalation:- Adjustment of Variation in Prices of Cement, Steel, Other materials, FOL and Labour: No escalation or variation in prices for cement, steel, other materials, Fuel, oil, lubricant and labour etc shall be payable to Contractor under this contract.

Performance Guarantee

123. (a) The Contractor shall furnish within a period of thirty days of acceptance of this tender, a bank guarantee bond on any Nationalized/Scheduled Indian Bank from the list of banks given at Appendix-K as Performance Guarantee for amount of 5% (Five percent) of the contract sum. The bank guarantee shall be submitted in two parts of amount equal to 50% each of performance guarantee. In case of failure on part of the contractor in timely submission of above mentioned performance guarantee within 30 days of acceptance of contract, following shall be applicable :-

(i) No payment to the contractor shall be released.
 (ii) The delay in submission of performance guarantee shall have bearing over the amount of performance guarantee to be submitted. The amount of performance guarantee shall be increased by 0.01% of acceptance amount of Contract Agreement per day of delay.
 (iii) **Blank**

(b) The Bank Guarantee bond as required above shall be on the form as attached at **Appendix-A of the General conditions of contract. Validity of these Bank Guarantee should cover the period as specified below: -**

(i) 50% of performance guarantees valid upto date of final completion of work.
 (ii) 50% of performance guarantee valid upto last date of Defect Liability Period.

(c) On receipt of Performance Guarantee, the Earnest money submitted along with the tender shall be refunded. In case the completion period gets extended for any reason, then the Contractor shall arrange extension of validity of Bank Guarantee period beyond this extended date of completion, or likely date of completion (if extension is not approved by the Employer), whichever is later at his own expense. The extension letter for the extension of Bank Guarantee on Non-judicial stamp paper issued by the Bank shall be arranged by the Contractor, at least one month before the expiry date of Bank Guarantee, failing which the AWHO will get the Bank Guarantee Bond en-cashed without any notice to the Contractor. The Bank Guarantee Bond(s) shall be in favour of the AWHO in such a way that it can be realized by him without reference to the Contractor and without any demur from the Bank.

(d) Any compensation or other sums of money recoverable from the Contractor under the terms of this contract may be realized by the Employer by en-cashing the guarantee bonds without any notice to the Contractor.

124. Release of Performance Guarantee. The performance guarantee as submitted by the Contractor shall be released in stages as given below: -

- (a) 50% of value of performance guarantee shall be released after issue of final completion certificate.
- (b) 50% of value of performance guarantee shall be released after expiry of DLP and subject to that all defects notified till DLP have been rectified to entire satisfaction of Architect & Project-in-Charge / Project Director / Project Director.

125. AWHO shall also certify at the end of the defect liability period regarding the state of rectification pointed out during defect liability period. This certificate issued by AWHO, confirming that all defects pointed out have been rectified satisfactory.

Mobilization Advance

126. It is expected that contractor will mobilize his resources on his own, immediately after the receipt of the Work Order from the Project-in-Charge / Project Director / Project Director. No payment of mobilization advance shall be payable to Contractor.

127. Blank

128. Blank

Running Account Payments and Retention

129. The Contractor may at intervals of not less than **thirty days submit RA bills** for payment of advance on account of work done and of material brought at site in connection with the lump-sum and measurement contracts.

130. (a) The Contractor shall be entitled to be paid in respect of such RA bills at the **95% of the value of work executed on the Site** to the satisfaction of the Architect & Project-in-Charge / Project Director / Project Director

(b) The net amount payable against each running account bill as per Condition No.129 above shall be released to the Contractor by the HQ on receipt of bill duly signed and stamped of Project-in-Charge / Project Director / Project Director / Project-in-Charge / Project Director / Project Director.

131. Provided further, the Contractor may be paid advance on account to the full value of work executed on the Site on his furnishing Guarantee Bond(s) or Fixed Deposit Receipt(s) from a scheduled Bank for the amount of the retention money which should otherwise be recoverable from him under the contract.

132. The validity of Bank Guarantee shall be for a period upto the date of completion of the contract. The Contractor shall further arrange to extend the period of guarantee bond or shall furnish a fresh guarantee bond at his own expense, of value and validity as per the amount and period given under Condition No. 134 hereinafter so as to cover the period till the provisional completion / final bill is paid / defect liability period to the satisfaction of AWHO.

133. The Contractor shall prepare the RA Bills for release of payment of advances on account as per Condition No. 130 above in the manner and on the form prescribed by AWHO which may be ascertained from the Project Director. No charges shall be allowed to the Contractor on account of preparation of RA Bills. The Contractor shall submit the following details along with each RA bill for current and past bills duly signed: -

- (a) Mobilization Advance, outstanding, if any.

- (b) Blank
- (c) Blank
- (d) Other Secured Advances
- (e) Blank
- (f) All Risk Policy valid up to.....
- (g) Contractor's labour/manpower compensation policy valid upto
- (h) Details of valid BGB
- (i) Details of BGB due for release
- (k) Details of BGB due for renewal
- (l) Date wise payments received from **AWHO** against all RA bills and Advances, etc.
- (m) Compensations/ penalties imposed, if any, with amount and reasons thereof.
- (n) Cement & Steel Reconciliation Statements.
- (o) Original receipt of payment of Service Tax or GSTs applicable & Labour Cess of the previous RA Bill/RAR.
- (p) Certificate towards ATT work as given in particular specification at Para 8(d) under section-I. No payment shall be released against ATT work until & unless these certificates have been received.

134. The amount of retention money shall be released to the Contractor in following stages as indicated below: -

- (a) 40% amount of retention money shall be released after final / actual completion of work.
- (b) 35% amount of retention money shall be released with final bill.
- (c) 25% amount of retention money shall be released after satisfactory expiry of defect liability period.

135. The Contractor shall also be entitled to be paid during the progress of works, 85% (eighty five percent) of the value of any materials which is arranged by Contractor in accordance with the contract and which have been brought on the site in connection therewith and are adequately stored and protected against damage by weather or other causes as per condition No. 61 but which have not at the time of the advance been incorporated in the works. Secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Architect/ PD provided the Contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Project-in-Charge / Project Director / Project Director shall be Final and binding on the Contractor in this matter. No secured advance shall however, be paid on high risk materials such as ordinary glass, sand, petrol, diesel etc.

136. Any certificate relating to work done or materials delivered may be modified or corrected by any subsequent Running Account certificates or by the final certificate.

137. No certificate of the Architect supporting an advance payment shall by itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract.

Final bill

138. The final bill shall be submitted by the Contractor in Triplicate to the Architect under intimation to the Project-in-Charge / Project Director / Project Director and **AWHO** within two months of final completion of the work as certified by the Architect and the Project-in-Charge / Project Director / Project Director.

139. The Contractor shall prepare the final bill in the manner and on the format prescribed by **AWHO**, which may be ascertained from the Project-in-Charge / Project Director. It shall be accompanied by all abstracts, vouchers and bills etc. supporting it. The Contractor shall

forward the following confirmation duly supported by documents and/ or certified by the Auditor that: -

(a) Provident Fund, Workers Welfare Fund, ESI of the staff employed by the contractor at **AWHO** site was deducted during the contract period and same has been deposited with the concerned authority.

(b) Goods & Services Tax assessment has been completed up to last financial year and no tax is due to be paid to the authority pertaining to **AWHO** project.

(c) No Due Certificate from authority that contractor has deposited Labour Welfare Cess and other applicable taxes for this project.

140 No charges shall be allowed to the Contractor on account of preparation of the Final bill.

141. No further claims shall be made by the Contractor after submission of the final bill and other claims if at all, shall be deemed to have been waived and extinguished with his free consent.

142. The Architect shall check and forward all copies of the final bill to the Project-in-Charge, who shall check and forward the original and duplicate copy of final bill along with all documents including measurement books in original to the Head Office of the AWHO.

143. The amount payable against the final bill shall be based on the full measured value of the work less the value of payment already made on account and any charges properly preferred under the clauses of contract and for stores issued by the AWHO subject to the certifications of the final bill by the Architect and Project-in-Charge / Project Director / Project Director and thereafter technical check carried out by head office of AWHO.

144. The net amount payable to the contractor against the final bill as worked out after technical check by the **AWHO** shall be released after the Contractor has rendered "No claim certificate" as under :-

"I / We hereby certify that I / We have no further claim under contract agreement

No beyond the net amount Rs.
(Rupees Only) payable to me/ us after technical check carried out by Head Office, **AWHO** in full and final settlement against final bill".

Payment to the Contractor

145. All payments due under this contract shall be made by means of a Cheque/Bank draft "A/C PAYEE" payable in the name of Firm indicating the details of Bank and account number as given by the Contractor under condition No. 146 hereinafter. If desired by the Contractor, all the payments would be given through electronic mode i.e. "NEFT/RTGS".

146. Within 15 days of the acceptance of the Contract, the Contractor shall provide self-attested copies of the following documents:-

- (a) Name of the Beneficiary (in whose name payment is to be made).
- (b) Name & Address of Bankers.
- (c) Account Number & Type (Saving/Current).
- (d) IFSC & MICR code for electronic transfer.
- (e) Latest GIR/PAN number as issued by Income Tax Authorities

Recovery from contractor

147. Whenever any claim(s) for payment of a sum of money arise(s) out, of or under this contract against the Contractor, the Contractor shall, on demand by the AWHO/Project-in-Charge / Project Director / Project Director, make the payment of the same or agree for affecting adjustment from any amount due to him. AWHO shall be entitled to withhold an amount not exceeding the amount of claim from any sum due at that point of time or which at any time thereafter may become due to the Contractor with the AWHO (which may be available with the AWHO) or from the Contractor's performance guarantee amount or retention money amount (in the form of cash or Bank Guarantee) and retain the same by way of lien till such time, payment is made by the Contractor or till the claim(s) is/are settled or adjudicated upon.

148. It is an agreed clause of this contract that the sum of money(s) withheld or retained, as and by way or lien under this clause by the AWHO, till the claims arising out of or under this contract is/are settled or adjudicated upon and that the contractor will have no claim for interest or damages whatsoever on any account in respect of such sum so withheld.

149. Any amount due to the Contractor under this contract may be withheld by way of lien against any amount claimed which may at any time hereafter be claimed by the **AWHO** from the Contractor on any account whatsoever under this or any other contract with them and retained till the claim(s) is/are settled or adjudicated upon.

Termination

150. The Employer may, without prejudice to any other right or remedy which shall have accrued or shall accrue thereafter to **AWHO**, cancel the contract in part or whole in any of the following cases :-

If Contractor :-

i. Being an individual, or if a firm any partner thereof shall at any time be adjudged insolvent or *have received* orders or orders for administration of his estate made against him or shall take any proceedings for liquidation or composition under any insolvency Act for the time being in force or made any conveyance or assignment of his effects or composition or arrangement for benefits of his credit for or support so to do, or if any application be made under any insolvency Act for time being in force for the sequestration of his estate or if a trust deed be granted by him and on behalf of his creditors.

Or

ii. Being a company shall pass a resolution or the court shall make an order for the liquidation of its affairs or a Receiver or Manager on behalf of the debenture holders shall be appointed or circumstances shall arise which entitle the court or debenture holders to appoint a Receiver or Manager.

Or

(c) Assigns, transfers or sublets or attempts to assign transfer or sublet any portion of the works without the prior written approval of AWHO.

Or

(d) Make defaults in commencing the work within a reasonable time from the date of the handing over of the site and continue in that state after reasonable notice from the Architect or the Project-in-Charge / Project Director / Project Director or AWHO.

Or

(e) In the opinion of AWHO/ Architect/ Project-in-Charge / Project Director / Project Director at any time whether before or after the date or extended date for completion makes defaults in proceeding with the works with due diligence and continues in that state after reasonable notice from the Architect or the Project-in-Charge / Project Director / Project Director or **AWHO**.

Or

(f) Fails to comply with any of the terms and conditions of the contract after reasonable notice in writing with directions properly issued there under.

Or

(g) Fails to complete the works, **or** items of work with individual dates for completion and clear the site on or before the date of completion/ extended date of completion.

or

(h) Fails to submit the Bank Guarantee for performance Guarantee as per provisions laid down at clause123 of General Condition of contract to this Contract Agreement.

Or

(i) Fails to submit the Bank Guarantee for remittance of 1.5% contract value by AWHO to Joint Account as per provision laid down at Clause 18 of General Condition of Contract of this Contract Agreement.

Or

(k) Fails to deposit an amount of 1.5% of contract value to Joint Account as per provision laid down at Clause 18 of General Condition of Contract of this Contract Agreement.

151. Whenever the **AWHO** exercises its authority to cancel the contract under condition No. 150 above, inventories and measurements of followings shall be made jointly by Project-in-Charge / Project Director / Project Director, Architect and Contractor or their respective accredited representatives as detailed by them by name:-

- (a) Complete and incomplete works.
- (b) Materials brought by contractor and lying at site for incorporation in the work.
- (c) Tools, plants other equipment including material such as shuttering and scaffolding etc, brought by contractor and lying at site.
- (d) Temporary office/storage space constructed by Contractor at site.

152. For preparation of the inventories and measurements as listed above, the Employer shall detail a Board of Officers along with date and time for commencement, as under :-

(a)	Presiding Officer	-	To be nominated by name by the Employer.
(b)	Members	1	Accredited representative of Architect.
		2	Contractor or his accredited Representative.
		3	Accredited representative of HQ Employer.
(c)	In attendance	-	Project-in-Charge / Project Director / Project Director

153. The Contractor shall handover the keys of all stores to the Project Director for preparation of the inventories of stores by the Board of Officers.

154. In case the Contractor or his accredited representative fails to hand over the keys of the stores or the dwelling units, in spite of written notice by the **AWHO** and Presiding Officer, the Presiding Officer in the presence of the other members of the Board shall be entitled to break open the locks for preparation of inventories. The Contractor shall have no claim for breaking open of locks of such stores and dwelling units.

155. In case the Contractor or his accredited representative does not attend or co-operate for preparation of the inventories in terms of **Condition No. 151 and 152** above, in spite of written notice of the Employer and or the Presiding Officer, the inventories

shall be prepared by the Board of Officers so detailed Ex-parte and the same shall be binding on the Contractor.

156. Whenever **AWHO** exercises his authority to cancel the contract as stated above , he may complete the works by any means at the Contractor's risk and expense provided always that in the event of cost of completion after alternative arrangements have been finalized by the Employer to get the works completed or estimated cost of completion (as certified by the Architect) and approved by the Employer being less than the contract cost, the advantage shall accrue to the Employer. If the cost of completion after alternative arrangements have been finalized by the AWHO exceeds the money due to the Contractor under this contract, the Contractor shall either pay the excess amount or the same shall be recovered from the Contractor by other means.
157. The **AWHO** shall also be at liberty to use the construction materials and stores brought by the contractor and lying at site for incorporation in the works, as he thinks proper in completing the work. The Contractor shall be allowed necessary credit for such materials incorporated in the work. The amount of credit to be allowed for such material shall be at the rates admitted in the RARs against such materials but nil rate / amount shall be admitted for the material where the shelf life has already expired.
158. In case the **AWHO** completes or decides to complete the work under the provisions of this contract by any means at the Contractor's Risk and Expenses under Condition No.156 above, then the Employer/ **AWHO** shall be entitled to claim excess amount incurred or estimated cost for physical completion of the balance work including expenses on extension of the validity period of All risk Insurance Cover. In addition to the above, the **AWHO** /Employer shall also be entitled to claim 25% (twenty five percent) of the excess amount spent or estimated, for the completion of work to cover the additional expenses on superintendence and establishment by the Employer.

Fore-Closure of Work

159. If at any time after the acceptance of the tender, the **AWHO** shall for any reason whatsoever not require the whole or any part of the works to be carried out, the **AWHO** shall give notice in writing of the fact to the Contractor who shall have no claim to any payment of compensation or otherwise, whatsoever on account of any profit or advantage which he might have derived from execution of the work in full but which he did not derive in consequence of the foreclosing of whole or part of the works.
160. The Contractor shall be paid at contract rates for the full amount of the executed works including such additional work eg: clearing of site etc. as may be rendered necessary by the said foreclosing. He shall be allowed a reasonable payment as decided by the **AWHO**, on recommendation of Architect for any expense sustained on account of labour and materials collected but which could not be utilized in the works.

Dispute

161. If any dispute arises and persists between the AWHO & Contractor, the same shall be referred to the sole Arbitrator whose decision on such dispute shall be final and binding on both the parties.

Arbitration

162. Any dispute or difference whatsoever arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this contract or the validity or

the breach there of shall be settled by arbitration referred to a sole arbitrator to be appointed from panel of Arbitrators available with Delhi International Arbitration Centre (DIAC) through the appropriate court which shall be final & binding on both the parties. The arbitration shall be in accordance with the rules of arbitration covered under the Arbitration and Conciliation Act 1996.

163. In case arbitrator is appointed from panel available with Indian Council of Arbitrator (ICA), then the cost of fee and expenses including registration fee, arbitration fee and administrative fee etc., shall be borne equally by both the parties.
164. Such reference shall not take place by either parties until after the physical completion of works or termination of the contract referred to here-in-before.
165. In the event of abandonment of the works or of the contract, such reference shall not take place until alternative arrangements have been finalized by the EMPLOYER/ AWHO to get the works completed by or through any other Contractor or Contractors or Agencies.
166. The commencement or continuance of any Arbitration proceeding hereunder or otherwise shall not in any manner militate against the EMPLOYER's AWHO's right of any recovery in the Contract from the contractor as provided for herein before in this Contract Agreement.
167. Notwithstanding the fact that the station of work is as stated in scope of work only the courts at Delhi shall have the jurisdiction to adjudicate and settle any disputes between the employer and the Contractor. No other court located outside Delhi shall have jurisdiction on any matter requiring reference to the Civil Court. Arbitrator so appointed shall adjudicate the disputes between the parties herein only at Delhi.

TAXES ,DUTIES ,RETURN AND RECOVERY

168 The rates quoted by Contractor shall be deemed to be inclusive of all taxes including GST,Royalties, labour cess and other levies payable under the respective states. No Re-imbursement /refund for variation in rates of taxes, royalties, labour cess and other levies and /or imposition/abolition of any new/existing taxes, royalties, labour cess and other levies shall be made.

169. Contractor shall submit the invoices in a month or as specified, based on the billing period including setting out GOODS AND SERVICE TAX as a separate line item. Contractor shall prepare such Running Account/Final Bills based on certified measurements and summary sheets as per applicable laws alongwith the invoices (including Goods and Service Tax as a separate line item) based on the billing period. Based on certified measurements and summary sheets, the Contractor shall prepare Running/Final invoices and duly sign and send such invoices along certified measurements and summary sheets.

170. All payments made to Contractor pursuant to this contract by the AWHO shall be subject to tax deducted at source ("TDS") in accordance with applicable law at prevailing rates, unless Contractor provides the AWHO with the invoice with an order of waiver or concessional rate of TDS from the Income Tax department specifying a lower rate.

171. Contractor hereby undertakes to comply with the GST ACT 2017 and provide the AWHO with correct invoice(s), all supporting documents and information in order that the AWHO is able to avail applicable input tax credit of the GST AMOUNT paid by the Contractor or the AWHO as the case may be. In the event of any mismatch or discrepancy in the details provided by Contractor and AWHO in their respective GST returns is reported in the GSTN, then the Contractor shall resolve such mismatch or discrepancy (in the event such mismatch or discrepancy is attributable to any act or omission of the Contractor) or otherwise cooperate with the AWHO to resolve such mismatch or discrepancy (in the event such mismatch or discrepancy is attributable to any act or omission of the OWNER) within the period prescribed by the GST ACT 2017.

172. The Contractor shall, among other compliances required to be made by the Contractor as set forth in the GST ACT 2017, comply with the following:-

- a. Ensure that correct place of supply, as determined in accordance with the GST ACT 2017, is provided on all invoices issued by the Contractor.
- b. Timely issue all invoices in accordance with the GST ACT 2017, including all particulars as prescribed under the GST ACT 2017 with all supporting documents in accordance with invoicing instruction set forth in the contract to enable the AW HO to timely avail the input tax credit of the GST AMOUNT paid by the Contractor with appropriate Governmental Authorities.
- c. Pay in accordance with the GST ACT 2017 the GST AMOUNT with appropriate Governmental Authorities, including within the time prescribed by the GST ACT 2017 and timely file all returns as required by the GST ACT 2017.
- d. Provide the AW HO with the 'receipt voucher' as required under the GST ACT 2017 for the advance payment received by the Contractor from or on behalf of the Owner.
- e. Ensure that correct GST registration number of the Contractor is provided by the Contractor to the AW HO for incorporation in the work order from the place where the Contractor is liable to issue invoice for the supply of services.
- f. Ensure that correct GST registration number of the contractor and the AW HO is provided on all invoices issued by the Contractor
- g. Ensure that the correct GST registration number of the Contractor and the AW HO is furnished in the Contractor's sales details unloaded as specified in all applicable returns to be filed by the Contractor in the prescribed formats under the GST ACT 2017.
- h. Ensure that due process as prescribed under GST ACT 2017 is followed in all cases of defective services or work, irrespective of whether such defective services or work is attributable to the Contractor or not, such that no loss is caused to the AW HO on account of denial of any input tax credit and no liabilities for any interest or penalties arises on the Owner.
- j. Accept the modification proposed by the AW HO in GSTR 2 in the event the AW HO notifies the Contractor that the AW HO does not accept the services or accept only part of the services along with the issuance of credit note to the AW HO for such non-acceptance or partial acceptance of the services.
- k. Provide on all invoices correct service accounting code (SAC)/HSN for the services rendered. Where service accounting codes for each item of services rendered under the work order differ, then the Contractor shall provide on all invoices the correct service accounting code for each line item of service rendered and for which invoice is raised as specified in the work order.

173. The Contractor represents and warrants that the Contractor has passed on to the AW HO the cumulative total savings derived by the Contractor as a result of reduction in rate of tax on any procurement of goods or services or the benefit of input tax credit as required under the GST ACT 2017 in prices or unit rates of the services.

174. The Contractor shall in good faith pass on to the AW HO any further cumulative total saving derived by the Contractor as a result of reduction in rate of tax after the date of the work order on any procurement of goods or services or the benefit of input tax credit as required under the GST ACT 2017 in the form of reduction in prices or unit rates of the services.

175 AW HO retains/reserves the right to inspect the books of accounts through its appointed Chartered Accountant at its discretion, to satisfy itself that all GST norms/laws are adhered to.

176. Non compliance to GST Act leads to the following consequences:-

(a) Stopping of all future payments in case GST returns are not filed by the Contractor as per schedule.

(b) Penalty to the extent of input credit not reflected by the contractor and any loss of interest incurred by AWHO + 15% thereon.

177 The contractor shall deposit royalty and obtain necessary permit for procurement of coarse and fine aggregate, stone, kankar, sand etc from the local authorities and quoted rates in the tender shall be deemed to be inclusive of all these.

178. For Labour Cess/Tax, the firm will get registered with the concerned department. Labour Cess will be deducted and deposited directly by AWHO from each RAR and Final Bill.

179 The Contractor shall comply with all the laws and statutory regulations dealing with the employment of labour such as:-

- (a) The payment of wages Act, 1936.
- (b) The minimum wages Act, 1938.
- (c) The Workmen's Compensation Act, 1923.
- (d) Employer's Liability Act, 1938.
- (e) Industrial Disputes Act, 1947.
- (f) Maternity Benefit Act, 1961.
- (g) Mines Act.
- (h) The Employees State Insurance Act, 1948.
- (i) Employees Provident fund.
- (k) Child Labour (Prohibition & Regulation) Act, 1986.
- (l) The Contract Labour (Regulation and Abolishing) Act, 1970 & Contract Labour (Regulation & Abolition) Central Rules 1971.
- (m) Building and other construction work welfare "CESS" Act, 1996.

180. Any penalty or financial burden arising due to an act of omission or commission on the part of Contract in tax related matters will not be borne by AWHO and the entire financial burden will rest with the Contractor.

181. Contractor **may visit and give presentation on progress of works to this HQ himself at interval of every three months** till completion of project or as directed to review the physical progress of work **at least, otherwise** appropriate penalty as decided by the accepting officer, may be deducted from RA Bills for lapse of visit at HQ **AWHO**. Contractor will give prior intimation, of **his visit** to this HQ.

182. Any Board of Officers detailed by HQ **AWHO** or higher HQs, at any time, shall have free access to inspect the work, materials etc. The Contractor shall attend the Board of Officers and provide all necessary assistance in this regard.

183. **Display Board:** The Contractor shall erect a M.S. sheet display board of minimum size of 1200 mm x 2400 mm with frame, duly painted, at appropriate location at site, as approved by Project Director and ARCHITECT, at no extra cost, indicating the following :-

- (a) Name and address of the Owner, ARCHITECT & Contractor.
- (b) Survey No. & Sector No. of land under reference along with description of its boundaries.
- (c) Order No. and date of grant of approvals by Bangalore – Wagholi, Ph-II infrastructure corridor area planning authority.
- (d) Permitted F.A.R.

(e) Date of commencement & completion of project.

184. **Diversion of Road, Drains etc.** The Contractor shall, wherever necessary, for execution of work, divert the existing roads & drains, at his own cost without causing any hindrance to the thoroughfare. In all such cases, the Contractor shall restore the road, drain and/or berms, footpaths, gardens, open spaces etc. to its original clause at no extra cost.

185. **Throwing of Malba/Debris/Construction Material.** No Malba/Debris/Construction Material shall be dumped in the government/authority land/road adjoining the site. In case of violation, any penalty imposed by the concerned authorities shall be borne by the Contractor at no extra **cost to** the Employer.

186. All the guarantees as mentioned in this tender documents shall be separately consider and submitted as specified in this tender documents. Quoted rate of contract shall be deemed to be included for all the expenses incurred for the purpose and no amount shall be reimbursed to the Contractor in any case and at any stage.

ANNEXURE Contd..**SCHEDULE OF MINIMUM FAIR WAGES****(PAYABLE BY THE CONTRACTOR UNDER MINIMUM FAIR WAGES ACT)****(See Condition 47 to 53 of GCC)**

1. It is hereby agreed by me/us* that the " Schedule of Minimum Fair Wages" (SMFW) as published vide Government of India which specifies the minimum rates of wages for various categories of workmen as applicable on the last due date of receipt of this tender shall form part of the tender documents and is in my/our* possession. I / We* have read and understood the provision contained in the aforesaid Schedule of Minimum Fair Wages before submission of tender.
2. The minimum rates of wages shall consist of all inclusive rates and include also the wages for weekly day of rest.
3. My/Our* signature(s) here amounts to my/our* having signed the aforesaid Schedule of Minimum Fair Wages forming part of this tender.

(* Delete whichever is not applicable)

Signature of Contractor:**For Accepting Officer.****Dated:**

Appendix 'A'**PROFORMA OF BANK GUARANTEE FOR PERFORMANCE TO BE PROVIDED BY A BANK ON A
NON-JUDICIAL STAMP PAPER OF Rs. 100.00**

The Managing Director,
Army Welfare Housing Organization,
South Huments, Kashmir House,
Rajaji Marg,
New Delhi - 110 011.

Dear Sir,

Contract Agreement No. AWHO/ /PRAYGRAJ/ PLOT-DEV /03/2024 with M/s _____

The conditions of contract provide inter-alia that the Contractor shall pay you a sum of Rs. _____ as security on account of the amount covered by a performance guarantee in the manner and subject to the terms therein mentioned. The performance guarantee includes an undertaking on our part to pay on demand to you the sum of Rs. _____ in the event of the said Contractor having incurred forfeiture of the amount as aforesaid for breach of any of the terms and conditions and stipulations as aforesaid and contained in the said agreement.

The said _____ has approached us and at their request and in consideration of the promises, we the _____ Bank, having our office at _____ have agreed to give such guarantee as is hereinafter mentioned in your favour.

We the _____ Bank, having our office at _____ (hereinafter called "the Surety") do hereby agree to give through the irrevocable guarantee to you the due payment of the said sum of Rs. _____ by the Contractor to you in terms of the said contract conditions and their due performance of the obligations in this behalf and we as surety undertake and agree with you that if default is made by the said M/s. _____ i.e., the Contractor in performing any of the terms and conditions of the contract or in payment of any money payable to you under the contract of which the Army Welfare Housing Organization shall be the sole judge and its decision communicated to us in this regard shall be final and conclusively binding on us, it shall not be open to us to ask you details in this regard and we shall have no right to question the same or make reference to the Contractor in any manner whatsoever. We shall on demand pay to you without any protest, delay or demur and without any reference of any kind whatsoever to the Contractor in such manner as you may direct the said amount of Rs. _____ (Rupees _____ only) or such portion thereof not exceeding the said sum as you may from time to time require or is payable to you by the Contractor for all or any such default you can look to us as the Principal Debtor without any reference whatsoever to the Contractor.

You will have the full liberty without reference to us without affecting this guarantee, postpone for any time or from time to time the exercise of any of the powers and right conferred on you under the said contract with the said _____ and to enforce to forbear from enforcing any powers or rights or by reasons of time being given to the said _____ which under law relating to the sureties would but for the provision have the effect of releasing us. Any such time/indulgence/forbearance and/or any act of omission or commission on your part will not violate this guarantee.

Your right to recover the said sum of Rs. _____ (Rupees _____ only) from us in manner aforesaid will not be affected or suspended by reason of the fact that any dispute or disputes

have been raised by the said _____ and/or that any dispute or disputes are pending before any officer tribunal.

The guarantee herein contained shall not be determined or affected by the liquidation or winding up dissolution or change of constitution or insolvency of the said M/s _____ but shall in all respects and for all purposes be binding and operative until full payment of all money due to you in respect of such liability or liabilities is received by you as if this is a continuing guarantee to secure your ultimate dues in the promises.

We have power to issue this guarantee in your favour under memorandum and article of association and the undersigned has full power to do under the Power of Attorney dated _____ granted to him by the Bank.

We will have no right of subrogation against the Contractor unless all your dues and aforesaid are paid in full. We do hereby waive our rights of surety ship which are inconsistent with all or any provision hereof.

You will be at liberty to alter the terms of said contract and/or take any other security/guarantee/promissory notes from the Contractor or others which will not effect/ vitiate discharge out this guarantee.

This guarantee will bind our successors and assignees and your successors and assignees and will remain operative irrespective of any change in the constitution of our Bank and/or the Contractor.

Our liability under this guarantee is restricted to Rs. _____ (Rupees _____ only) and this guarantee shall remain in force until and unless a claim to enforce this guarantee is filed with us upto _____ (which is the date of expiry of this guarantee) all your rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there under.

We agree with you that in case we fail or neglect to honour our part of obligation and commit any breach in the terms and conditions of this irrevocable guarantee, we the surety, shall be liable to pay you damages in addition to the amount guaranteed under this deed together with legal miscellaneous and administrative expenses incurred by you in enforcing this guarantee against us. We further agree with you that you shall be the sole judge and your decision in this regard shall be final and conclusively binding on us and we shall have no right to question the same on any ground whatsoever.

For the purpose of enforcing legal rights/remedies under this guarantee we agree with you that the courts in the state of Delhi shall have exclusive jurisdiction.

Notwithstanding what is stated here in above our liability under this guarantee is restricted to

Rs. _____ (Rupees _____ only) and shall be valid upto _____ unless a demand/claim is made to us in writing on or before that date we shall be discharged from all liabilities under this guarantee.

Dated _____ day of _____ 2024 for _____ Bank.

Yours faithfully,

(Signature of a person duly authorized
to sign on behalf of the Bank).

Regional Office

Address

Date :

Place :

APPENDIX-B**PROFORMA OF BANK GUARANTEE FOR RETENTION MONEY TO BE PROVIDED****BY A BANK ON A NON-JUDICIAL STAMP PAPER OF Rs. 100.00**

The Managing Director,
 Army Welfare Housing Organization,
 South Hutmants, Kashmir House,
 Rajaji Marg,
 New Delhi - 110 011.

Dear Sir,

Contract Agreement No. AWHO/ PRAYGRAJ/ PLOT-DEV/03/2024 With M/s_____

1. The conditions of contract provide inter alia that the Contractor shall furnish a Guarantee Bond from a Nationalised Bank for an amount of Rs. _____ against the retention money, which should otherwise be recoverable from him under Clause- _____ of Contract Agreement for payment of full value of work executed as advance under Clause- _____.
2. The said M/s _____ has approached us and at their request and in consideration of the promises, we the _____ Bank, having our office at _____ have agreed to give such guarantee as is hereinafter mentioned in your favour.
3. We the _____ Bank, having our office at _____ (hereinafter called "the Surety") do hereby agree to give through this irrevocable guarantee to you the due payment of the said sum of Rs. _____ by the Contractor to you in terms of the said contract conditions and their due performance of the obligations in this behalf and we as surety undertake and agree with you that if default is made by the said M/s _____ i.e. the contractor in performing any of the terms and conditions of the contract or in payment of any money payable to you under the contract of which the Army Welfare Housing Organization shall be the sole judge and its decision communicated to us in this regard shall be final and conclusively binding on us. It shall not be open to ask you details in this regard and we shall have no right to question the same or make reference to the Contractor in any manner whatsoever. We shall on demand pay to you without any protest, delay or demur and without any reference of any kind whatsoever to the Contractor in such manner as you may direct the said amount of
 Rs. _____ (Rupees _____) only or such portion thereof not exceeding the said sum as you may from time to time require or is payable to you by the Contractor for all or any such default you can look to us as the Principal Debtor without any reference whatsoever to the Contractor.
4. You will have the full liberty without reference to us without affecting this guarantee to postpone for any time or from time to time the exercise of any of the powers and rights conferred on you under the said contract with the said _____ and to enforce or to forbear from enforcing any powers or rights or by reasons of time being given to the said M/s _____ which under law relating to the sureties would but for the provision have

the effect of releasing us. Any such time/indulgence/forbearance and/or any act of omission or commission on your part will not violate out this guarantee.

5. Your right to recover the said sum of Rs. _____ (Rupees _____ only) from us in manner aforesaid will not be affected or suspended by reason of the fact that any dispute or disputes have been raised by the said _____ and/or that any dispute or disputes are pending before any officer tribunal, court, arbitrator/umpire.
6. The guarantee herein contained shall not be determined or affected by the liquidation or winding up dissolution or change of constitution or insolvency of the said M/s _____ but shall in all respects and for all purposes be binding and operative until full payment of all money due to you in respect of such liability or liabilities is received by you as if this is a continuing guarantee to secure your ultimate dues in the promises.
7. We have power to issue this guarantee in your favour under memorandum and Article of Association and the undersigned has full power to do so under the Power of Attorney dated _____ granted to him by the Bank.
8. We will have no right of subrogation against the Contractor unless all your dues and aforesaid are paid in full. We do hereby waive our rights of surety ship, which are inconsistent with all or any provision thereof.
9. You will be at liberty to alter the terms of said contract and/or take any other security/guarantee/promissory notes from the Contractor or others which will not affect/vitiate discharge our guarantee.
10. This guarantee will bind our successors and assignees and your successors and assignees and will remain operative irrespective of any change in the constitution of our Bank and/or the Contractor.
11. Our liability under this guarantee is restricted to Rs. _____ (Rupees _____ only) and this guarantee shall remain in force until and unless a claim to enforce this guarantee is filed with us upto _____ (which is date of expiry of guarantee) otherwise all your rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there under.
12. We agree with you that in case we fail or neglect to honour our part of obligation and commit any breach in the terms and conditions of this irrevocable guarantee, we the surety, shall be liable to pay damages in addition to the amount guaranteed under this deed together with legal, miscellaneous and administrative expenses incurred by you in enforcing this guarantee against us. We further agree with you that you shall be the sole judge and your decision in this regard shall be final and conclusively binding on us and we shall have no right to question the same on any ground whatsoever.
13. For the purpose of enforcing legal rights/remedies under this guarantee we agree with you that the courts in the state of Delhi shall have exclusive jurisdiction.
14. Notwithstanding what is stated here in above our liability under this guarantee is restricted to Rs. _____ (Rupees _____ only) and shall be valid upto _____ unless a demand/claim is made to us in writing on or before that date we shall be discharged from all liabilities under this guarantee.

Dated _____ day of _____ 2024 for _____ Bank.

Yours faithfully,

(Signature of a person duly authorized to sign on behalf of the bank).

Regional Office
Address

Date:
Place:

APPENDIX-C**GUARANTEE FOR PRE-CONSTRUCTION ANTITERMITE TREATMENT TO BE GIVEN BY
GUARANTOR (SPECIALIST FIRM)****ON NON-JUDICIAL STAMP PAPER OF Rs. 100.00**

The Managing Director,
Army Welfare Housing Organization,
South Huments, Kashmir House,
Rajaji Marg,
New Delhi - 110 011.

PRE-CONSTRUCTION ANTI-TERMITE TREATMENT WORK FOR PLOTTED DEVELOPMENT WORK
AT KALINDIPURAM, PRAYAGRAJ (UP), under **CA No. AWHO/ PRAYGRAJ/ PLOT-DEV/03/2024**

BY M/s. _____

Dear Sir,

We M/s. _____ (GUARANTOR) hereby Guarantee that the work of pre-construction Anti Termite Treatment carried out by us for foundation, floors and plinth protections of all buildings constructed under CA No. _____ by M/s _____ shall remain entirely free of termites for a period of 10 years from the actual date of completion of CA No. _____ i.e. from _____.

If any re-infestation by Termites is observed during the period of Guarantee of 10 years, then it shall be treated with post construction anti termite treatment by us without any extra cost of the Owner. The work of treatment shall be taken up within 15 days of receipt of intimation of the re-infestation by termite from AWHO.

However we shall not be responsible in any way, if the portion of the building where pre-construction Anti Termite Treatment has been done is tampered by the occupants or any other agency for any work of additions/alterations. Further we shall not be responsible if the structure of the building is damaged due to sinking, cracking or any act of God beyond our control.

Witness:

Signature of Proprietor/Director of

Specialist firm

(Signature should be stamped and dated)

(By Principal Guarantor)

APPENDIX-D

**BANK GUARANTEE FOR PRE-CONSTRUCTION ANTITERMITE TREATMENT TO BE GIVEN BY
GUARANTOR (PRINCIPAL GUARANTOR)**

ON NON-JUDICIAL STAMP PAPER OF Rs. 100.00

The Managing Director,

Army Welfare Housing Organization,

South Hutmants, Kashmir House,

Rajaji Marg,

New Delhi - 110 011.

PRE-CONSTRUCTION ANTI-TERMITE TREATMENT WORK FOR PLOTTED DEVELOPMENT WORK
AT KALINDIPURAM, PRAYAGRAJ (UP)under **CA No. AWHO/ PRAYGRAJ/PLOT-DEV/ 03/2024.**

BY M/s. _____

Dear Sir,

We M/s _____, (PRINCIPAL GUARANTOR) hereby confirm that the work of pre-construction Anti Termite Treatment for all foundations, floors and plinth protections etc. of all building constructed by us under CA No. _____ have been got executed from M/s _____ in terms of Clause- _____, on page _____ of contract Agreement.

The ten year guarantee for the pre-construction Anti Termite Treatment given by M/s _____ is enclosed herewith in original.

We hereby guarantee as PRINCIPAL GUARANTOR under Clause- _____ on page _____ of Contract Agreement. That if any infestation by termites is observed during the period of Guarantee of ten years and the same is not rectified by M/s _____ the GUARANTOR within 15 days of receipt of information from AWHO, then we as PRINCIPAL GUARANTOR shall get the rectifications of Termites infestation done at our cost and without any extra cost to the allottees. We further agree that if we default in getting the rectification of termites' infestation done within 15 days after the receipt of notice from the AWHO/allottee, then AWHO may employ any other person to rectify the defects. All expenses consequent there on or incidental thereto shall be borne by us and shall be recoverable from us by AWHO.

We shall not be responsible in any way, if the portion of the building where pre-construction Anti Termite Treatment has been done is tampered by the occupants or any other agency for any work of additions/alterations. Further we shall not be responsible if the structure of the building is damaged due to sinking, cracking or any act of God beyond our control.

Witnesses:

Signature of Principal Guarantor
(Proprietor or Director of the firm)

1. Signature _____

Name _____

Address _____

2. Signature _____

Name _____

Address _____

GUARANTEE FOR WATER PROOFING WORK**BY GUARANTOR (SPECIALIST FIRM)****ON NON-JUDICIAL STAMP PAPER OF Rs. 100.00**

The Managing Director,
Army Welfare Housing Organization,
South Huments, Kashmir House,
Rajaji Marg,
New Delhi - 110 011.

WATER PROOFING WORK FOR PLOTTED DEVELOPMENT WORK AT KALINDIPURAM, PRAYAGRAJ (UP), under **CA No. AWHO/ PRAYGRAJ/PLOT-DEV/03/2024** BY M/s_____

Dear Sir,

We M/s _____ (GUARANTOR) hereby Guarantee that the work of water proofing treatment carried out by us for All sunken floors, terraces and _____ of all buildings constructed under CA No. _____ by M/s _____ shall remain entirely water proofed for a period of 10 years from the actual date of completion of CA No. _____ i.e. from _____.

If any leakage/seepage/dampness occurs during the period of Guarantee of 10 years, then it shall be rectified by us without any extra cost to the Owner. The work of rectification shall be taken up within 15 days of receipt of intimation of the leakage/seepage/dampness from AWHO.

However, we shall not be responsible in any way, if the portion of the building where water proofing treatment has been done is tampered by the occupants or any other agency for any work of additions/alterations. Further we shall not be responsible if the structure of the building is damaged due to sinking, cracking or any act of God beyond our control.

Witness:

Signature of Proprietor/Director of Specialist firm

(Signature should be stamped and dated)

(By Principal Guarantor)

APPENDIX-F**BANK GUARANTEE FOR WATER PROOFING WORK****TO BE GIVEN BY CONTRACTOR (PRINCIPAL GUARANTOR)****ON NON-JUDICIAL STAMP PAPER OF Rs. 100.00**

The Managing Director,
 Army Welfare Housing Organization,
 South Huments, Kashmir House,
 Rajaji Marg,
 New Delhi - 110 011.

WATER PROOFING WORK FOR PLOTTED DEVELOPMENT WORK AT KALINDIPURAM, PRAYAGRAJ
 (UP), under **CA No. AWHO/ PRAYGRAJ/PLOT-DEV/ 03/2024** BY M/s_____

Dear Sir,

We M/s _____ (PRINCIPAL GUARANTOR) hereby confirm that the work of water proofing treatment for all sunken floors, terraces and of all buildings constructed by us under CA No. _____ have been got executed from M/s _____ in terms of Clause- _____ on page _____ of Contract Agreement.

The ten years guarantee for the water proofing treatment given by M/s _____ is enclosed herewith in original.

We hereby guarantee as PRINCIPAL GUARANTOR under Clause- _____ on page _____ of Contract Agreement, that if any leakage/seepage/dampness occurs during the period of Guarantee of ten years and the same is not rectified by M/s _____ the GUARANTOR within 15 days of receipt of information from AWHO, then we as PRINCIPAL GUARANTOR shall get the rectifications of leakage/seepage/dampness done at our cost and without any extra cost to the allottees. We further agree that if we default in getting the rectification of leakage/seepage/dampness done within 15 days after the receipt of notice from the AWHO/allottee then AWHO may employ any other person to rectify the defects. All expenses consequent there on or incidental thereto shall be borne by us and shall be recoverable from us by AWHO.

We shall not be responsible in any way, if the portion of the building where water proofing treatment has been done is tampered by the occupants or any other agency for any work of additions/alterations. Further we shall not be responsible if the structure of the building is damaged due to sinking, cracking or any act of God beyond our control.

Witnesses:

Signature of Principal Guarantor

(Proprietary or Director of the firm)

1. Signature _____

Name _____

Address _____

2. Signature _____

Name _____

Address _____

APPENDIX-G**LIST OF BANKS FOR FURNISHING BANK GUARANTEES****SCHEDULED COMMERCIAL BANKS****NATIONALISED BANKS**

1. Bank of Maharastra
2. Canara Bank
3. Central Bank of India
4. Indian Bank
5. Indian Overseas Bank
6. Punjab National Bank
7. Punjab & Sind Bank
8. State Bank of India
9. UCO Bank
10. Bank of Baroda

SCHEDULED PRIVATE BANKS (INDIAN BANKS)

1. ICICI Bank
2. HDFC Bank Ltd.
3. Axis Bank

SPECIAL CONDITIONS

1. GENERAL

1.0 The subject work will be executed at Prayagraj and the work under this contract shall be carried out in accordance with DBR, Particular Specifications, Drawings, other provisions in CPWD specifications and DSR and as defined under scope of work etc.

1.1 The Special Conditions of Contract which include various deviations from General Conditions of Contracts and certain other Conditions particular to this Contract shall be read in conjunction with the General Conditions of Contract, particular Specifications, Conditions particular to various works & specific scope of each work as specified together with particular Specifications, Drawings etc.

1.2 The term 'General Specifications' referred to hereinbefore, as well as referred to in General Conditions of Contracts shall mean the specifications contained in DSR & CPWD specification.

1.3 General Rules, Specifications, Special Conditions and all preambles in the CPWD specification shall be deemed to apply to the works under this contract. In case of any discrepancy, the provisions in these tender documents shall take precedence over the aforesaid provisions in the DSR & CPWD specification.

1.4 The detailed Design Basis Report (DBR), Particular Specifications and Drawings for each function like Civil works and services etc. are given in the tender documents. The same also includes specific scope of each work & conditions particular to the work.

1.5 Blank

1.6 The contractor is required to complete the project on the design drawings and items of the BOQ as specified in the Scope of Work, particular Specification & Drawings covering the entire site including all internal services and the contractor's quoted rates are deemed to include everything from the award of work upto & including handing over of completed project, defect liability period. However, the contractor is required to connect all the external services like Water Supply, Sewerage, Drainage, Electric Supply, Telephone Lines, road etc. to the main lines of the authorities/service providers/existing services which shall be integral part of his Scope of work and deemed to be included in his quoted price.

All mandatory approvals required for commencement of work, permission for running of PLOT-DEV/occupation and completion of the work shall be obtained from concerned authority / agency by the Contractor. However, the statutory fee / charges paid by the Contractor shall be reimbursed by the AWHO on the production / submission of the invoices, challans proof of the payments made.

1.7 It shall be deemed that the contractor has satisfied himself as to the nature and location of the work, general and local conditions and particularly those pertaining to transport including restriction of movement of traffic/ vehicles etc., handling, availability and storage of materials, availability of labour, weather conditions at site and general ground/sub soil conditions and the contractor has to quote his rates accordingly and nothing extra shall be payable on any reason whatsoever.

1.8 AWHO will bear no responsibility for the lack of such knowledge and also the consequences thereof to the contractor. The information and site data shown in the drawings and mentioned in the tender documents are furnished for general information and guidance only. The Project Director in no case shall be held responsible for the accuracy thereof or/and deductions, interpretations or conclusions drawn there from by the contractor and no claim shall be entertained whatsoever on this account, if the site conditions/information is different or otherwise incorrect. It will be presumed that the contractor has satisfied himself for all possible contingencies, situations, bottlenecks and acts of coordination which may be required between the different agencies.

SPECIAL CONDITIONS (Contd.../..)

2. INSPECTION OF SITE BY THE TENDERER

2.1 The tenderer is advised to contact the Project Director for the purpose of inspection of site(s) and relevant documents other than those sent herewith, who will give reasonable facilities for the purpose. The tenderer shall also make themselves familiar with the working conditions, accessibility of site (s), availability of materials and other cogent conditions, which may effect the entire completion of the work under this contract.

2.2 The tenderer shall be deemed to have inspected the site (s) and made themselves familiar with the working conditions, whether they actually inspected the site (s) or not.

3. EMPLOYMENT OF PERSONNEL

3.1 Contractor shall employ only Indian Nationals as his representatives, servant and workmen after verifying their antecedents and loyalty. He shall ensure that no person of doubtful antecedents and nationality is in any way, associated with the work. If for the reasons of technical collaboration or other considerations the employment of foreign national(s) is unavoidable, the contractor shall furnish full particulars to this effect to the Accepting Officer at the time of submission of the tender. As a proof, that the contractor has employed only Indian Nationals, he shall render a certificate to Project Director within one month from the date of acceptance of tender to this effect. In case the Project Director desires, contractor will have the police verification done of personnel employed by him.

3.2 The Project Director shall have full powers and without giving any reason to order the contractor immediately to cease to employ, in connection with his contract, any agent, servant or employee whose continued employment is, in his opinion, undesirable. The contractor shall not be allowed any compensation on this account.

3.3 The contractor's attention is also drawn to condition 72 to 82 in this connection. The contractor shall maintain a minimum number of qualified Engineers throughout the construction stage and during Defect Liability Period.

4. CONDITIONS FOR WORKING IN UNRESTRICTED/RESTRICTED AREA

4.1 **CONDITION FOR WORKING IN UNRESTRICTED AREA:** All works lie in Unrestricted Area. The restrictions for entry to work site and conditions of working in unrestricted area shall be as under:-

4.1.1 The **work lies in UNRESTRICTED AREA.** However, the contractor, his agents, servants, workmen and vehicles may pass through the Ph-I, in which case, the Project Director at his discretion has the right to issue the passes, control their admission to the site of work or any part thereof. The contractor shall on demand by the Project Director submit a list of personnel etc. concerned and any other information called for by the Project Director and shall satisfy the Project Director as the bonafide of such people. Passes shall be returned at any time on demand by the Project Director and in any case on completion of work.

4.1.2 The contractor and his work people shall observe all the rules promulgated from time to time by authority controlling the area where the work is to be carried out e.g. prohibition of smoking etc. Any person found violating the security rules laid down by the authority shall be immediately expelled from the area without assigning any reasons whatsoever and the contractor shall have no claim on this account. Nothing shall be admissible for any man hours lost on this account.

SPECIAL CONDITIONS (Contd.../..)

5. MINIMUM WAGES PAYABLE

5.1 Refer Conditions 47 to 53 of General conditions of contracts. The contractor shall not pay wages lower than minimum wages for labour as fixed by the State Govt, whichever applicable at UP.

5.2 Contractor's attention is also drawn, amongst other things to the "explanation" to the schedule of minimum wages referred above.

5.3 The fair wages referred to in Condition 47 to 53 will be deemed to be the same as the minimum wages, referred to above upto date from time to time.

5.4 Schedule of minimum wages are not enclosed along with tender documents. However contractor shall be deemed to have verified the minimum fair wages payable as on the last due date of receipt of tender

5.5 The contractor shall have no claim whatsoever, if on account of local factor and or regulations, he is required to pay the wages in excess of minimum wages as described above during the execution of work.

6. ALLOTMENT OF AWHO LAND FOR STORAGE OF MATERIALS FOR CONSTRUCTION

6.1 Refer to conditions 43 of GCC. The contractor shall be permitted to store his materials for construction at the areas of land marked on the site plan / as directed by the Project Director.

6.2 The contractor shall submit the application to Project Director, Prayagraj for marking of temp land for storage of material on available land.

7. WATER

7.1 Refer to condition 68 of GCC.

7.2 Water will not be supplied by AWHO. The tenderers are advised to visit the site of works to ascertain availability of water from civil sources or from nearby natural sources outside AWHO land. The contractor shall not be allowed, to install hand pumps, tube wells at site of work. The responsibility of obtaining permission for boring outside AWHO land from the concerned competent authority shall lie with the tenderer and nothing extra shall be admissible on this account. Use of water from such sources shall only be permitted if, found after testing, potable and fit for use in the work.

The water from such sources shall be got tested by the contractor from laboratory approved by the Project Director, who shall after satisfying himself permit the contractor to use the water from such sources. Testing charges shall be borne by the contractor.

8. **CO-ORDINATION WITH OTHER AGENCIES:** The contractor shall permit free access and afford normal facilities and usual convenience to other agencies or departmental workmen to carry out connected works of services under separate arrangements. The contractor will not be allowed any extra payment on this account.

SPECIAL CONDITIONS (Contd.../..)

9. ELECTRIC SUPPLY

9.1 Refer to condition 68 of GCC: Electricity will not be supplied by AWHO to the contractor. The Contractor have to buy electricity from the state electricity department for construction/other purpose however after completion of Phase I of work electricity shall be supplied by RWA/PD of AWHO for Phase II ..

10. NET WORK ANALYSIS (CPM)/PROJECT PLANNING

10.1 The time and Progress Chart to be prepared as per Condition 19 of General Conditions of contract shall consist of detailed net work analysis and a time schedule. Contractor in consultation with Project Director soon after acceptance of contract shall prepare the entire projects in MS Project clearly defining Stages of completion, Resources, Constraints, and Activities involved. The entire project shall be divided into sub projects consisting of different buildings, and these sub projects shall be sub divided into further stages of completion e.g earthwork, foundation etc. The resources shall consist of following broad heads viz. Materials, Manpower, Equipment. These heads shall be further sub divided into details eg. Material shall consist of cement, steel, 12.5 mm aggregate, 20 mm aggregate, bricks etc. Man power shall include Engineer, Supervisors, Mason, Carpenter, Mazdoor, Equipment shall consist of Concrete mixer, Shuttering material, Trucks etc. The output of the resources shall be judicially decided keeping in view the realistic output under the circumstances. The critical path net work will then be derived from the project jointly by the Project Director and the contractor. The time scheduling of the activities will be done by the contractor so as to finish the work within the stipulated time. On completion of the time schedule, a firm calendar date schedule will be prepared and submitted by the contractor to the Project Director who will approve it after the due scrutiny. The schedule will be submitted in four copies within two weeks from the date of handing over the site.

10.2 During the currency of the work, the contractor is expected to adhere to the time schedule and this adherence will be apart of the contractor's performance under the Contract. During the execution of the work the contractor is expected to review and update the net work finalized in consultation with Project Director. The contractor shall submit original CPM chart within 30 days of commencement of work. The delays period not attributable to contractor for grant of extension under condition 109 of GCC updation of CPM, shall be considered as an activity preceding the succeeding activity, the CPM shall be considered revised CPM. If contractor fails to submit CPM chart original and revised no extension of time shall be granted. If the contractor fails to adhere to revised CPM chart, the contractor shall be put under slow progress in his WLR which may result to non issue of further tender to the contractor till the contractor achieves desired progress as per revised CPM.

10.3 These reviews may also be undertaken at the discretion of Project Director either as periodic appraisal measure or when the quantum of work ordered on the contractor is substantially changed through deviation orders or amendments. Any revision of the schedule as a result of the review will be submitted by the contractor to the Project Director within a week who will approve it after due scrutiny. The contractor will adhere to the revised time schedule thereafter. In case of Project Director disagreeing with the revised time Schedule, the same will be referred to the Accepting Officer whose decision shall be final, conclusive and binding. Project Director's approval to the revised schedule resulting in a completion date beyond the stipulated date of completion shall not automatically amount to a grant of extension of time. Extension of time shall be considered and decided by the appropriate authority mentioned in Condition 109 of GCC and separately regulated.

10.4 The contractor shall mobilize and employ sufficient resources to achieve the detailed schedule within the broad frame work of the accepted methods of working and safety.

SPECIAL CONDITIONS (Contd.../..)

10.5 No additional payment will be made to the contractor for any multiple shift work or other incentive methods contemplated by him in his work schedule even though the time schedule is approved by the department.

11 SITE INVESTIGATION

11.1 Brief tasks to be carried out:-

- (a) Collect sub-soil data, undertake detailed survey, wind data, earthquake data, & sub soil investigations.
- (b) Prepare key map (with scales 1:50,000) showing the location of the buildings investigated and the important structures, in the vicinity. The reference to the position of the benchmark, location of the trial pits or bore holes giving identification number for each bore connected to the datum and location of all nullahs, buildings etc.
- (c) Prepare detailed designs and Drawings.
- (d) Whenever required or necessitated by the site conditions, modify designs as well as suggest solutions to the problems come across during actual execution.
- (e) Obtain approval of design of each component of buildings from the Project Director before execution.

11.2 Tenderer may satisfy himself/themselves by conducting pre-soil tests if he/they so requires. Tenderer will be required to conduct detailed soil investigation including detection of harmful chemicals for the buildings separately at their own cost for carrying out structural design of buildings, through soil consultants and also for advising the type of cement to be used in foundation to take care from the harmful effect of the chemicals encountered in the soil in contact with foundation.

The contractor will be required to carry out Geotechnical investigations and sub soil Exploration at each proposed building location and conduct all relevant laboratory and field tests on soil and rock samples. Soil bore particulars duly indicating the classification of soils within a bore log chart and soil test report conducted in approved soil testing laboratory on undisturbed and disturbed samples for all the geo-technical parameters like C, Atterberg limits, DFS, SPT and silt factor worked out from the mean diameter of the particle size to the maximum scour level, safe bearing capacity of soils or rocks, core recovery (RQD) for rock, erodibility test for rocks, consolidation settlement parameters etc.

The contractor will get the detailed soil investigation done as per relevant IS code, NBC 2016 etc. as applicable through the soil consultant having professional experience of 15 years & one set of test report (both soft & hard copy) shall be deposited with AWHO.

After award of work, the contractor shall carryout detail survey and soil investigation for preparation of detailed designs as per the scope of work and technical specifications, The contractor (Bidder) shall be deemed to have inspected and examined the site, its surroundings, collected the data and all other information, and to have been satisfied before submitting the tender as to all relevant matters, including (without limitation): -

- (i) The form and nature of the site, including sub surface conditions.
- (ii) The climatic conditions.
- (iii) The extent and nature of the work and Goods necessary for the execution and completion of the works and the remedying of any defects.

SPECIAL CONDITIONS (Contd.../..)

(iv) The contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

(v) Availability of required materials.

Contractor has to carry out the topographical survey of site for reference purpose. The contractor shall however, ascertain the contour levels, location of proposed boundaries, any other site feature present at site for which he shall get conducted fresh topographical survey done at his own cost. The contractor shall be held fully accountable for accuracy of levels/design, position of buildings/facilities etc. on account of details obtained from Topographical survey.

12. MATERIAL AND SAMPLE

12.1 Refer Condition 54 to 63 of GCC.

12.2 The materials and articles, which have been specified from certain makers/manufacturers, shall be of makes/manufactures as specified in Appendix 'D' & 'E' here-in-after. If the manufacturers specified in tender documents make both ISI marked and conforming to ISI, the materials/articles shall be ISI marked.

12.3 The materials and articles, which have not been specified in tender documents by makes/manufacturers, shall be as under:

(i) If ISI marked materials are being manufactured the same shall be ISI marked. For list of ISI marked manufacturers refer website of BIS i.e. www.bis.org.in.

(ii) If ISI marked materials are not being manufactured, the same shall be conforming to IS specifications.

12.4 Materials of local origin shall be as specified and conforming to samples kept in Project Director's office. The tenderer is advised to inspect sample of materials which are displayed in the office of Project Director, before submitting his tender. The tenderer shall be deemed to have inspected the samples and satisfied himself as to the nature and quality of materials, he is required to incorporate in the work irrespective of whether he has actually inspected them or not.

12.5 The contractor shall not procure materials and articles unless the samples are first got approved from the Project Director.

13. TESTING OF MATERIALS

13.1 **'A' LEVEL TESTS FOR WORKS COSTING Rs. 100 LAKHS AND ABOVE:** The contractor shall set up site laboratory for testing of materials (except Sch 'B' materials) for 'A' level tests as listed in Appendix 'C' hereinafter. The contractor shall arrange all equipment/machines for the tests specified in Appendix 'C' hereinafter as 'A' level tests at his own cost with prior approval of Project Director. This cost shall be included in the lump-sum costs quoted by the contractor. The contractor shall employ a competent technical representative as approved by the Project Director for the purpose of testing and all such tests shall be carried out in the presence of Project Director. The successful tests result thereof shall be recorded and signed jointly by the contractor and the Project Director. The charges for these tests i.e. 'A' level tests carried out in site laboratory of the contractor shall not be recovered. In case, the contractor has not set up the site laboratory and the tests are carried out in zonal or any other laboratory approved by Project Director, the recovery shall be made at rates applicable i.e. as given in Appendix 'C' hereinafter.

SPECIAL CONDITIONS (Contd.../..)

13.2 **'B' & 'C' LEVEL TESTS:** For tests of 'B' and 'C' level as indicated in Appendix 'C' hereinafter, the contractor shall provide all facilities for testing of materials at Govt. approved laboratories or test house/Engg. Colleges at his own cost. The lump sum/rates quoted by the contractor shall be deemed to be inclusive of these tests. The rates of various tests conducted in Laboratory are indicated in Appendix 'C' hereinafter. The contractor shall bear the actual charges of 'C' level tests irrespective of rates indicated in Appendix 'C' hereinafter. Wherever it is convenient to get 'B' level test done at approved test house/Engg. College, the same can be done at the cost of the contractor and no separate recoveries will be made by the Department for the same test done at approved test house/Engg. College, the same can be done at the cost of the contractor and no separate recoveries will be made by the Department for the same.

13.3 The recoveries on account of testing charges wherever applicable shall be effected from the running account payments due to the contractor payable after completion of the respective tests or whenever the test is due whichever is earlier.

14 **PERIOD FOR KEEPING THE TENDER OPEN:** The tender shall remain open for acceptance for a period of 90 (Ninety) days from the date specified for its submission.

15. **ADVANCE ON ACCOUNT OF MATERIALS (FOR WORKS WHOSE ESTIMATED COST AT MARKET RATE EXCEEDS RS 50 LAKHS):**

15.1 Refer to condition 135 of GCC- Advance on Account.

15.2 The contractor may be paid advance on account to the 85% value of the under mentioned materials only, brought on the site:-

- (a) Electrical fittings/fixtures
- (b) Water supply pipes and pipe fittings/fixtures
- (c) Steel.
- (d) Cement
- (e) SGSW Pipes and Reinforced cement concrete pipes
- (f) All other non perishable items

16. **RECORD OF CONSUMPTION OF CEMENT**

16.1 The contractor shall maintain a "bound register" with serially numbered pages with all pages initialed by Project Director against numbering showing quantities of cement received, used in work and balance at the end of each day. The form of record shall be as approved by representative of AWHO and the contractor in token of verification of its correctness and will be checked by Project Director at least once a week and on the day, cement is brought by the contractor to the site.

16.2 The register shall be kept at site in safe custody of the contractor's representative during the progress of the work and shall on demand be produced for verification to the inspecting officer(s).

16.3 On completion of the work, the contractor shall deposit the cement register with the Project Director for record.

17 **SECURITY OF CLASSIFIED DOCUMENTS**

SPECIAL CONDITIONS (Contd.../..)

Contractor's special attention is drawn to Condition 4 to 6 of General Conditions of Contracts. The contractor shall not communicate any classified information regarding works either to sub-contractors or others without prior approval of the Project Director. The contractor shall also not make copies of the design/drawings and other documents furnished to him in respect of the works and he shall return all documents on completion of the work or on earlier determination of the contract. The contractor shall alongwith final bill attach a receipt from Project Director in respect of his having returned the classified documents.

18. RECORD OF MATERIALS AND PURCHASE VOUCHERS

18.1 The quantity of materials such as cement, steel, paints, water proofing compound, chemicals for anti-termite treatment and the like, as directed by Project Director (the quantity of which cannot be checked after incorporation in the works), shall be recorded in Measurement Books and signed by the contractor and the Project Director as a check to ensure that the required quantity has been brought to site for incorporation in the work.

18.2 Materials brought to site shall be stored as directed by the Project Director and those already recorded in Measurement Book shall be suitably marked for identification.

18.3 Contractor shall produce vouchers/invoices from the manufacturers and/or their authorized agents for the full quantity of the following materials as applicable as a pre-requisite before submitting claims for payment for advance on account of the work done and/or materials collected in accordance with Condition 55 of General Conditions of Contracts :-

- (a) Materials for which payment is claimed as material lying at site in RAR.
- (b) Cement and Steel
- (c) BLANK
- (d) LED light fittings
- (e) LT Panel board with accessories
- (f) RCC hume pipe
- (g) Electrical , water supply and fire fighting fittings / fixtures where names of manufacturers / brands are specified or approved
- (h) Cable / wires.
- (i) APFC panel
- (k) Transformer and DG sets

18.4 The contractor shall, on demand, produce to the Project Director, original receipted vouchers/invoices in respect of the materials other than as stated in condition 18.3 above. Vouchers/invoices so produced and verified shall be stamped by Project Director indicating contract number. The contractor shall ensure that the materials are brought to site, in original sealed containers/packing, bearing manufacturer's marking except in the case of the requirement of materials(s) being less than smallest packing.

18.5 The vouchers/invoices will clearly indicate the contract number and the IS No., specific alternative to which the material conforms in case of various alternative in IS.

19. SECURITY AGAINST LOSS OR DAMAGES

19.1 The contractor shall furnish to the Project Director every morning distribution return of his plants/equipments on the site of work stating the following particulars:-

SPECIAL CONDITIONS (Contd.../..)

- (a) Particular of plants/equipments, their make, manufacturers, Model No. if any, Registration No. if any, capacity, year of manufacture and year of purchase etc.
- (b) Total No (quantity) on site of work
- (c) Location, indication No (quantity) at each location of site of work.
- (d) Purchase value on the date of purchase, for the purpose of the condition, plants/equipment's shall be given vehicle No i.e. trucks and lorries but neither the workman's tools nor any manually operated tools/equipment's. The Project Director shall record the particulars supplied by the contractor in the works diary and keep the same for record in his office.

20. **OFFICIAL SECRET ACT:** The contractor shall be bound by the Official Secret Act 1923.

21. **CLEANING DOWN:** Refer Condition 110 of General Conditions of Contracts. The Contractor shall clean all floors, remove cement, lime or paint drops, clean joinery, glass panels etc, touch up all paint work and carryout all necessary items of work in connection therewith and have the whole premises clean and tidy to the entire satisfaction of Project Director before handing over the items/works. No extra payment shall be admissible to the contractor for the operation.

22. **DAMAGE TO EXISTING STRUCTURES:** Any damage to the existing structures, any existing road etc., during the execution of work shall be made good by the contractor at his own expense. Rectification, replacement, making good and touching up etc, shall be carried out, conforming to the materials and workmanship originally provided and to the satisfaction of the Project Director. In case of any dispute on this account, the decision of the MD shall be final, binding and conclusive.

23. **APPROACHES:** The contractor shall make arrangements for and provide at his own cost all temporary approaches, if required to the site(s), after obtaining approval in writing of the Project Director to the layout of such approaches without any extra cost to the Dept.

24. **LOCATION OF PLOT-DEV AND WORKS:** There may be some changes in location/siting of building shown in site (layout) plan(s) to suit local conditions and/or departmental requirements. The contractor shall have no claim what-so-ever consequent to such changes in the location/siting of works.

25. **WATCH/LIGHTING:** The contractor shall at his own cost take all possible precautions to ensure safety of life and property by providing necessary fencing, barrier, light, watchmen etc., during the progress of work and as directed by the Project Director.

26. **HANDING OVER OF SITE:** The efforts will be made by the AWHO to handover the site to the Contractor free of encumbrances. However, in case of any delay in handing over of the site to the Contractor on account of any reason whatsoever like (including but not limited to) not cutting of tress/social infrastructure, non-receipt of any approval/NOC from any statutory body (obtaining approval of which are excluded from contractor's scope) etc.; then AWHO shall only consider suitable extension of time for the execution of the work. It should be clearly understood that the contractor will not be entitled for any extra claim on such accounts and AWHO shall not consider any revision in contract price or any other compensation whatsoever. The contractor shall be obligated/required to provide assistance to AWHO in obtaining statutory approvals, for commencement of work from competent authorities.

27. **QUALIFIED TRADESMEN** In compliance with the condition 7 and 8 of General Condition of Contracts, the contractor shall employ skilled/semi skilled tradesmen who are qualified and possessing certificate in particular trade from Industrial Training Institute (ITI)/National Institute of Construction Management and Research (NICMAR)/National Academy of Construction (NAC) Hyderabad, similar

SPECIAL CONDITIONS (Contd.../..)

reputed and recognized-Institutes by State/Central Government, to execute the works of their respective trade. The number of such qualified tradesmen shall not be less than 25% of total skilled/semi skilled tradesmen required in each trade. The contractor shall submit the list of such tradesmen along with requisite certificate to Project Director for verification and approval. Notwithstanding the approval of such tradesmen by Project Director, if the tradesmen are found to have inadequate skill to execute the work of their trades, leading to unsatisfactory workmanship, the contractor shall remove such tradesmen within a week after written notice to this effect by the Project Director and shall engage other qualified tradesmen after prior approval of Project Director. Project Director's decision whether a particular tradesman possesses requisite qualification, skill and expertise commensurate with nature of work, shall be final and binding. No compensation whatsoever on this account shall be admissible.

31. Condition 28 to 31 ----- Blank --

32. COMPLETION AND TAKING OVER CERTIFICATE

32.1 (a) Work shall not be taken over by PD/Employer/allottee unless complete work or section(s) as applicable are completed in all respect and all defects pointed out by Project Director are attended by the contractor to the satisfaction of Project Director and site is cleared of all materials, plants and machinery not required after completion of work, all rubbish, labour huts & all other temporary structures constructed by contractor for his use are removed from construction site.

32.2(b) The Works shall be taken over by the Employer when they have been completed in accordance with the Contract, have passed the Tests on Completion, including Integrated Testing and Commissioning where ever applicable as per the contract, and a Taking Over Certificate shall be issued. If the Works are divided into Sections, the Contractor shall be entitled to apply for a Taking over Certificate for each Section. The Project Director will:-

- (i) Issue the Taking Over Certificate/Completion Certificate to the Contractor, stating the date on which the Works or Section were completed, including the Tests on Completion and integrated Testing and Commissioning where ever applicable as per the contract: or
- (ii) Reject the application, giving his reasons and specifying the work required to be done by the Contractor to enable the Taking over Certificate to be issued. The Contractor shall then complete such work before issuing a further notice under this Sub-Clause,

32.3 (c) As-Built Drawings and Documents:-

Prior to issue of any taking over certificate, the Contractor shall furnish to the Project Director a complete set of as-built Drawings, in 6 (six) hard copies and in soft form or in such other medium as may be acceptable to the Project Director, reflecting the Project as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project and setback lines, if any, of the buildings and structures forming part of Project Facilities. The work shall not be considered to be completed for the purpose of taking over until such documents have been submitted to the Engineer.

33. COMPLIANCE OF LAWS

The contractor shall keep himself fully informed of all acts and laws of the Central and state govt. (i.e. Govt. of National Capital Territory of Delhi and State Govt. of UP) all local bye laws, ordinances, rules and regulations and all orders and decree of bodies or, tribunals having any jurisdiction or authority which in any manner affect those engaged or employed on the work or which in any way affect conduct of the works. Contractor shall at all times, observe and comply with all such laws, ordinances, rules, regulations, orders and decrees, and shall give all notices and pay out of his own money any fees or charges to which he may be liable. He shall protect and indemnify AW HO and its officers and

SPECIAL CONDITIONS (Contd.../..)

employees against any claim or liability arising out of violations of any such law, ordinances, legislations, order or decree, whether by himself or by his employees & authorized representatives

34 DISCLAIMER

The Contractor acknowledges that prior to the execution of this Agreement, the Contractor has, after a complete and careful examination, made an independent evaluation of the Request for Qualification, Request for Proposals, Scope of the Project, Specifications and Standards of design, construction and maintenance, Site, local conditions, physical qualities of ground, subsoil and geology, traffic volume & restrictions, suitability and availability of access routes to the Site and all information provided by the Employer or obtained procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. The Contractor confirms that it shall have no claim whatsoever against the Employer in regard the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it.

34.1 The Contractor acknowledges and hereby accepts to have satisfied itself as to the correctness and sufficiency of the Contract Price.

34.2 The Contractor acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth elsewhere in the tender document and hereby acknowledges and agrees that the Employer shall not be liable for the same in any manner whatsoever to the Contractor, or any person claiming through or under any of them.

34.3 The Parties agree that any mistake or error in or relating to any of the matters set forth elsewhere in tender document shall not vitiate this Agreement, or render it voidable.

34.4 In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth elsewhere in tender document, that Party shall immediately notify the other Party, specifying the mistake or error.

34.5 Except as otherwise provided in this Agreement, all risks relating to the Project shall be borne by the Contractor; and the Employer shall not be liable in any manner for such risks or the consequences thereof.

35 SERVICE OF NOTICE

35.1 Any Notice or document or order to be given by one Party to other Party shall be deemed to be served:-

(a) By the Employer/Project Director: -

- (i) Delivering it by hand to the Contractor or contractor's person as designated by notice to Employer, or
- (ii) Leaving it at, or sending by e-mail at mail ID last known or by sending it by registered post/speed post to, the address of the place of residence or business of the Contractor last known;
- (iii) On a body corporate by leaving it at, or sending by e-mail at mail ID last known or sending it by registered post speed post to the registered office of the corporate

(b) By the Contractor

SPECIAL CONDITIONS (Contd.../..)

- (i) Delivering it by hand to the Employer/Project Director or other person of Employer as designated by notice to Contractor, or
- (ii) Leaving it at, or sending by e-mail at mail ID last known or by sending it by registered post speed post to, the address of the employer or Project Director last known;
- (iii) Provided that in the case of e-mail, it shall be deemed to have been delivered on the working day following the date of its delivery.

36. DEFINITIONS

The following definitions are added, as under:

- (i) Execution shall mean carrying out /cause to carry out every work by the contractor so as to fulfill his contractual obligation as per his Scope of Work commencing from the issue of Letter of Award including but not limited to) Design, preparation of Drawings; Construction activities, approval processes etc. till completion/handing over of work also including Defects liability period.
- (ii) Employer/AWHO shall mean Army Welfare Housing Organisation
- (iii) Employer's Engineer shall mean PD/AE/JE.
- (iv) PD shall mean Project Director.
- (v) Bidder/Agency shall means Contractor.
- (vi) The words Tenderer, Bidder, Applicant shall have the same meaning.

37. PROTECTION OF ENVIRONMENT

The Contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or other resulting from pollution, noise or other causes arising as a consequence of his methods of operation. The contractor shall be required to follow all the rules/norms of National Green Tribunal applicable to this work and all buildings shall be designed to comply with GRIHA 3 Star rating.

The contractor shall indemnify AWHO its officials against any claims or obligations arising out of any damage to adjacent property, structure or to building work done by him.

During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, by-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. However, Salient features of some of the major laws that are applicable are given below:

- (a) The Water (prevention and Control of Pollution) Act, 1974: This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health or animals or plants or of aquatic

SPECIAL CONDITIONS (Contd.../..)

organisms.

- (b) The Air (prevention and Control of Pollution) Act, 1981: This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant, which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.
- (c) The Environment (Protection) Act, 1986: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment includes water, air and land and the inter-relationship which exists among and between water, air and land, and human being, other living creatures, plants, micro-organism and property.

- (d) The public Liability Insurance Act, 1991: This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

38. SPECIFIC CONDITIONS

38.1 PRE-CONSTRUCTION PHASE

The Contractor shall obtain all other necessary requisite clearances/permissions/Licence from concerned authorities/agencies before commencement of work.

38.2 CONSTRUCTION PHASE:-

(a) The Contractor shall ensure that the guidelines issued by Ministry of Environment, Forests & Climate Change (MOEF & CC), vide OM No. 19-2/2013-IA.III dated 09.06.2015, to be followed for building and construction projects to ensure sustainable environmental management in pursuance of Notification No. 3252 (E) dated 22.12.2014 under the EIA Notification, 2006, as applicable, are followed in this project.

(b) During the construction phase for control of dust pollution all precautionary measure should be ensured in compliance of Hon'ble National Green Tribunal order dated 04.12.2014 & 10.04.2015 in O.A. No.21 of 2014 and O.A. No.95 of 2014 in the matter of Vardhaman Kaushik Vs. Union of India & other sand Sanjay Kulshreshtha Vs Union of India & ors.

(c) The Contractor shall ensure that the guidelines issued, regarding dust mitigation by measures for construction and demolition activities for projects requiring Environmental Clearance, by Ministry of Environment, Forests & Climate Change (MoEF & CC). vide Notification No. G.S.R.94(E) dated 25.01.2018, are to be followed.

(d) All the top soil excavated during construction activities should be stored for horticulture/landscape development within the project site.

(e) Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed off after taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority. The Rules on the Solid Waste Management including Construction waste issued by MOEF &CC as amended will be applicable.

SPECIAL CONDITIONS (Contd.../..)

- (f) Construction spoils, including bituminous material and other hazardous materials must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.
- (g) Any hazardous waste generated during construction and operation phase should be disposed off as per applicable rules and norms with necessary approvals to the Pollution Control Committee.
- (h) Vehicles hired for bringing construction material to the site and other machinery to be used during construction should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during permitted hours. The material loaded or unloaded should be covered (especially sand, excavated soil) before transportation to avoid fugitive emissions etc.
- (j) Techniques like, air extraction equipment, and covering, scaffolding, hosing down road surfaces, reducing the speed of vehicle, use of covering sheets for vehicles carrying construction materials and cleaning of vehicles to reduce dust and vapour emissions, Measures should include appropriate containment around bulk storage tanks and materials stores to prevent spillages entering watercourses.
- (k) The Diesel Generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environment Protection Rules prescribed for air and noise emission standards.
- (l) The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.
- (m) Ambient noise levels should conform to prescribed standards both during day and night. Adequate measures should be made to reduce ambient air and noise level during construction and operation phase, so as to conform to the norms stipulated by - CPCB/DPCC. Ambient air and noise monitoring should be done by an accredited lab and data should also be submitted, on six monthly bases, with DPCC& Regional Office of MoEF& CC. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase.
- (n) Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended to date.
- (o) Ready Mix Concrete must be used in building construction,
- (p) Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other best practices preferred.
- (q) Proponent shall obtain prior permission for ground water withdrawal from authority concern, in compliance of notifications.
- (r) Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.
- (s) Construction/provision of the PLOT-DEV, DG Sets, Utilities etc, earmarked by the project proponent on the layout plan, should be made in the earmarked area only. In any case the position/location of these utilities should not be changed later-on.
- (t) Health and safety norms should be followed during construction.

SPECIAL CONDITIONS (Contd.../..)

- (u) Soil and water samples of the site should be tested by the proponent through Govt Approved and recognized laboratory to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants, on quarterly basis for inclusion in the six monthly reports.
- (v) Adequate steps shall be taken to conserve energy by limiting the use of glass up-to 40% to reduce the electricity consumption and load on air-conditioning. If necessary. use high quality double glass with special reflective coating in windows, provision of proper thermal insulation and taking measures as prescribed under the Energy Conservation Building Code.
- (w) Energy Conservation Building Code to be strictly adopted in all aspects of buildings design and construction.

39. PREVENTION OF NUISANCE AND POLLUTION

The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupiers of adjacent properties and to the public in general and to prevent any damage to such properties and any pollution. He shall make good at his own cost and to the satisfaction of the Project Director, any damage to roads, paths, drainage works or public or private property whatsoever caused by the execution of the work or by traffic brought hereon by the contractor. All waste or superfluous materials shall be cleaned away by the contractor without any reservations entirely to the satisfaction of the Project Director at no extra cost.

The site has to be kept clean of all debris, rubbish and dirt & surplus/waste material all the time. It also includes maintenance, cleaning & de-silting the pipe lines laid by the agency for all internal services etc. executed by the agency to the entire satisfaction of the Project Director during the maintenance periods. Cleaning and de-silting will also be done by the agency before handing over the completed structures to AWHO. All machines, equipment and labour for this purpose will be arranged by contractor at no extra cost to AWHO.

40 STATUTORY FEE PAYMENT

Statutory fees, if any paid to the local bodies/Authorities in connection with the approval of the project / connection of the services/shifting of the services by the contractor shall be reimbursed by AWHO on submission of vouchers/bills / receipts/ challans/invoices issued by the concerned local bodies/Authorities. The cost of restoration of any services damaged by the contractor during execution shall however be borne by the contractor.

41. CONTRACTOR'S WARRANTY OF DESIGN

- (a) The Contractor shall be fully responsible for the suitability, adequacy, integrity, durability and practicality of the Contractor's proposal in respect of design of buildings/PLOT-DEV and its services as per the Scope of the Work.
- (b) The Contractor warrants that the Works have been or will be designed, manufactured, installed and otherwise constructed to the highest standards available using proven up-to-date good practice. By submitting the Drawings for review to the Engineer, the Contractor shall be deemed to have represented that it has determined and verified that the design and engineering, including field construction criteria related thereto, are in conformity with the Scope of the Project, the Specifications and Standards and the Applicable Laws.
- (c) The Contractor warrants that the Contractor's Proposals meet the requirements and is fit for the purpose thereof. Where there is any inadequacy, insufficiency, impracticality or

SPECIAL CONDITIONS (Contd.../..)

unsuitability in or of the Requirements or any part thereof, the Contractor's Proposal shall take into account, address or rectify such inadequacy, insufficiency, impracticality or unsuitability at Contractor's own cost.

(d) The Contractor warrants that the Works will, when completed, comply with enactments and regulations relevant to the Works.

(e) The Contractor shall also provide a guarantee from the Designer for the design for suitability, adequacy, and practicality of design for Employer's Requirements.

(f) The Contractor shall indemnify the Employer against any damage, expense, liability, loss or claim, which the Employer might incur, sustain or be subject to arising from any breach of the Contractor's design responsibility and/or warranty set out in this Clause.

(g) Notwithstanding that such design may be or have been prepared, developed or issued by the Employer, any of Contractor's consultants, his sub-contractors and/or his qualified personnel/persons or cause to be prepared, developed or issued by others.

(i) Notwithstanding any warranties, guaranties and/or indemnities that may be for may have been submitted by any other person.

(ii) Notwithstanding that the same have been accepted by the Employer/Project Director/Engineer, the Contractor shall be fully responsible for the Plants, Materials, 'goods, workmanship, preparing, developing and coordinating all design Works to enable that part of the Works to be constructed and/or to be fully operational in accordance with the Contract's requirements.

No claim for additional payment or extension of time shall be entertained and/or no review and/or observation of the Engineer and/or its failure to review and/or convey its observations on any Drawings shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Engineer or the Employer be liable for the same in any manner; and if errors," omissions, ambiguities, inconsistencies, inadequacies or other Defects are found in the Drawings, they and the construction works shall be corrected at the Contractor's cost, notwithstanding any review under this section.

42. SECURITY OF THE SITE

The Contractor shall be wholly responsible for security of site and Works. Unless otherwise stated in Special Conditions of Contract.

- (a) The Contractor shall be responsible for keeping unauthorised persons off the Site; and :
- (b) Authorized persons shall be limited to the Employees of the Contractor, Sub contractor or persons authorized by the Project Director /Engineer.

43. LIGHTING

The contractor shall provide sufficient lighting at project site, of the right type and at the right place / location for it to be properly effective. Lighting ought not to introduce the risk of electric shock.

Therefore, 230V supplies should be used for those fittings, which are robustly installed, and well out of reach e.g. flood lighting or high-pressure discharge lamps. The contractor shall ensure that luminaires should always be so placed that no person is required to work in their own shadow and that the local

SPECIAL CONDITIONS (Contd.../..)

light for one person is not a source of glare for the others. Strongly made clamps should be available for attaching luminaries to poles and other convenient supports.

Luminaries should be robust, resistant to corrosion and rain proof especially at the point of the cable entry. The correct type of lamp for each luminaries should always be used and when lamps need to be replaced, it shall be in accordance with the supply voltage. Lamp holders not fitted with a lamp should be capped off.

The contractor shall take every effort to illuminate the work site as per the direction of Project Director. The compliance of above provisions are deemed to be included in the quoted amount of the contractor and no claim / payment whatsoever shall be entertained on this account.

44 DEWATERING OF SITE

The rates for all items, shall be considered as inclusive of pumping / bailing out water, wherever necessary for which no extra payment shall be made. The area shall be kept dry when the work is in progress even below water table. Nothing extra shall be paid for removal of slush / sludge due to sub-soil condition, rains, spring etc.

45. INCIDENTAL WORKS SUCH AS BAILING-OUT WATER, SHORING ETC.

For execution of any items of work where incidental works such as bailing out water, shoring etc. are actually required but not specifically stated in the scope of item and/ or tender document, it is to be understood that the contract amount quoted by the contractor shall cover such charges also and nothing extra on account of such incidental charges, if any, shall be paid

46. CONTRACTOR'S CARE OF THE WORKS

The Contractor shall bear full risk in and take full responsibility for the care of the Works and Materials, goods and equipment for incorporation therein from the Commencement Date until the Completion default or neglect of the Employer.

The Contractor shall throughout the execution of the Works including the carrying out of any testing, commissioning (including Integrated Testing and Commissioning), or remedying of any defect:

- (a) Take full responsibility for the adequacy, stability, safety and security of the Works, Plant, Goods, Contractor's Equipment, Temporary Works, operations on Site and methods of manufacture, installation, construction and transportation
- (b) Have full regard for the safety of all persons on or in the vicinity of the Site (including without limitation persons to whom access to the Site has been allowed by the Contractor), comply with all relevant safety regulations, including provision of safety gear, and insofar as the Contractor is in occupation or otherwise is using areas of the Site, keep the Site and the Works (so far as the same are not completed and occupied by the Employer) in an orderly state appropriate to the avoidance of injury to all persons and shall keep the Employer indemnified against all injuries to such persons.
- (c) Provide and maintain all lights, guards, fences and warning signs and watchmen when and where necessary or required by the Engineer or by laws or by any relevant Employer for the protection of the Works and for the safety and convenience of the public and all persons on or in the vicinity of the Site; and
- (d) Where any work would otherwise be carried out in darkness, ensure that all parts of the Site where work is being carried out are so lighted as to ensure the safety of all persons on

SPECIAL CONDITIONS (Contd.../..)

or in the vicinity of the Site and of such work.

Contractor is required to take note of all the necessary provisions in Employer's Safety, Health and Environment Manual (SHE Manual) and the Contractor's price shall be inclusive of all the necessary costs to meet the prescribed safety standards. In the case, the Contractor fails in the above, the Employer may provide the necessary arrangements and recover the costs from the Contractor.

47. HOUSE-KEEPING

- (i) Housekeeping is the act of keeping the working environment cleared of all unnecessary waste, thereby providing a first-line of defence against accidents and injuries. General House-keeping shall be carried out by the contractor and ensured at all times at Work Site, Construction Depot, Fabrication Yard, Workshop, Batching Plant, Labour Camp, Stores, Offices and toilets/urinals etc. The contractor shall be responsible to provide segregated containers for disposal of debris at required places and regular cleaning of the same.
- (ii) All stairways, passageways and gangways shall be maintained without any blockages or obstructions. All emergency exits passageways, exits fire doors, break-glass alarm points, fire-fighting equipment, first aid stations, and other emergency stations shall be kept clean, unobstructed and in good working order.
- (iii). All surplus earth and debris shall be removed, disposed-off from the working areas immediately. Trucks carrying sand, earth and any pulverized materials etc. shall be covered while moving in order to avoid dust or odour impact. The tyres of the trucks leaving the site shall be cleaned with water, **wherever the** possibility of spillage on carriageways meant for regular road traffic exists.
- (iv) No parking of trucks/trolleys, cranes and trailers etc, shall be allowed on roads, which may obstruct the traffic movement.
- (v) Roads shall be kept clear and materials like: pipes, steel, sand boulders, concrete, chips and brick etc., shall not be allowed on the roads to obstruct free movement of road traffic.
- (vi). Water logging or bentonite spillage on roads shall not be allowed.
- (vii). Proper and safe stacking of material are of paramount importance at fabrication stores, stores and such locations where material would be unloaded for future use. The storage area shall be well laid out with easy access and material stored / stacked in an orderly and safe manner.
- (viii) Flammable chemicals, compressed gas cylinders etc. shall be safely stored. Unused /surplus cables, steel items and steel scrap lying scattered at different places within the working areas shall be removed to identified locations(s). All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from the site. Lumber with protruding nails shall be either bent/ removed and properly stacked.
- (ix) The compliance of above provisions are deemed to be included in the quoted amount of the contractor and no claim /payment whatsoever shall be entertained on this account.

48. UNFORESEEABLE DIFFICULTIES

Except as otherwise specifically stated elsewhere in the Contract:

SPECIAL CONDITIONS (Contd.../..)

- (a) The Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works;
- (b) By signing the Contract, the Contractor accepts total responsibility for having foreseen all difficulties and costs of successfully completing the Works; and
- (c) The Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs.

AWHO shall not provide any material either on chargeable or on free issue basis to the contractor for execution of the project.

49. BLANK

50. **REMEDIAL MEASURES FOR NOISE REDUCTION:**

50.1 **During Construction:**

50.1.1 Machinery used for construction will be of highest standard of reputed make and will adhere to international standards and norms as applicable for construction equipments and machinery. These standards itself take care of noise pollution, control/vibration and air emission control.

50.1.2 All norms as specified by the Pollution Control Board / National Green Tribunal shall be strictly adhered / implemented.

50.1.3 The construction planning and execution should be in conformity to highest achievable Green Ratings of GRIHA.

50.1.1.4 All plants and machinery should be located in Acoustic enclosures.

51. **STANDARD OF WORKMANSHIP**

To determine the acceptable standard of workmanship and of fittings, wiring etc, the Project Director shall order the contractor to execute certain typical portion of work (different trades) and services sufficiently in advance of other work in one portion of the building. These shall be executed and completed under the close super of the Project Director and shall be got approved from Project Director. On approval by the Project Director of such items, these items shall signed and /or suitably identify by the Project Director and labeled as guiding samples. The record of such inspection and passing of each stage of these samples shall be recorded by Project Director under his dated signatures. Work on such sample/portion of the building shall be progressed well ahead (minimum two stages ahead) of other portion of the building. Approved finishes/workmanship shall be followed in the work as a whole.

52. **Contractor shall give warranty and guarantee of all water retaining structure of PLOT-DEV tanks for 10 years**

52.1 The period of guarantee for the water tanks of PLOT-DEV shall be 10 (ten) years from the certified date of completion. The contractor shall be responsible for effectiveness of the water proofing of tanks during this period and any leakage noticed therein during this period shall be made good by him at his own cost. Condition 114 to 120 of GCC shall be deemed to be amended to the extent mentioned above.

52.2 The contractor shall furnish guarantee in favour of MD, AWHO for the efficacy of the water proofing treatment during the guarantee period.

SPECIAL CONDITIONS (Contd.../..)

52.3 An amount of security deposit equal to 0.25% of the assessed cost of the PLOT-DEV as per payment schedule as calculated for the PLOT-DEV for which treatment is to be carried out shall be retained from the contractor's final bill as security deposit for the water tanks of PLOT-DEV. This will be over and above the Performance Security. This security deposit shall be released to the contractor only after expiry of guarantee period as mentioned above. The contractor may alternatively furnish a fixed deposit receipt in favour of MD, AWHO in lieu of sum to be retained as security deposit for water proofing treatment from any approved Schedule Bank.

53. BLANK

Signature of contractor
Dated: _____

for Accepting Officer

PARTICULAR SPECIFICATIONS PART- I – A
(CIVIL WORKS GENERAL)

GENERAL

1. The work shall be carried out strictly in accordance with Particular Specifications and drawings. The drawings and specifications shall be taken complementary and also supplementary to each other and shall form part of this contract. Any material or work including all architectural pattern/feature work in reinforced cement concrete, brick masonry, plastering, finishing or other work shown on drawings and not specifically included in specifications or vice versa shall be executed and deemed to be included in the scope of work for lump sum rate.
- 1.1 **In case there are no specifications for items shown on the drawings or where items are not exhaustively described, the general specifications of CPWD shall be followed for which nothing extra shall be paid.**
- 1.2 General Rules, specifications, special conditions and all preambles in the CPWD Specification / Schedule shall be deemed to be applicable to the work under this contract, unless specifically stated otherwise in these documents in which case shall take precedence over the aforesaid provisions in the CPWD Specification / Schedule. The term "as specified" wherever appears in the tender documents and drawings, relates to relevant particular specifications and in its absence, general specifications. All references to CPWD Specification / Schedule /DSR in these specifications relate to CPWD Specification / Schedule unless otherwise mentioned. Reference to only some paragraphs of CPWD Specification / Schedule has been made in these particular specifications but other paragraphs and provisions, as applicable, are also to be followed the entire work even though not particularly mentioned hereinafter.
- 1.3 Where specifications for any item of work are not given in the tender documents, particular specifications, the specifications as given in relevant Indian Standard Code of Practice shall be followed.
- 1.4 The lump sum amount quoted by the tenderer shall be deemed to include for any minor details/items of work and/or constructions which are obviously and fairly intended and which may not have been included in these documents but which are essential for the execution and entire completion of work.
- 1.5 ----Blank--

1.6 MATERIALS :-

1.6.1 Unless specific makes/manufacturers are specified in the tender documents all the materials to be procured by the contractor for incorporation in the work under this contract (with the exception of local materials like bricks, stone aggregate, stones, sand etc) shall be with ISI certifications mark. For materials of specific make/manufacturer's names refer in clause 1.6.2 here-in-after.

1.6.2 If any specific makes/manufacturers names are specified in Particular specifications or in **Appendix “D”** to Particular Specifications, materials shall be of these specific makes/manufacturers only. If any material is not manufactured with IS certifications mark in the country, it shall be confirming to relevant IS and other specifications specified elsewhere and shall also conform to samples displayed in PD office as applicable. However steel windows/ventilators and doors shutters shall be of makes specified in **Appendix “D”**to the particular specifications and conforming to relevant IS (IS marking is not mandatory).

1.6.3 Indian Standard (IS) of the year of publication/edition listed or specified in the SSR (Part-I) or revised thereafter shall be applicable for the work under this contract unless specifically indicated otherwise elsewhere in these tender documents.

1.6.4 LOCAL MATERIALS :- Irrespective of actual distance involved, local materials such as stones, aggregates, sand, road metals etc shall conform to or superior to the specifications given here in after and to the samples kept in the office of PD. The tenderers are advised to inspect these samples. The tenderers shall be deemed to have inspected the samples and have full knowledge thereof whether they inspect them or not before quoting their tender. No claim whatsoever on this account shall be admissible.

1.6.5 SAMPLES OF MATERIALS :-

- (a) Refer condition 54 to 60 of GCC.
- (b) Specific requirements regarding dimensions, strength, weight and finishes, as per IS, DSR and CPWD specifications given hereinafter vis-à-vis actual properties check, tests carried out, reference to test certificates and markings, etc based on which samples of each materials are approved as Conforming to relevant specification shall be recorded in the sample approval register.
- (c) The contractor shall produce samples of all materials and shall obtain approval in writing from PD before he places bulk order for the materials for incorporation in the work. The contractor shall not procure materials unless the samples are first got approved from the PD.

1.6.6 RECORD OF MATERIALS :- (Refer Special condition 18)

- (a) The quantity of all the proprietary materials (including the materials the quantity of which cannot be checked after incorporation in the works) shall be recorded in measurement books and signed by the contractor and the PD as a check to ensure that the required quantity has been brought at site for incorporation in the work.
- (b) Materials brought to site shall be stored as directed by the PD and shall be suitably marked for identification.
- (c) The contractor shall procure all the materials (where specific makes/manufacturer's specified) directly from their manufacturers or from their authorized dealers only. The contractor shall ensure that the materials are brought to site, in original sealed containers/packing, bearing manufacturers marking except in the case of the requirement of material(s) being less than smallest packing.
- (d) The contractor shall produce to the PD original printed and machine numbered purchase vouchers/invoices including manufacturer's test certificate (where applicable) for all the materials mentioned here-in-before in Special Conditions. Copies of orders placed on the manufacturer/authorized dealers shall also be provided by the contractor to PD along with above documents. Whenever procured and brought to site of work for incorporation in the work, a Xerox copy of such vouchers/invoices shall be stamped (office stamp) and defaced in ink by the PD stating "verified for materials purchased and brought to the site of work for incorporation in the subject work and signed with date before allowing payment for these materials through RAR.
- (e) Payment for the materials shall neither be made in the RARs nor will these be allowed for incorporation in the work unless documents as stated above are produced by the contractor and are verified by the PD. In case of any disputes on account of above Accepting Officer,s decision shall be final and binding.

1.7 **STANDARD OF WORKMANSHIP:-**

To determine the acceptable standard of workmanship and of fittings, wiring etc, the PD shall order the contractor to execute certain typical portion of work (different trades) and services sufficiently in advance of other work in one portion of the building. These shall be executed and completed under the close supervision of the Engineer-in-charge and shall be got approved from PD. On approval by the PD of such items, these items shall be signed and/or suitably identified by the PD and labeled as guiding samples.

The record of such inspection and passing of each stage of these samples shall be recorded by PD under his dated signatures. Work on such sample/portion of the building shall be progressed well ahead (minimum two stages ahead) of other portions of the building. Approved finishes/workmanship shall be followed in the work as a whole.

1.8 **MAKING GOOD :-**

The contractor shall cut, leave or form holes, recesses, chases etc, in concrete, brick work, walls, ceilings, floors and in any other situations as required or as directed by the Project Director and make good in cement and sand mortar (1:3)/PCC (1:2:4) type Bo as decided by Project Director and finish to match the adjoining surfaces.

SCOPE OF WORK

2. The scope of work under this contract comprises of full, final and entire completion of works as defined under scope of work and as specified in these Particular specifications, General specifications and as directed by PD.
- 2.1 The Makes of products mentioned here-in-after are to be selected from List of Approved Manufacturer/Makes in Appendix 'D' of Particular Specification of the tender.
- 2.2 Although all the details of construction have been by and large covered in these documents, any item or detail of construction not specifically covered but obviously implied and essential to consider civil works and all internal services complete and functional shall be deemed to have been covered in the lump sum quoted. The Tenderer may, however, consider a minimum level of specifications conforming to IS code or National Building Code to cover these missing details.
3. Blank
4. Blank
5. Blank
6. BLANK
7. BLANK
8. All materials fittings/fixtures to be incorporated in the sample Plot-Dev conforming to specifications makes and brands as given in the Contract Agreement shall be got approved within six weeks before they are required at site for incorporation. The order should be placed by the contractor in such a way that they can be procured in time and incorporated in the sample Plot-Dev.
9. All stages of the sample Plot-Dev shall be jointly approved by Project Director and Architect and record of approval stage wise duly signed and dated shall be kept by the Project Director.
10. BLANK.

SLOPES

11. Adequate slopes will be provided in areas where there is likely-hood of ingress of water such as toilets, plinth protection etc. though these may not be expressively shown in drawings.

CURING

12. Exposed surfaces of all cement works viz. cement concrete, brickwork, flooring, plastering, pointing and the like shall be cured by keeping the surface adequately and continuously wet as directed by the Architect and Project Director for at least 7 (seven) days where ordinary Portland cement (OPC) has been used and minimum 10 (Ten) days where Pozzolona Portland cement (PPC) has been used. Approved curing compound may be used in lieu of moist curing with the permission of Architect and Project Director. Such compound shall be applied to all exposed surfaces of cement works as soon as possible after the initial setting of cement. This shall be without extra cost.

13. **CPM CHARTS AND BAR CHARTS**

For CPM and BAR charts, refer General Condition no. 19 to 21 .

SECTION-I**EXCAVATION EARTH WORK, CUTTING OF TREES AND
ANTITERMITE TREATMENT****1. SITE CLEARANCE**

Before the start of the work, the areas of the plot shall be cleared of all shrubs, vegetation, grass, bush, wood shrubs stumps, trees and saplings of girth upto 30 cm measured at a height of 1 mtr. above ground level (in case of trees and saplings included under this clause the contractor shall get such trees and saplings marked by the Architect / Project Director and approval obtained in writing before these are cut and cleared). If, any extra excavation is carried out due to moving of wood shrubs stumps and trees shall be filled with good earth by the Contractor without any extra cost to AWHO. All the building shall be laid out to ensure that the layout plan fits at the site. After completion of the work, the entire area of the plot shall be cleared from all debris, unwanted materials and level/slope of ground as required at site upto peripheral roads. The debris and unwanted material shall be disposed off away by the contractor from AWHO plots without any extra cost to AWHO.

2. SITE LEVELS

After site clearance and before commencement of excavation or filling, the contractor shall take levels at maximum 3 metres intervals in either directions or at lesser intervals as considered necessary at site for the entire plot. A record of these levels shall be signed jointly by the Contractor, Architect and Project Director. These records shall be kept by the Project Director and forwarded to Head Quarter, AWHO in duplicate.

3. SETTING OUT OF WORKS

The contractor shall set out the works and shall provide and fix all setting out apparatus required and solely be responsible for the true and perfect setting out of all works and for the correctness of the position, levels, dimensions and alignment of all buildings as per the drawings. The contractor shall take in writing the approval of the Architect and Project Director for setting out and levels before starting the works. These approvals shall be recorded in the stage passing register and signed by the Architect and contractor and countersigned by the Project Director.

4. BENCH MARK

The contractor shall erect adequate numbers of permanent Benchmarks by way of masonry pillars or burjies at locations approved by the Architect / Project Director, before commencing the work, from which exact levels of all floors shall be determined. These shall be retained till such time as decided by the Architect / Project Director and all marking on these shall be painted with white / red colour, which shall be maintained for required duration of the project.

5. CLEARANCE FROM LOCAL AUTHORITIES

The contractor shall intimate to the Architect and Project Director on completing structure of each block / buildings upto plinth level and shall commence further construction of superstructure only after getting permission from the Architect / Project Director in writing, as it is essential to obtain necessary clearance from the local authority at this stage, before proceeding with further construction, failing which the contractor shall be solely responsible to pay all the penalties levied, if any by the local authorities. The contractor will assist the Architect for obtaining the necessary clearance from the local authorities.

6. **SURFACE DIGGING**

The surface area to be occupied by the buildings shall be cleared of all the debris shrubs, plants and grass and there after excavated if required to an average depth of 15 cm. including 3 metres all round the building including ramps. All roots and organic material shall be cleared from the filling area inside the buildings.

7. **EXCAVATION FOR FOUNDATION**

- a) Earthwork in excavation in any type of soil and rock for foundation of columns and raft foundation shall be carried out as indicated in the drawing and cost of the excavation work in soil and rock is included in the lump sum offer of all work as specified in schedule 'A' part 'I' of the contract.
- b) Existing ground levels with contour plan have been mentioned in the drawings of site plan. The levels recorded are in relation to the permanent bench mark and temporary bench mark as indicated and shown in drawings.
- c) Excavation shall be carried out to such lines and levels as may be necessary to allow for the proper construction of the works, including the provision of adequate working space for fixing shuttering, planking and other operations required for the execution of the works. Excavation in foundations will include all operations as may be necessary to ensure the stability of the works and also such that surrounding ground and all structures, personnel and plant will be secured against damage, risk or injury. The contractor shall thoroughly consolidate the bottom of all excavations by watering & ramming before construction and excavations have to be kept free of outside water by making open drains, if necessary, which are to be maintained till required and then refilled. The excavation is to be kept free at all times from storm water, percolating water by pumping, bailing or other means.

NOTE: No extra payment shall be admissible on account of type of soil, sub soil strata or due to encounter of sub soil water during execution of work. The contractor shall not be entitled for any extra payment, if the hard rock is found in excavation of foundation.

- d) For lump sum offer of all clusters of Schedule 'A' Part-I, the depth of excavation for columns and walls from existing ground level and from finished levels of stilts shall be based on the levels given in sub paras (e), (f) and (g) below.
- e) Finished level of stilt floor of all clusters shall be as per drawing.
- f) Finished floor level of lobby and stilt area of each block shall be as per drawing.
- g) Immediately after excavation of the foundation work and before covering the same, the record of the following levels as actually executed at site separately for each block shall be recorded in the measurement books and jointly signed by the Architect, Contractor and Project Director and record kept with the Project Director.
 - i) Existing ground level.
 - ii) Level of bottom of lean concrete of column foundations.
 - iii) Finished floor level of lift lobby as well as separately of stilt area.
 - iv) Finished ground level.
- h) If trenches or foundations are excavated beyond the specified dimensions due to bad workmanship of contractor, the extra excavation shall be filled with lean concrete 1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate 40 mm nominal size) without any extra cost to the employer (AWHO). If any weak/loose soil pocket found under the PCC level that shall be removed and filled with lean concrete 1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate 40 mm nominal size) without any extra cost upto the depth of loose pocket.

7.1 Soft/Loose Soil, Hard/Dense Soil, Soft/Disintegrated Rock and Hard Rock

(i) Where soft/loose soil, hard/dense soil, soft/disintegrated rock and hard rock are mixed, the measurement for the total quantity shall be made by taking levels of the ground as directed by PD and the total quantity of excavation shall be computed from these levels. The soft/disintegrated rock and the hard rock excavated shall then be stacked separately and measured in stacks. The quantity of soft/disintegrated rock and hard rock so measured shall be reduced by 50% to allow for voids. These reduced quantities of soft/ disintegrated rock and hard rock shall only be admissible for payment under item of excavation of soft/disintegrated rock and hard rock respectively. From the total qty of the mixture the quantity of soft disintegrated rock and hard rock excavated thus arrived and shall be deducted to work out the quantity of soil i.e. soft/loose/hard dense soil excavated.

(ii) Where only soft /disintegrated rock and hard rock are mixed, the measurement for the total quantity shall be made by taking levels of the ground as directed by PD and the total quantity of the excavation shall be computed from these levels. The hard rock excavated shall then be stacked and measured in stacks. The quantity of hard rock so measured shall be reduced by 50% to allow for voids. This reduce quantity of hard rock shall only be admissible for payment under item of excavation of hard rock. From the total quantity of the mixture, the quantity of hard rock excavated thus arrived at, shall be deducted to work out the quantity of soft/disintegrated rock excavated.

(iii) All excavation shall be measured in successive stages of 1.5 **metres** depth starting from the commencing level. In case of excavation in rocks, if the depth of successive stage slightly exceeds 1.5 **metres** the levels shall be taken at that stage but excavated rock though obtained from this deeper depth, shall be measured in the previous successive stage only.

(iv) Hard rock obtained from excavation shall become property of the contractor for which he will be charged @ Rs 500/- per cum. The method of measurement shall be as laid down in Section 2 of DSR-2021. The measurement shall be properly recorded in MB and signed by the Project Director and Contractor.

(v) In case of any dispute with regards to the classification of various strata and their depth, the decision of Accepting Officer will be final and binding.

8. ANTI-TERMITE TREATMENT

a) This shall be provided as specified in IS: 6313 (Part II) for pre-construction soil treatment with any of the following chemicals:-

S.No .	Chemical	Concentration by weight (%)
i)	Chlorpyriphos emulsifiable concentrates	1.00
ii)	Chlorodane emulsifiable concentrates conforming to IS: 2682 - 1966	1.00

b) "The work of anti-termite treatment shall be got executed by a specialist firm/contractor. In case contractor opt to carryout Anti termite treatment themselves, they have to prove their capability and expertise to the satisfaction of Architect / Project Director. Anti termite treatment shall be carried out as per IS : 6313 (part IT) of 1981 for pre-construction soil treatment. The firm shall render a Ten Year guarantee to the Employer. The period of ten year shall be reckoned from the date of completion of the contract. The contractor shall give the guarantee on Non-Judicial stamp paper of value of Rs. 100/- as per Appendix 'D' & 'E'. The contractor also shall give the Guarantee on a Non-Judicial stamp paper of value of Rs. 100/- as per Appendix 'E'. Bank guarantee shall be @ Rs. 1/- per Rs. 4000/- of contract value for Ten years and shall be released 50% after completion of 5 years and remaining 50 % after 10 years.

c) The work of anti termite treatment shall be got executed by following firms and approved by Project Director:-
 i) Pest Control India Ltd.
 ii) Pestokem In Plot-Devtries Pvt. Ltd., Mumbai

9. PLINTH FILLING

Earth obtained from excavation (excluding rock) or approved earth brought from outside (for which no extra payment shall be made) shall be filled in layers not more than 20 cms in depth at a time, spread levelled, watered and well consolidated around foundations, under floors and other locations. The earth used for filling shall be free from all grass, roots, debris etc. In case extra earth filling is required for under floors, open to sky area (under plinth protection and entrance court etc.) within the perimeter of the block, the contractor will do so at their own cost. The lump sum offer shall be deemed to include the earth filling required under floors for the locations indicated here in before and upto the levels as worked out as per para 7 here-in-before and as directed at site by Architect and Project Director.

10. DISPOSAL OF SURPLUS SOIL/SOFT ROCK

Surplus soil/earth/soft rock, if any, shall be disposed off without any extra cost within the site of AWHO / outside of AWHO site of any lead as directed by the Architect / Project Director. The same shall be spread out evenly without any extra cost to AWHO and excess if any, shall be disposed off outside AWHO's site without causing any inconvenience to the local population. The Contractor should ascertain suitable area for disposal of surplus soil and the cost shall be deemed to be included in the lump sum quoted rates.

11. DISPOSAL OF HARD ROCK OBTAINED FROM EXCAVATION

Hard rock obtained from excavation shall be broken as per directions of Project Director. All hard rock excavated in foundation shall be stacked separately in well compacted stacks on a levelled ground. Stack shall not be less than average one metre height. While stacking rock, bottom stones shall be stacked on their natural beds and not made to stand in such a way as to create any voids. Regarding method of stacking instructions of Project Director and Architect shall be followed. Deduction of 50% shall be made from each stack for voids to derive the quantity of solid content. The hard rock obtained from excavation shall be made property of the contractor for which contractor shall give credit @ **Rs. 500/-** per cum of solid content as measured and recorded in M.B. However, regarding incorporation of such hard rock stones in the work, the decision of the Project Director and Architect shall be final. Surplus quantity shall be removed by the contractor away from the site at his cost. **Blasting for the excavation of hard rock is NOT PERMITTED.** Contractor shall use other standard methods as approved by the Project Director.

12. STONE PLOT-DEVT FILLING

- a) 40mm thick layer of stone filling under floor of ground floor (plinth) shall be provided as shown in drawings in the area where there is no basement. This shall be dry stone watered and consolidated including dressing and levelling.
- b) Black cotton soil obtained from excavation shall not be filled in the plinth. The back filling under floors and other locations shall be carried out with the approved earth brought from outside. The lump sum offer shall be deemed to include the earth filling required under floors and other locations instead of filling with black cotton soil.

SECTION - II
CONCRETE (PLAIN AND REINFORCED)

GENERAL

1. DESCRIPTION

- a) The section covers the requirements for the furnishing of cement concrete work including materials, proportioning, batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast-in-situ reinforced concrete.
- b) Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, water with or without admixtures as approved, proportioned and mixed as specified herein.

2. APPLICABLE CODES AND STANDARDS

The codes and standards generally applicable to the work of this section but not limited to those listed hereinafter including latest corrections and revisions.

IS:269	Ordinary and low heat Portland cement.
IS:383	Coarse and fine aggregate from natural sources for concrete.
IS:455	Portland slag cement.
IS:456	Code of practice for plain and reinforced concrete.
IS:516	Methods of test for strength of concrete.
IS:1199	Methods of sampling and analysis of concrete.
IS:1838	Preformed fillers for expansion joints in concrete non-extruding and resilient type.
IS:1946	Codes of practice for use of fixing devices walls, ceilings and floors of solid construction.
IS: 2386 (Part-I, II & III)	Methods of testing of aggregates.
IS:2645	Integral cement water proofing compounds.
IS:3414	Code of practice for design and installation of joints in building.
IS:3535	Methods of sampling hydraulic cement.
IS:3558	Code of practice for use of immersion vibrators for consolidating concrete.
IS:4031	Methods of physical tests for hydraulic cement.
IS:4032	Methods of chemical analysis for hydraulic cement.
IS:4082	Recommendations on stacking and storage of construction materials at site.
IS:1542	Specification for sand for plaster.
IS:1838	Performed filler for expansion joints in concrete non-entruding and resilient type.
IS:2116	Specification for sand for masonry mortar.
IS:8112	Specification for 43 grade Ordinary Portland Cement.
IS:6925	Methods of test for determination of water soluble chlorides in concrete admixtures.
IS:7861 Part- I	Code of practice for extreme weather concreting.
IS:7861 Part-II	Code of practice for hot weather concreting.
IS:9102	Admixture for concrete.
IS:456-2000	Water for mixing concrete clause 5.4.

3. **MATERIALS**

a) **CEMENT**

Cement shall not be issued under Schedule 'B'. The contractor shall procure cement from any one or more approved manufacturers as given in the list of approved makes/manufacturers. Cement to be used in all types of RCC, design mix and allied works shall be Ordinary Portland Cement (OPC) 43 grade conforming to IS: 8112-1989 or Pozzolana Portland cement (PPC) 53 grade conforming to IS 1489 Part-I / Part-II. The Contractor shall produce Test Certificate of design mix for OPC and PPC separately, from approved Testing Laboratories. Fly ash content shall not be mixed in case of PPC being used in R.C.C. work. The Contractor shall procure cement for all sections of Schedule 'A' required for this contract as the work proceeds at site.

Cement shall be procured by the contractor from any one or more approved producers of cement as given in the list of approved makes/manufacturers. However the contractor will intimate Project Director well in advance that he intends to use cement of a particular make & manufacturer. As far as possible only one make of cement shall be used in a block. In case of unavoidable circumstance prior intimation/permission from the Project Director will be obtained.

The particulars of the approved manufacturer / supplier of cement along with the date of manufacture and test certificate shall be produced by the contractor for every lot of cement separately. The documents in support of the purchases of cement shall be produced before the Architect / Project Director for verification.

b) **FINE AGGREGATE (SAND)**

- i) Fine aggregate for all concrete work shall be superior sand and /or river sand, complying with the requirement as specified at clause 3.1.3 of CPWD specifications. Sand in Zone-II grading may also be permitted provided mix design is done and the requisite strength of the concrete is achieved. Contractor must provide samples of fine aggregate he proposes to use, well in advance to the Architect/Project Director. Approved samples will be kept in the site office of AWHO and the contractor. However, for all concreting work, the percentage of coarse sand (River sand) in fine aggregate shall not be less than 80%. The balance may be coarse crushed metal sand in fine aggregate not exceeding 20%.
- ii) In case of non availability of river sand, use of 100% coarse crushed metal sand in fine aggregate may be permitted for all concrete works provided mix design is done and the requisite strength of the concrete is achieved. Contractor must provide samples of coarse crushed metal sand in fine aggregate he proposes to use, well in advance to the Architect/Project Director. Approved samples will be kept in the site office of AWHO and the contractor. Crushed stone Plot-Devt (M-Sand) manufactured hard rock and conforming to IS 2116 can only be used.
- iii) The coarse crushed metal sand should not have fine Plot-Devt (passing through sieve size 150 micron) exceeding 4%.

c) **COARSE AGGREGATE**

Coarse aggregate shall be crushed stone aggregate and shall conform to specifications given on clause 4:1:1 of CPWD specifications 2009. However in case of controlled quality concrete the provisions made in IS-456-2000 shall be applicable. Where due to less thickness of concrete the use of 20mm graded aggregate is not possible, the aggregate shall be of 12.5mm grading as specified in clause 4:1:1:3 of CPWD Specifications without any price adjustment. Contractor must provide samples of Coarse Aggregate he proposes to use, well in advance to the Architect/Project Director. Approved samples will be kept in the site office of AWHO and the contractor.

- d) Water used in concrete, masonry work, plaster and curing, shall be potable, clean, fresh and non-saline according to relevant IS. Water samples should be got tested before use and during the progress of work, if required, by the Architect/Project Director. Cost of testing charges including transportation shall be borne by the contractor. This Test shall be conducted within minimum every 6 (six) months or earlier if deterioration in water quality is suspected, as directed by Architect and Project Director.
- e) Steel Reinforcement shall be as specified in Particular Specification Part I-A Section VI. After the reinforcement is placed in position, it shall be inspected by the Architect & Project Director before it is covered up. Fabrication shall be accurately done to the dimensions, spacing and minimum cover as per drawings and binding done with structural gauge annealed steel wire. Cement mortar (1:2) cubes with MS binding wire of thickness 0.9 mm embedded for tying with reinforcement, mild steel chairs or spacer bars shall be used in order to ensure accurate positioning of reinforcement.

4. TESTING OF CEMENT

- a) The contractor shall submit the manufacturer's test certificate in original along with the Test Sheet giving the result of each physical test as applicable and the chemical composition of the cement or authenticated copy thereof, duly signed by the manufacturer with each consignment clearly bringing out lot No. The Architect/Project Director shall record these details in the cement acceptance register as given in Annexure 'A' hereinafter after due verification. The Architect/Project Director shall also organise independent testing of random samples of cement (both physical and chemical properties) drawn from various lots for each consignment to cement brought out by the contractor before incorporation in the work from the National accreditation Board for testing and calibration accredited labs/reputed Lab approved by Project Director as per IS: 3535-1986 (Method of sampling Hydraulic cement), IS: 4031 (Method of physical test for Hydraulic Cement), IS: 4032-1985 (Method of chemical analysis of Hydraulic cement.), IS 8112-1989 (Ordinary Portland Cement) and IS 1489 Part-I/Part-II (Portland Pozzolana cement)
- b) Following mandatory tests shall be carried out under the direction of Project Director for cement procured by the Contractor and expenditure should be borne by the contractor.
 - i) Initial and final setting time
 - ii) Soundness test
 - iii) Compressive strength test at 3, 7 & 28 days as specified in relevant IS code.
 - iv) Design mix of cement of that particular brand is to be used for R.C.C.
- c) The cement shall conform to chemical requirements and physical requirements as specified in clause 4 & 5 respectively of IS: 269-1976. The tests carried out as per provisions of IS codes specified herein before shall be the criteria for acceptance of cement by Project Director. If samples from a lot/lot are not within the acceptance limits of Indian standard the lot/lot shall be rejected without any claims or compensation to the contractor for the lot/lot purchased. The contractor shall replace the lot/lot with the fresh one, which shall be tested again for acceptance. The cost of all tests carried out on each make of cement before acceptance for incorporation in the work shall be borne by the contractor whether the results are acceptable or not.

5. STORAGE OF CEMENT

Cement in bags shall be stored in a shed or godown over dry platform at least 30cm high in such a manner as to prevent deterioration due to moisture or intrusion of foreign matter. In case of storerooms, the stock should be at least 20cm above from floors and 45 cm away from walls in addition to precautions specified in clause 3.1.2.6, of CPWD Specifications. It shall be ensured by the Architect/Project Director that tested and untested cement are segregated and stored separately with distinct identification. The cement godown shall be provided with two locks on each door. The key of one lock at each door shall remain with the Project Director or his representative and that of the other lock with the contractor's authorised representative at site of works so that cement is removed from the godown only according to daily requirement with the knowledge of both the parties

6. ACCEPTANCE OF CEMENT AND DOCUMENTATION

The contractor shall submit original purchase vouchers from the supplier for the total quantity of cement supplied under each consignment to be incorporated in the work. All consignments received at the work site shall be inspected by Architect/Project Director along with the relevant documents before acceptance. The original purchase vouchers and the Test Certificates shall be defaced by the Project Director and kept on record in the office of Project Director duly authenticated and with cross-reference to the control number in the cement Acceptance Register. The cement Acceptance Register will be signed by Architect/Project Director and the Contractor. The entire quantity of all types cement shall also be suitably recorded in the Measurement Book for record purpose not to be abstracted before incorporation in the work and shall be signed by the Architect/Project Director and the contractor.

7. SCHEDULING OF SUPPLY OF CEMENT

Schedule of procurement of cement shall be finalised by the contractor with Project Director and shall be incorporated in the CPM chart so that procurement is in accordance with the progress contemplated in the CPM prepared. The complete requirement of cement shall be worked out before making any RAR payment and procurement of cement by the contractor shall be completed sufficiently in advance of the execution of work.

8. CEMENT CONCRETE MIX COMPOSITION

Mix of cement concrete/reinforced cement concrete required to be used in various location/situation shall be as under irrespective of what is mentioned in drawings.

a)	Lean concrete under column Footings / Raft / brick masonry walls / Entrance Steps.	PCC 1:4:8 (1 cement: 4 coarse sand: 8 graded stone aggregate 40mm nominal size)- 20 mm stone aggregate for below Raft and rendered smooth.
Note: In case of PCC 1:4:8 in lean concrete with 20 mm stone aggregate for below Raft / Basement parking etc., RMC may be permitted from batching plant at site or from outside source approved by Project Director / Architect.		
b)	Under flooring at ground floor and stilts.	PCC 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 40mm nominal size).
c)	Sub floor (base concrete under floor finish) in sunken at upper floors and stilts.	PCC 1:5:10 (1 cement : 5 coarse sand : 10 brick aggregate 40 mm nominal size)
d)	Cement concrete for hold fast blocks for joinery, fixing of railings & grills above brick work / parapet and filling/ encasing for rain water pipes (wherever shown as concealed) from terrace & balconies wherever PCC is mentioned on drawings and mix of PCC is not specified.	PCC 1:3:6 (1 cement :3 coarse sand: 6 graded stone aggregate 12.5mm nominal size)

e)	Cement concrete in DPC	PCC 1:2:4 (1 cement :2 coarse sand : 4 graded stone aggregate 12.5 mm nominal size)
f)	All Reinforced cement concrete in raft and footings, staircases, lintels, chhajjas, slabs, beams, mouldings, paragolas, parapet, bands, over head water tank etc.	M-25 design mix (controlled quality concrete).
g)	All Reinforced cement concrete in columns, shear walls, lift walls, other walls etc.	M-30 (controlled quality concrete) design mix.
h)	The mix 1:2:4 shall conform to M-15	As per IS 456-2000 for the purpose of testing and acceptance based on 28 days strength.
j)	Under ground Water Tank complete	M-25 (controlled quality concrete) design mix.
k)	Unless otherwise mentioned elsewhere, all RCC work in buildings covered under Schedule 'A' Part- I shall be M- 25 Design Mix concrete.	
l)	Beam - Column Junctions: - In case of Beam - Column Junctions, the grade of concrete to be used shall be the richer mix out of both the structural elements as specified in drawings. At all such junctions concrete in total area of $(L+600) \times (B+600)$ shall be of richer mix to full depth. This area includes column area and 'L' and 'B' are Length and Breadth of the respective column.	

9. Maximum water cement ratio for nominal mix of various grades of plain/reinforced concrete shall be as per Table 5 and 6 of IS-456-2000.

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11. PREPARATION BEFORE CONCRETING

- a) All chutes, through pipes and other placing equipment shall be kept clean & free from casting of hardened concrete by cleaning and thoroughly flushing with water after each run and the water used for flushing shall be discharged clear of the concrete already in place.
- b) Pre-moulded cement cubes etc. as para 3(e) above or plastic blocks will be placed between formwork and reinforcement to achieve uniform cover of concrete.

12. APPROVAL BEFORE CONCRETING

Contractor will get the supporting & shuttering system inspected by Project Director / Architect. No concreting shall be carried out by the contractor unless the Architect/Project Director has inspected the reinforcement work, and certified in writing that concreting may proceed. Any concrete poured without such prior written approval shall be rejected and removed by the contractor at his own cost.

13. DESIGN MIX CONCRETE

Where the concrete is specified by grade i.e. M-25, M-30 and M35 the same shall be design mix. The design concrete mix shall be as per IS 456: 2000, IS-10262-1982, SP-23 (S &T) 1982 and as specified hereinafter. Design Mix M-25, M-30 and M35 shall be carried out on recommended guide lines for concrete mix design with following stipulations. However additional expenditure for Design Mix and testing of the same shall be borne by the contractor for each make of cement. Thereafter, in case the quality of the material / water is changed (other than that considered for mix design), fresh mix design shall have to be obtained by the Contractor.

a)	Grade of Concrete	M-25, M-30 and M35
b)	Characteristic compressive strength compliance requirement	As per IS-456: 2000 Table 11
c)	Type of cement	Ordinary Portland Cement 43 grade as per IS 8112 or Pozzolona Portland cement as per IS 1489 Part-I/Part-II
d)	Maximum size of aggregate	i) 20mm (Crushed aggregate) for sections more than 75 mm ii) 10mm (Crushed aggregate) for sections less than or equal to 75mm
e)	Type of exposure	Moderate: as per IS-456:2000 Table 3
f)	Maximum water cement ratio	As per IS- 456:2000
g)	Degree of quality Control	Very Good (Refer table 40 of SP23-1982)
h)	Degree of workability	As per IS- 456: 2000
i)	Minimum quantity of cement	Irrespective what is mentioned the quantity of minimum cement consumption in concrete shall be as under :- a) M-20 : 280 Kg/cum b) M- 25 : 300 kg/cum c) M- 30 : 320 kg/cum d) M -35 : 340 kg/cum

Note: - Mix 1:2:4 (nominal) wherever mentioned in this work, shall confirm to M-15 as per IS 456-2000 for the purpose of quoting and acceptance based on 28 days strength.

14. At the time of tendering, the contractor shall take into account the type of aggregate, plant and method of casting, the intent of use, designed water cement ratio which is essential to achieve the strength requirement specified and will produce workability which will enable concrete to be properly compacted for its full depth.
15. Actual proportion of cement, aggregate and water to obtain the required strength shall be determined by preliminary tests. The water cement ratio may be reduced in the trial mix design but not increased.
16. **All RCC work unless otherwise specifically mentioned shall be M-30/M35 (Design Mix).** If actual quantity of cement used as per mix design is more than the above minimum required, no price adjustment shall be made. Architect/Project Director shall maintain a record of actual consumption of cement in a proper register and initial the entry for every change in quantity of material. Contractor has option to procure and incorporate concrete manufactured by approved Ready Mix Concrete (RMC) suppliers. The details are given in subsequent paras.
 - 16.1 In case the quantity of cement consumption varies in the design mix approved by the accredited laboratory then the following actions are to be taken:-
 - a) If the quantity of cement in approved design mix is less than minimum quantity as specified in Para 13 (i), even then the minimum specified quantity of cement will have to be used.
 - b) If the quantity of cement in approved design mix is more than minimum quantity as specified in Para 13 (i), then the approved quantity of cement is to be used and nothing extra will be paid on this account.
 - c) Samples of all materials used for design mix must be kept in the sample room of the Project Director at site (duly identified).

17. As soon as possible, after receiving the order to commence the work, the Contractor shall procure sufficient quantities of the aggregate and cement samples for testing and mix design. The optimum mix to achieve the target mean strength shall be determined in the laboratory Conditions and the Concrete shall conform to relevant IS Specification. Design mix shall be done from NABL accredited Lab/reputed laboratory approved by Project Director. Cost of materials and transportation and testing charges are to be borne by the Contractor and same shall deem to be included in the rates quoted by the Contractor. Details/results of trial mixes from the National accreditation Board for testing and calibration accredited labs/reputed Lab approved by Project Director along with their recommendations regarding quantities of cement, water, sand and coarse aggregates to be used in the work to achieve requisite strength in the field at 28 days shall be submitted by the contractor to the Project Director.
18. The approval of the Project Director will not absolve the contractor of his responsibilities to obtain the required minimum strength of concrete at any stage.
19. Contractor's lump sum rates quoted shall include for the above provisions and as brought out here-in-after. Further, in case there is any change in source of local materials viz. sand/aggregates or grade of cement etc., the procedure here-in-before shall be repeated.
20. In proportioning design mix concrete, the quantity of both cement and aggregate shall be determined by mass and all in accordance with clause 9.2 and sub clauses thereon of IS 456-2000 as applicable. All the materials shall be tested at a frequency as laid out in relevant IS. Use of weigh batcher is compulsory for all grades of concrete.
21. BLANK

22. BATCHING PLANT

For mixing of quality concrete at site as per design mix, computerized automatic batching plant of minimum capacity 25-40 cum per hour while execution shall be used. Volumetric mixing for controlled quality concrete shall not be permitted.

23. AUTOMATIC BATCHING PLANT:

All cement concrete work e.g. in footing, raft, walls, columns, beams slabs etc. shall be from automatic batching plant installed at site with tested and calibrated water meter, control panel and of capacity 25-40 cum/hr or as required. For smaller quantities i.e. for concreting to lintels, chhajjas, shelves etc. mechanical mixtures may be used with approval of Project Director and Architect and mixing of concrete shall be as per clause 10.3 of IS: 456-2000. The type of batching equipment selected for use shall be subject to the approval of Architect and Project Director. The Contractor shall establish the batching plant / plants at the site or obtain RMC from outside or utilize both options from time to time as required for timely completion of the work.

23.1 REQUIREMENTS OF WEIGH BATCHING EQUIPMENTS:

- a) In Design Mix concrete, the quantity of cement and aggregate shall be determined by weight. In no case volume batching of aggregates based on weight- volume conversion in the mix design shall be allowed. Water shall be either measured by volume in calibrated tanks or weight. Due care shall be given to adhere to maximum free water cement ratio indicated in IS 456-2000. All measuring equipment shall be maintained in clean serviceable condition and their accuracy periodically checked. In this connection also refer clause 4.2.3 & 4.2.4 of CPWD Specifications.
- b) All measuring and weighing equipment, forming part of the weigh batchers shall conform to the following requirement:

- i) The accuracy of the weighing equipment shall be such that the combined inaccuracies in feeding and measuring during normal operations will not exceed one and half percent for water or weighed cement, 10 percent for admixtures if used, 2 percent for sand, 20mm, 40mm aggregates and 3 percent for 75mm aggregates generally. If no other specifications are laid out, the accuracy of the batching equipment shall be such that the indicated weight of any hopper will not vary more than 1 percent from the true weight.
- ii) Each unit shall be provided with a batch counter, which shall preferably be attached to the cement batcher to record the number of batches delivered. A totalizing device shall also be provided to record the total number of batches mixed by all units in the plant.
- iii) The batching plants, each set of units for measuring all of the materials delivered to one or more mixers shall be provided with an accurate combined autographic recorder for making a continuous visible record on a single chart of the measurement of each separate materials including all mixing water and admixture is used. This recording equipment shall include facilities for automatically registering on the chart the time of day at intervals of not more than 15 minutes and shall be designed for simplicity in operation and maintenance.
- iv) The equipment shall be designed to permit ready and proper adjustment of the proportions of the mix and to compensate for varying weight of moisture contained in the aggregates.
- c) Quantity of concrete mixed in any one batch shall not exceed the rated capacity of the mixer. The whole of the mixed batch shall be removed before adding new batch. Concrete mixed above shall not be modified by addition of water or otherwise in order to facilitate handling or for any other purpose.
- d) On cessation of work and other stoppage exceeding 20 minutes, the mixer and other plant used for the wet mix shall be thoroughly washed with clean water. Pick up and throw over blades in the drums of the mixer, which are worn down 20mm or more in depths shall be replaced with new blades.
- e) In proportioning design mix concrete, the quantity of both cement and aggregate shall be determined by mass and all in accordance with clause 9.2 and sub clauses thereon of IS-456-2000 as applicable. The mix design shall be revised with change in properties of cement and aggregate. All the materials shall be tested at a frequency laid down in relevant IS. Use of weigh batcher is compulsory for all grades of concrete. The Contractor shall ensure that concrete is manufactured under computer-controlled operations and pumped and placed at site using sophisticated equipments and methods. For that the various operations of production of concrete like weigh batching of all ingredients, adjustment for moisture, water cement ratio control, admixture dose if required, auto timer for mixing, delivery slips etc shall be fully computerized. This record of quality assurance shall be submitted to the Project Director and shall be kept on record. Fully automatic batching plant shall conform to relevant IS and shall be of standard make as approved by Project Director. The concrete produced from the batching plant shall be pumped using pumps of suitable capacity. Admixtures / plasticizers of make as given subsequently can be added (as per design mix) to make concrete plastic for facilitating pumping.

24. POURING AND CONSOLIDATION:

- a) The layers of concrete shall be placed that the bottom layer does not finally set before the top layer is placed. The vibrators shall maintain the whole of concrete under treatment in an adequate state of agitation, such that de-aeration and effective compaction is attained at a state, commensurate with the supply of concrete from mixers. The vibrator shall continue during the whole period occupied by placing of concrete, the vibrators being adjusted so that the centre vibrations approximates to the centre of the mass being compacted at the time of placing. Shaking of reinforcement for the purpose of compaction should be avoided. Pouring of concrete and compaction shall be completed before initial setting starts i.e. within thirty minute of addition of water to the dry mixture. Care shall be taken to ensure that concrete is not over vibrated so as to cause segregation.

- b) The concrete shall be deposited in its final position in a manner to preclude segregation of ingredients. In deep trenches and footings, pile cap concrete shall be placed through chutes. In case of concreting of slabs and beams, it shall be by pumping concrete and wherever permitted, manually, by Architect / Project Director, wooden planks or cat walks supported directly on the centering by means of wooden blocks or lugs shall be provided to convey the concrete to the place of deposition without disturbing the reinforcement in any way. Labour shall not be allowed to walk over the reinforcement.
- c) Pre-moulded cement cubes or plastic blocks will be placed between form work and reinforcement to achieve uniform cover of concrete.
- d) Before pouring of concrete contractor should notice and remove or cover it any gaps by providing and laying PVC sheet of suitable size over shuttering / form work of slab to make it fully water tight and to avoid loss of cement slurry and water from the concrete.
- e) Where the shape of element is such that form work has re-entrant angles, the form work shall be removed as soon as possible after the concrete has set to avoid shrinkage cracking occurring due to the restraint imposed.

25. PLACING CONCRETE BY PUMPING METHODS

Concrete conveyed by pressure through either rigid pipes or flexible hoses and discharged directly into the desired area is termed as pumped concrete. The method of conveying the concrete through pipelines is dealt within these specifications.

Method of applying pressure to concrete is by pumps. Pumps to be used shall be either of the two types of method below:

- a) Piston type pumps
- b) Squeeze pressure type pumps

Piston pump to be used in the works shall consist of a receiving hopper for mixed concrete an inlet valve, an outlet valve and the pump shall be a twin-piston pump. The two pistons shall be so arranged that one piston retracts when the other is moving forward and pushing concrete into the pipe line to maintain a reasonably steady flow of concrete. Single piston pumps shall not be acceptable.

Inlet and outlet valves shall be anyone of the following types:-

Rotating plug type sliding plate type guided plunger type swing type flapper type or any combination of the above.

The pistons shall be mechanically driven using a crank or chain or hydraulically driven using oil or water.

The receiving hopper shall have a minimum capacity of 1.0 cum and the hopper shall be fitted with re-mixing rotating blades capable of maintaining consistency and uniformity of concrete. The primary power for pumps may be supplied by gasoline, diesel, or electric motors. The primary power unit and the pump unit may be truck, trailer or skid mounted.

Squeeze pressure pumps shall consist of a receiving hopper fitted with a re-mixing blades. Re-mixing blades shall be such that these can push the concrete into the flexible hose connected at the bottom of the hopper.

The flexible hose shall pass through a metal drum around the inside periphery of the drum and come out through the top part of the drum.

The drum shall be maintained under a very high degree of a vacuum during operation. The drum shall be so fitted with hydraulically operation metal rollers, which when rotating, create a squeeze pressure on the flexible hose carrying concrete and forces the concrete out into the pipe line.

Effective range of pumps to be used in the work shall be decided by the Project Director, AWHO/Architect after studying the site conditions. However the minimum horizontal range shall not be less than 150 metres and minimum vertical range shall not be less than 50 metres.

Selection of pumps based on discharge capacity shall be decided by the Project Director, AWHO/Architect after studying the requirements for the project. Discharge capacity shall be worked out by the Contractor and approval obtained from the Project Director and Architect. As a guide line figure the Contractor may assume a discharge capacity of 15 cubic metre / hour / pump.

26. PIPE LINES

All concrete carrying pipelines shall generally be rigid pipe lines. Flexible pipe lines may only be used at bend curves in lines or at discharge ends if required. Placements of flexible units shall be done judiciously and connected to the pipe lines only when it meets the approval of the Project Director.

Rigid Line / Hard Line / Slick Line. Such Lines shall be made either of steel or plastic Aluminium alloy pipes shall not be used.

Minimum pipeline diameter shall be 100 millimetres and shall have normal maximum length of 3 metre in each section connected through couplers.

a) **Flexible Pipe Line** - Flexible pipe lines shall be made out of rubber or spiral wound flexible metal or plastic. The pipe shall again be such that they are in Sections of 3 metre length each and connected through couplers. These pipes shall be such that they are interchangeable with rigid lines while installing flexible units. Care shall be taken that there are no kinks in the pipeline, which is a normal tendency with these pipe having diameters 100mm and above.

Couplers to be used for connecting pipeline sections (either hard or flexible) shall have adequate strength to withstand stresses due to handling, misalignments poor support to pipe lines etc

For horizontal runs to pipes and for vertical runs up to 30-metre height the couplers shall be rated for a minimum pressure of 35 kg/cm square. Couplers used for rising runs between 30 metre and 50 metre heights shall have a minimum pressure rating of 50 kg/cm square. Couplers shall be designed to allow for replacement of any pipe section without displacing other sections. These shall provide for the full internal cross section with no constructions or service, which may disrupt the smooth flow of concrete. For pipelines of size 150mm and above, double logged type coupler with a thick rubber gasket and secondary wedge-take-up is recommended. Types of couplers that may be used shall be any of the following:

- Grooved end coupler
- One piece extended lever swing type
- Couplers and full flow oil line type couplers

b) Other Accessories

Other accessories which shall be catered for, are as under:

- Rigid and flexible pipes of varying lengths.
- Curved sections of rigid pipes.
- Swivel joints and rotary distributors.
- Pin and gate valves to prevent back flow in pipelines.
- Switch valves to direct the flow into another pipeline.
- Connection devices to fill forms from the bottom up.
- Splints, rollers, and other devices for protection of conduit over rock concrete. Reinforcing steel & form and to provide lifting and lashing points in the pipe line. Transitions for connecting different sizes of pipe sections.
- Air vents for downward pumping.
- Clean out equipment.

For concreting of columns, walls and scattered small placements, recommendation is made for special cranes or power controlled booms carrying pipelines with a pendant type concrete delivery hose.

27. LUBRICATING OF PIPE LINE

Before pumping concrete into the pipeline, the line shall be lubricated with a properly designed mortar/grout lubricant. This shall be ensured by starting the pumping operation with a properly designed mortar, or with a batch of regular concrete with the coarse aggregate omitted. The quantity of mortar required as lubricant is dependent on the smoothness and cleanliness of the pipelines. As a guide line, for a 100mm diameter pipe line of 100metre length, 0.08 cum to 0.10 cum of mortar should normally be adequate, but this shall not be taken as specified, and the Contractor shall establish his requirement.

The quantity of mortar that comes out of the delivery end of the pipeline shall not be used in place of the concrete work. However, with the approval of Project Director, this mortar may be used as bedding mortar against construction joints. The rest of the mortar shall be wasted.

Lubrication shall be maintained as long as the pumping of concrete continues.

Proper planning of concrete supply, pump locations, line layout, placing sequence and the entire pumping operation will result in savings of time and expense.

The pump shall be placed as near the placement area as practicable. The surrounding area of the pump shall be free of obstructions to allow movement of concrete delivery trucks. The surface must be strong enough to withstand the loaded trucks operating on it. If the surface is a suspended slab the truck route shall be adequately supported in consultation with the Project Director and Architect.

Pipe lines from the pump to the placing area shall be laid with minimum number of bends for large placement areas, alternate lines shall be installed for rapid connection when required. A flexible pipe at the discharge end will permit placing over a large area directly without re-handling of pipelines. The pipeline shall be firmly supported.

If more than one size of pipe is to be used, the smaller diameter pipe shall be placed at the pump end and the larger diameter at the discharge end.

When pumping downwards, an air release valve shall be provided at the middle of the top bend to prevent vacuum or air build-up. Similarly, while pumping upwards, a no-return valve shall be provided near the pump to prevent the reverse flows of concrete during the fitting of clean up equipments or when working on the pump.

It is essential that direct radio/telecommunication be maintained between the pump operator and the concrete placing crew. Good communication between the pump operator and the batching-plant is also essential. The placing rate shall be estimated by the pump operator so that concrete can be ordered at an appropriate delivery rate.

The pump shall be started for a check run and operated without concrete to ensure that all moving parts are in operation properly. Before placing concrete, the pump shall be run with some grout/mortar for lubricating the line.

When concrete is received in the hopper, the pump shall be run slowly until the lines are completely full and the concrete is steadily moving. A continuous pumping must be ensured, because, if the pump is stopped, concrete in the line may be difficult to move again.

When a delay occurs because of concrete delivery or some form repair works or for any other reason, the pump shall be slowed down to maintain some movement of concrete in the pipeline. For longer delays, concrete in the receiving hopper shall be made to last as possible by moving the concrete in the lines occasionally with intermittent strokes of the pump. It is sometimes essential to run a return line back to the J pump so that concrete can be re-circulated during long delays.

If after a long delay, concrete cannot be moved in the line, it may be necessary to clean out the entire line. However, quite often only a small section of pipeline may be plugged and required cleaning. The pump operator who knows such details as the length of line, age of concrete in the line etc, should be, dependent upon to aid in deciding the appropriate section to be cleaned.

When the form is nearly full, and there is enough concrete in the line to complete the placement, the pump shall be stopped and a "go-devil" inserted at the appropriate time so that concrete ahead of the go-devil shall be forced completion of the work. The go-devil shall be forced through the pipeline to clean it out. Use of water pressure is a safer method. The go-devil shall be stopped at the discharge end to ensure that water does not spill on the placement area. If air pressure is used extreme care shall be taken and the pressure must be carefully regulated. A trap shall be installed at the end of the line to prevent the go-devil being ejected as a dangerous projectile. An air release valve shall also be installed in the line to prevent air pressure build up.

It is essential to clean the line after concrete placing operation is complete. Cleaning shall be done in the reverse direction from the form work end to the pump-end where the concrete in the line can be dumped in a bucket. After removal of all concrete, all pipe lines and other equipments shall be cleaned thoroughly and made ready for the next use.

28. The Contractor shall obtain the approval of the Project Director and Architect in writing for the design mix of the controlled quality concrete to be used for the execution of work at site indicating the quantity of cement per cubic metre to be adopted.

29. READY MIX CONCRETE (RMC)

a) Structural work shall be of design mix concrete of grade M-25 , M-30 and M35 as specified here-in-before. The contractor has the option to use RMC of required design mix for slabs, beams, column, column footing etc. without extra cost to AWHO. Admixtures/plasticizers in the concrete may be used provided there is no increase in the stripping time of form work and durability is not affected. No extra payment shall be admissible on any account such as transportation, VAT/all types of taxes, handling, pumping, wastage, shrinkage and admixtures/plasticizers. **Only OPC 43 grade cement will be used by the RMC manufacturers.** The cement content for M-25 design mix shall have the minimum quantity of cement as per design mix or 300 Kg/cum whichever is more. The cement content for M-30 design mix shall have the minimum quantity of cement as per design mix or 320 Kg/cum whichever is more. If actual quantity of cement used as per design mix is more than the above minimum required, no price adjustment shall be made. Ready mix concrete (RMC) shall be produced from the Automatic Batching Plant installed at site. However, the contractor can procure RMC from approved manufacturers, given in list of approved Manufacturers, having fully automatic batching plants installed of capacity over 30 cum/hr with tested and calibrated water meter, control panel and provision for computer generated batch report all as per IS-4926 (amended upto date).

For the Procurement of RMC from outside, the contractor shall obtain written approval of the Project Director and Architect.

- b) The relevant details of Design Mix Concrete as specified earlier shall be applicable along with the following specific details for Ready Mix Concrete. The contractor shall use ready mix concrete (RMC) of grades as specified. RMC shall conform to the requirements as per IS-4926 (amended up to date) and IS 456-2000. However the stipulation of minimum cement contents as at para (a) above are to be strictly followed.
- c) BLANK
- d) In proportioning design mix concrete, the quantity of both cement and aggregate shall be determined by mass and all in accordance with clause 9.2 and sub clauses thereon of IS-456-2000 as applicable. The mix design shall be revised with change in properties of cement and aggregate. All the materials shall be tested at a frequency as laid out in relevant IS. Use of weigh batcher is compulsory for all grades of concrete. The Contractor shall ensure that concrete is manufactured under computer-controlled operations and pumped and placed at site using sophisticated equipments and methods. For that the various operations of production of concrete like weigh batching of all ingredients, adjustment for moisture, water cement ratio control, admixture dose if required, auto timer for mixing, delivery slips etc shall be fully computerized. This record of quality assurance shall be submitted to the Project Director and shall be kept on record. Fully automatic batching plant shall conform to relevant IS and shall be of standard make as approved by Project Director. The concrete produced from the batching plant shall be pumped using pumps of suitable capacity. Admixtures / plasticizers of make as given below can be added (as per mix design) to make concrete plastic for facilitating pumping.
- e) Specification for all materials / ingredients, etc as given earlier shall hold good for RMC.
- f) ADMIXTURE / Plasticizers: Admixtures / plasticizers @ not more than 1% of weight of cement at no extra cost to the AWHO may be used conforming to IS 9103-1999 (Revised) and shall be from any one of the approved Firms as given in the list of approved makes/manufacturers.
- g) Initial design mix from RMC manufacturer shall be submitted by the contractor in quadruplicate with complete data adopted for mix design along with test results of all materials and concrete. The initial mix design should take into account the aspects such as loss of workability and strength during transportation, till placement of concrete.
- h) RMC manufactured and supplied shall be in conformity with the initial design mix approved by the Architect/Project Director. Any change shall be made only with approval of Architect/Project Director after necessary revision in design mix.
- j) The contractor shall ensure that all facilities are made available by the manufacturer of RMC at the plant for the AWHO officials to inspect the materials incorporated, test carried out for all materials, concrete etc. Copies of all tests carried out for materials used / concrete shall also be made available to the Architect and Project Director.
- k) The concrete shall be transported in concrete transit agitators conforming to IS-5892.
- l) The concrete shall be delivered and placed by pumping using BOOMER and/or concrete pump. The decision as to whether the RMC can be placed by pumping or not shall be decided by Architect/Project Director whose decision shall be final and binding. The tenderer will have no extra claim on this account.
- m) The pump and pumping arrangement shall be inspected and approved by Project Director, while approving the RMC manufacturer.

- n) No water / admixture shall be allowed after initial mixing of concrete at the plant.
- o) Slump test shall be carried out at site by the Architect/Project Director in the presence of contractor and representative of RMC manufacturer. The concrete shall be placed in position within the designed initial setting time and at the end of initial setting time, the remaining concrete shall be rejected.
- p) In addition to the tests carried out by RMC manufacturer at the plant site, sampling and testing of concrete shall be carried out at the site before delivery as per IS-456-2000 by the Architect/Project Director along with the representative of the contractor and RMC manufacturer. However, the cost of testing shall be borne by the contractor. The concrete, which does not meet the requirement of acceptance criteria as per IS-456-2000 shall be rejected and the contractor shall make good the same at his risk and cost.
- q) The quality assurance records indicating following details duly signed by the competent representative of RMC manufacturer / contractor and Project Director shall be maintained.
 - i) Quantity and Grade of RMC
 - ii) Time of mixing
 - iii) Date of delivery at site.
 - iv) Time of delivery at site.
 - v) Quantity of cement used for cum of concrete.
- r) The contractor shall enter into an agreement with the approved RMC manufacturer to ensure compliance of above aspects. The overall liability to the AWHO, for the RMC supplied shall rest with the contractor only. The AWHO shall not be liable for any breakdown or problems with the RMC manufacturer.
- s) Workability: - The workability of concrete shall be checked frequently as per IS 1199-1959.

30. SAMPLING AND ACCEPTANCE CRITERIA FOR CONCRETE

The criteria for sampling and acceptance of the concrete shall be as per Para 15.1 to 16.1 of IS-456:2000, (Code of practice for plain and reinforced concrete). The minimum frequency for the work tests shall be as specified therein and as specified here in after.

31. TESTS

The following tests shall be carried out during the execution of work. Tests shall be carried out in accordance with IS-516 and IS-1199. The contractor shall provide all facilities and equipment for casting and curing of test cubes.

a) SLUMP TEST

The frequency of the test shall be decided by the Architect/Project Director. The lump for the vibrated concrete or pumped concrete shall be as specified in IS-456. The Project Director, however, reserves the right to vary the limit which will be ascertained at the time of deciding the mix design for each grade. Any batch from which a slump test is being made shall not be transferred to the places of laying until the slump in excess of the required for the particular batch is not removed from the site.

b) **COMPRESSIVE STRENGTH TEST**

- i) Three cubes shall be tested at 7 days and three at 28 days for crushing
- ii) For the purpose of subsequent identification of the work test cubes, the concrete to which these pertains shall be cross referred and record of this maintained and signed by the Architect/ Project Director and contractor or his authorized representative.
- iii) **Cement Boiling Test:** - Accelerated Compressive Strength Test as per IS 9013/78 shall be carried out to determine the quality of cement received at site in each consignment. The test result shall be recorded in register. These shall be signed and dated by the representatives of Architect, Contractor and Project Director and kept in the office of Project Director.

32. TRANSPORTING, PLACING, COMPACTION AND CURING

- a) It should be as per clause 13 of IS 456:2000. Concrete shall be transported without delay and incorporated in works at the position of laying within 20 minutes from the time of discharge from the mixer.
- b) Mixed concrete shall be deposited in final position and solidly packed around reinforcement, carefully poured and consolidated by means of portable vibrators or mechanically operated and of the kind as suitable for a particular situation as directed by the Architect/Project Director. Care shall be exercised that no voids or honey comb pockets are formed. In general, the concrete shall not be laid in position for more than 1 metre in height in one concrete operation. However, the exact height in one concrete operation shall be decided by the Project Director and Architect depending upon the arrangement of formwork, workability of concrete. The compaction of concrete in RCC roof and floor slabs shall be done with plate vibrators. The compaction of concrete in RCC roof and floor slabs shall be done with plate vibrator.
- c) Exposed surfaces of concrete shall be kept continuously in a damp or wet Condition by ponding or by covering with a layer of sack, canvas, Lenin, water sealing paint and kept constantly wet for at least 10 days. The concrete shall be protected from premature drying for at least 8 days after pouring and shall be cured as directed by the Architect/ Project Director for a period of not less than 10 days.
- d) All cement concrete work e.g. in footing, walls, columns, beams, slabs etc. shall be from automatic batching plant.
- e) The layers of concrete shall be placed such that the bottom layer does not finally set before the top layer is placed. The vibrators shall maintain the whole of concrete under treatment in an adequate state of agitation, such that de-aeration and effective compaction is attained at a state commensurate with the supply of concrete from mixers. The vibrator shall continue during the whole period of placing of concrete, the vibrators being adjusted so that the centre vibrations approximates to the centre of the mass being compacted at the time of placing. Shaking of reinforcement for the purpose of compaction should be avoided. Pouring of concrete and compaction shall be completed before initial setting starts i.e. within thirty minutes of addition of water to the dry mixture.
- f) The concrete shall be deposited in its final position in a manner to preclude segregation of ingredients. In deep trenches and footings, concrete shall be placed through chutes. In case of columns and retaining walls, the shutting shall be so adjusted that the vertical drop of concrete is not more than 1.5 m at time. A key of appropriate size shall be made at the end of each casting in concrete columns to give proper bonding to columns as per relevant IS / directions of the Architect and Project Director. In case of concreting of slabs and beams, wooden planks or cat walks supported directly on the centering by means of wooden blocks or lugs shall be provided to convey the concrete to the place of deposition without disturbing the reinforcement in any way. Labour shall not be allowed to walk directly over the reinforcement.

- g) All construction expansion joints in concrete work shall be made as indicated in drawings or as directed by the Architect and Project Director. Where vertical joints are required, these shall be shuttered as directed and blocks/strips used for this purpose shall be removed in a manner such as to avoid injury to the concrete.
- h) Holes for fixing bolts, sleeves, inserts etc. for all purposes shall be firmly secured and angles, holdfasts or other fixtures shall be embedded during the work of concreting in the position shown on drawings or as instructed by the Architect and Project Director.
- j) Where the shape of element is such that formwork has re-entrant angles, the formwork shall be removed as soon as possible after the concrete has set to avoid shrinkage, cracking occurring due to the restraint imposed.

33. NIGHT WORK

Concrete shall not be mixed, placed, completed or finished during the hours of darkness except where necessary to complete a pour. However, concreting in darkness for these exceptions shall only be done after obtaining express permission in writing from the Architect and Project Director.

34. DEFECTS IN CONCRETE WORK

- a) If any concrete found honey-combed or in any way defective, such concrete shall on the instructions of the Architect/Project Director be cut by the contractor and made good at his own expense with epoxy concrete / mortar. On no account shall the concrete surface be patched or covered up or damaged concrete rectified or replaced until the Architect/Project Director has inspected the works and issue instructions for rectification.
- b) If cracks develop in reinforced concrete construction, which in the opinion of the Architect/Project Director may be detrimental to the strength of the construction, the contractor at his own expenses shall test the slab or other construction. If the crack develops further under such test loads, the contractor shall dismantle the construction, cart away the debris, replace the construction and carry out all consequential work thereto at his own expense. Repairing work by special cement/chemicals/Epoxy etc. if so required shall be carried out under the supervision and instructions of Architect/Project Director at the cost of the contractor.
- c) If cracks develop in the concrete construction, which in the opinion of the Architect/Project Director are not detrimental to the stability of the construction, the contractor at his own expense shall do the grouting if required as per the instructions of Architect/Project Director. He shall also make good at his own expense and risk all other building works (such as plaster, moulding, surface, finish of floors, roofs, ceiling etc.) which in the opinion of the Architect/Project Director have suffered damage either in appearance or stability owing to such cracks. The Architect/Project Director's decision, as to the extent of the liability of the contractor in the above matter, shall be final and binding.
- d) Any concrete work found defective shall be tested by NDT test if required at no cost to AWHO.

35. SITE LABORATORY

The contractor shall establish a laboratory at site of work as per the requirement as directed by the Project Director.

36. Inspection & testing of structure shall be as per clause 17 of IS: 456:2000. The Contractor & Project Director shall implement quality assurance plan for its participation in the project. A quality assurance plan shall define the tests and responsibilities of all persons involved, adequate control and checking procedure and the organization and maintaining adequate documentation of the building process & its results. The following documents shall be maintained by the Contractor & Architect/ Project Director at site jointly:-

- Test reports and manufacturers certificate for materials, concrete mix design details.
- Pour cards for site organization & clearance for concrete placement.
- Record of site inspection of workmanship, field tests.
- Non-conformance reports, change orders.
- Quality control charts.
- Statistical analysis.

37. FORM WORK

- a) Steel/plywood form work along with supporting system shall be designed for the self and live loads as per design and constructed to the shapes, lines and dimensions shown on the drawings. Form work shall carry without deformation the full weight of wet concrete, and other live and dead loads and it should also withstand the effect of vibration without deflection, bending, distortion or loosening of its component parts. All forms shall be sufficiently water tight to prevent leakage of slurry and water of concrete by using PVC sheets. Camber fillets shall be provided at all corners wherever called for on the drawings. All the plywood shall be water proof and have min. 12 mm thickness and shall be water proof. All formwork shall be coated with approved oil before it is fixed in position. Maximum repetition of plywood formwork shall be not more than six unless otherwise approved by Architect and Project Director. The wooden formwork shall be used only after approval of Project Director/Architect.
- b) Forms shall be so constructed as to be removable in sections. One side of the column forms shall be left open and the open side filled in panel by panel successively as the concrete is placed and compacted except when vibrators are used. Maximum height of column for which concrete can be placed at a time shall not be more than 2500 mm. Epoxy from approved manufacturer shall be applied to give proper bonding to columns and walls as per relevant IS codes/directions of Project Director /Architect.
- c) Props shall be of steel.

37.1 CLEANING AND TREATMENT OF FORMS:-

- a) All rubbish, particularly chippings, shavings and saw Plot-Devt shall be removed from the interior of the forms (Steel/ply) before the concrete is placed. The form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition to prevent adhesion between form work and concrete. Care shall be taken that such approved composition is kept out of contact with the reinforcement.
- b) To avoid leakage of slurry from the joints, the joints should be filled with foam sheets.
- c) All shuttering material should be painted with shuttering oil.
- d) All column and beam shuttering should be well clamped with the help of angle iron clamp and nut and bolts to maintain proper shape during the casting.
- e) Joints in slab shuttering will be covered with adhesive tape to avoid leakage of slurry.

- f) Starters of adequate size should be cast to support the shuttering and also to avoid leakage of slurry from bottom.
- g) Column cap should have sufficient overlap at column to ensure proper grip and shape. All caps should be clamped at top and bottom.

37.2 VERTICALITY OF FRAME STRUCTURE:

All the outer columns of the frame will be checked for plumb by plumb bob as well as by the Theodolite/Total Station as the work proceeds to upper floors. Internal columns will be checked by taking measurements from outer row of columns for their exact position.

37.3 STRIPPING TIME:

Forms shall not be struck until the concrete has attained a strength at least twice the stress to which the concrete may be subjected at the time of removal of form work. The strength referred to shall be that of concrete using the same cement and aggregate with the same proportions and cured under conditions of temperature and moisture similar to those existing on the work. Where so required form work shall be left longer in normal circumstances. The form work may generally be removed after the expiry of the following periods:-

Sl. No .	Description	Period when OPC is used	Period when PPC is used
i.	Walls, columns and vertical faces of all structural members	2 days	2 days
ii.	Removal of props under slabs:- (aa) Spannings upto 4.5m (ab) Spannings over 4.5m	7 days 14 days	10 days 20 days
iii.	Removal of props under beams (aa) Spannings upto 6.0 m (ab) Spannings over 6.0 m	14 days 21 days	20 days 28 days

In case of cold weather, these periods may be increased at the discretion of the Architect /Project Director.

iv.	The number of props left under, their sizes and disposition shall be such as to be able to safely carry full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during placing of concrete, curing or further construction.
(aa)	PPC should conform to IS-1489 Part-I. However the 28 days strength achieve shall meet the strength criteria of minimum 43 Grade OPC as laid down in IS 8112 of 1989.
(ab)	Only PPC should be used for brickwork, flooring, terracing and plaster.
(ac)	Mix design should be carried out for each batch of OPC/PPC Cement and quantity of cement used accordingly.
(ad)	OPC and PPC should not be mixed in any work.
(ae)	While procuring PPC a certificate should be obtained from the manufacturer for each batch of cement to include the following:-
v.	Cement and quality of fly ash shall conform to IS 1489 Part I (Test Certificates for Physical Tests and Chemical Composition to be attached)
vi.	Fly ash is inter-ground with clinker and not mixed with it.
vii.	The fly ash content does not exceed 25% by mass of OPC
(ag)	Use of PPC should be resorted to after proper consultation with Architect and Project Director
(ah)	Any other relevant precautions/conditions as per relevant IS Codes shall also be followed and taken care of

37.4 REMOVAL OF FORM WORK:

Form work shall be removed in such a manner as it would not cause any shock or vibration that would damage the concrete. Before removal of soffits and props, concrete surface shall be exposed to ascertain that the concrete has sufficiently hardened. Where the shape of element is such that form work has re-entrant angles, the form work shall be removed as soon as possible after the concrete has set to avoid shrinkage, cracking occurring due to the restraint imposed.

37.5 REUSE OF FORMS

- i. Immediately after the forms are removed, they shall be cleaned with jet of water and a soft brush before they are reused.
- ii. The Architect and Project Director may in his absolute discretion order rejection of any forms he considers unfit for use in the works, and order their removal from the site. Centering and shuttering to be used on the project shall be of suitable good quality to ensure that concrete work of required quality is obtained.

38. FINISH OF THE CONCRETE WORK

- a) All concrete while being poured against form work shall be worked with vibrators, rods and trowels as required so that good quality concrete is obtained.
- b) All exposed surface of RCC lintels, beams, columns, pergola and the like shall be plastered to match with adjoining plastered face of walls after suitably hacking the concrete surface.
- c) All soffits of RCC slabs, shelves etc and other exposed surface of RCC work not continuous to Brick masonry wall shall be plastered (6mm thick) with cement mortar 1:3 (1 cement : 3 fine sand) to give even and smooth surface.
- d) The top of loft slabs / shelves (other than kitchen toilet counter) shall be self finished while the concrete is green, with a floating coat of neat cement to give a smooth and even surface. The exposed front face shall be finished in cement plaster 1:2 (1 cement: 2 coarse sand) to bring it in line and level and finished in neat cement. Such slabs shall be carefully cast so that they can be finished within 1 to 2mm of their specified thickness. Additional thickness of plaster which makes these elements look unnecessarily heavy will not be allowed.
- e) Fibre wire mesh, 24 gauze and 20 mesh, will be provided all along RCC surface adjoining masonry work giving 150mm lapping on either side using nails etc, for fixing the mesh while plastering.
- f) The rates shall be deemed to include small and incidental labour such as chamfers, splays, rounded or curved angles, grooves, rebate and drip moulds/courses.

39. BEARING PLASTER

Bearing Plaster shall consist of cement plaster 1:3 (1 cement :3 coarse sand) 20 mm thick finished with a coat of neat cement laid on top of walls as bearing for RCC lintels, beams & slabs. The shuttering shall be started after minimum one day of bearing plaster so that it is set. When dry, a coat of lime wash shall be given.

40. SUB BASE (IN GROUND FLOOR)

The sub base (base concrete) under floor finish where there is no basement shall be 100mm thick PCC 1:3:6 (1 cement: 3 coarse sand: 6 stone aggregate 40 mm nominal size) over 40mm thick stone Plot-Devt above 230mm thick compacted dry stone rubble packing & voids filled with stone chipping and top of rubble packing truly levelled and dressed over well compacted earth.

41. PLINTH PROTECTION

Plinth protection 750 mm wide and 50 mm thick of cement concrete 1:3:6 (1 cement: 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including finishing the top rough. Location of Plinth protection shall be provided as per drawings. The P.C.C. in plinth protection shall have 10 mm joints through depth of concrete along brick wall at each turning and across at every 2.40 meters.

42. CONCRETE FILLING FOR SUNKEN AND LOWERED PORTION OF THE SLAB

This shall be cement concrete 1:5:10 (1 cement: 5 coarse sand: 10 brick ballast 40 mm nominal size) in the entire sunken portion irrespective of what is shown on the drawings. Over this sub base flooring as per specifications shall be provided.

43. DAMP PROOF COURSE

- This shall be provided at locations as per drawing. It shall consist of 40 mm thick PCC 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 12.5 mm nominal size) with approved waterproof compound as per manufacturers specifications including centering and shuttering. The top surface of the DPC shall be finished fair and even but not smooth.
- DPC as specified above shall be provided 40 mm thick at level with finish floor to the full width of walls (in stilted area, shafts and rooms at ground floor only).
- No DPC shall be provided over dwarf walls or toe walls but floors shall be carried over to the width over the dwarf wall finished 10 mm projecting over from the wall.
- Vertical Damp proof course shall be provided at ground floor on common walls between floors at different levels and shall consist of 20 mm thick plaster of mix 1:4 (1 cement: 4 coarse sand) with waterproofing compound at the rate as used in horizontal DPC and coated with hot bitumen as given below, before filling earth/stone Plot-Devt is carried out
- Over Horizontal and Vertical DPC as provided above, a coat of bitumen 80/100 graded at the rate f 1.7 kg. per sq.m. shall be provided, when the surface is dried up and clear, cleaned with brushes and finally with a piece of cloth soaked in kerosene oil.

44. BLANK

45. R.C.C. UNDERGROUND WATERTANKS

- a) RCC underground watertanks shall be provided in all blocks/buildings as per standard norms . The water proofing to RCC to the watertank shall be all as specified in the relevant Section of Particular Specification Part-I A.
- b) There shall be no construction joint at the meeting point of bottom slab and vertical walls. Vertical walls to a minimum height of 250 mm shall be cast monolithic with the bottom slab.
- c) In concrete for bottom slab and sidewalls of RCC watertanks, waterproofing compound of approved make and quantity as per manufacturer's instructions shall be mixed.
- d) PVC Water stops (water bars) shall be placed conforming to IS:12200 for construction joints between RCC members and fixed to the reinforcement with binding wire before pouring concrete.
- e) Manholes with covers shall be provided in the roof slabs of each RCC tank as shown on drawing.
- f) Water proofing treatment shall be done on the internal surface of all walls and floor of the all water tanks as per direction of Project Director and Architect.

Annexure 'A'**CEMENT SUPPLY AND
ACCEPTANCE / REJECTION FORM**

1. CA No.
2. Name of Work.....
3. Details of Supplier
- (a) Invoice No. Date.....
4. Particulars of Manufacturer
5. Details of Test Certificate
- (a) Certificate No. and Date.....
- (b) Particulars of issuing Authority.....

Sr.No.	Nomenclature of cement	IS	Specific Surface by Air Permeability	Soundness by Le'chea Tillers methods	Initial Setting Time	Final Setting Time	Average Compressive Strength of three mortar cubes as defined in relevant IS Code					Remarks
							24 Hrs + 30 Mts	72 Hrs + 2 Hrs	72 Hrs + 2 Hrs	72 Hr s+ 2 Hr s	72 Hr s+ 2 Hr s	

JE (Civil)

Architect

Contractor

Remarks with signature of P D (AWHO)

Accepted/Rejected

SECTION-III
BRICKWORK/ MASONARY WORK AS PER LOCAL STATE GOVERNMENT POLICY/COURT ORDER IF ANY

1. MATERIAL

Sand for Masonry Mortar : Unless otherwise indicated, sand for masonry mortars shall consist of natural sand (generally termed as coarse sand), crushed stone sand or crushed sand or a combination of any sand conforming to IS: 2116-1980 specifications for sand for masonry mortars. Sand shall be hard, durable clean, and free from adherent coatings and impurities such as iron particles, alkalis, salts, coal, mica, shale or similar laminated or other materials exceeding the specified limit. Grading of sand shall be as under:-

IS Sieve	Percentage passing by Weight	
	(Un-reinforced masonry)	(Reinforced masonry)
4.75 mm	100	100
2.36 mm	90-100	90-100
1.18 mm	70-100	70-100
600 micron	40-100	40-100
300 micron	5-70	5-70
150 micron	0-7.5	0-10

- Sand for Masonry Mortar :** Unless otherwise indicated, sand for masonry mortars shall consist of natural sand (generally termed as coarse sand), crushed stone sand or crushed sand or a combination of any sand conforming to IS: 2116-1980 specifications for sand for masonry mortars. Sand shall be hard, durable clean, and free from adherent coatings and impurities such as iron particles, alkalis, salts, coal, mica, shale or similar laminated or other materials exceeding the specified limit. Grading of sand shall be as under:-
2. The maximum quantities of clay, fine silt and fine Plot-Devt in the sand shall not be more than 4 percent by weight, organic impurities shall be below that obtained by comparison with the standard solution specified in 6-2-2 of IS: 2386 (Part II 1983).
3. **Common / well burnt clay building bricks:** Common burnt clay-building bricks (hereinafter termed as bricks shall conform to the requirements laid down in IS:1077 - 1992 for common burnt clay building bricks). Bricks shall be class designation 7.5 (average compressive strength not less than 75 kg/ Sqcm), sub class A as per parameters given in the I.S. regarding edges, dimensions etc. The overall dimensions shall however be as per local practice of moulds. Water absorption after immersion in cold water for 24 hours shall not exceed 20% and grading for efflorescence shall be less than moderate. Bricks shall be free from cracks, flaws and modulus of free lime. Dimensions shall be within tolerance. Under or over burnt bricks and warped bricks shall be totally rejected.
4. Test checks on random samples from each lot of bricks brought at site shall be carried out for compressive strength and water absorption test. Result of these tests duly signed and dated by Contractor, Architect and Project-in-Charge / Project Director shall be recorded in a separate register, which shall be kept with the Project-in-Charge / Project Director .

5. WORKMANSHIP - MASONRY MORTARS

Preparation of cement mortar: Mortar shall be of mix as indicated. The mix specified are by volume. Mixing shall be done in a mechanical mixer. The mortar shall be mixed for at least three minutes after adding of water. Cement mortar shall be freshly mixed for immediate use. Any mortar, which has commenced to set shall be discarded and removed from the site.

6. Bond: All bricks work shall be built in English bond, unless otherwise indicated. Half brick walls shall be built in stretcher bond. Header bond shall be used for walls curved on plan for better alignment, header bond shall also be used in foundations, stretchers may be used when thickness of wall renders use of headers impracticable. Where the thickness of footings is uniform for a number of courses the top course of the footings shall be of headers. Brick courses at DPC level and at all slab levels below the bearings of slab shall be as bricks on edges.

7. Half or cut brick shall not be used except where it is necessary to complete the bond.

8. Overlap in stretcher bond is usually half brick and is obtained by commencing each alternate course with a half brick. The overlap in header bond which is equally half the width of the brick is obtained by introducing a three quarter brick in each alternate course at quoins. In general, the cross joints in any course of brickwork shall not be nearer than a quarter of brick length from those in the course below or above it.

9. Curing: The bricks shall be adequately wet before use and brickwork shall be constantly kept wet for at least seven days.

10. Half Brick Walls: The brick shall be laid in stretcher bond in cement and sand mortar 1:4 (1 cement: 4 coarse sand) or as indicated. The reinforcement shall be two nos. M.S. round bar. The diameter of bars shall be 6 mm. The first layer of reinforcement shall be used at second course and then at every fourth course of brickwork. The bars shall be properly anchored at their ends where the portions and or where these walls join with other walls where the half brick walls are joining with RCC column / RCC shear wall, two nos. 6 mm dia bar at every forth course shall be inserted into columns / RCC shear wall by drilling and then capping the hole with rich mortar in 1:3. The inlaid steel reinforcement shall be completely embedded in mortar. Overlap in reinforcement if any, shall not be less than 30 cm. The cover i.e. the mortar interposed between the reinforcement bars and brick shall not be less than 8 mm. The mortar covering in the direction of joints shall not be less than 15 mm.

11. Brick Work in Foundation upto Plinth : Brick work in foundation shall be with bricks of class designation 7.5 (average compressive strength not less than 75 kg/ Sqcm) upto plinth level in cement mortar 1:6 (1 cement: 6 coarse sand).

12. Brick work in superstructure: Brick work in superstructure shall be with bricks of class designation 7.5 (average compressive strength not less than 7.5 N/ Sqmm) in cement mortar 1:6 (1 cement: 6 coarse sand).

13. Brickwork in steps of Staircases: Brickwork in steps of staircases shall be in bricks of class designation 7.5 (average compressive strength not less than 75 kg/Sqcm) and in cement mortar 1:4 (1 cement: 4 coarse sand).

14. Half brick wall shall be laid with a gap of 50 mm on external walls of the overhead water tank as per para 10 above.

15. FLY ASH BRICKS (IF REQUIRED DUE TO THE COURT ORDER)

Fly ash bricks of class designation 75 (hereinafter termed as bricks) shall conform to the requirements laid down in IS: 12894-2002 for Fly Ash bricks). Bricks Shall be locally made of following sizes and required at location all as shown in design drawings:-

- 230X100X80 mm
- 150X100X80 mm
- 230X150X100 mm

Fly ash bricks shall be machine made of the following admixtures and their composition:

- Fly ash 50 %
- Sand 32-40 %
- Cement 8-12 %

A maximum of (+/-) 2 mm shall be allowed as manufacturing tolerance. The bricks shall have frog of 75 mm in length 40 mm in width and 10 to 20 mm deep of one of its flat sides.

Testing:

- i) The fly ash bricks when tested for compressive strength, drying shrinkage and water absorption in accordance with the procedure laid down in IS 12894 : 2000 and IS 3495 (part 2) : 1992 after immersion in cold water for 24 hrs., water absorption shall be within 13-15% by weight. Similarly, the porosity of the fly ash bricks shall be within 12-20%. The fly ash bricks shall have a minimum crushing strength of 75 Kg/sq. cm.
- ii) Test checks on random samples from each lot of fly ash bricks brought at site and/or produced at site shall be carried out for compressive strength and water absorption test. Result of these tests duly signed and dated by Contractor, Architect and Project Director and shall be recorded in a separate register, which shall be kept with the Project Director.

16. WORKMANSHIP – MASONRY MORTARS

Preparation of Cement Mortar: Pozzolana Portland cement shall be used in masonry work, flooring and plaster work only. Mortar shall be of mix as indicated. The mix specified is by volume. Mixing shall be done in a mechanical mixer. The mortar shall be mixed for atleast three minutes after adding of water. Cement mortar shall be freshly mixed for immediate use. Any mortar, which has commenced to set shall be discarded and removed from the site.

Bond:

All fly ash bricks works shall be built in English bond, unless otherwise indicated. Half fly ash brick walls shall be built in stretcher bond. Header bond shall be used for walls curved on plan for better alignment, header bond shall also be used in foundations and stretchers may be used when thickness of wall renders use of headers impracticable. Where the thickness of footings is uniform for a number of courses the top course of the footings shall be of headers. Brick courses at DPC level and at all slab levels below the bearings of slab shall be as bricks on edges.

Half or cut fly ash brick shall not be used except where it is necessary to complete the bond.

Overlap in stretcher bond is usually half brick and is obtained by commencing each alternate course with a half brick. The overlap in header bond which is equally half the width of the brick is obtained by introducing a three quarter brick in each alternate course at quoins. In general, the cross joints in any course of brickwork shall not be nearer than a quarter of brick length from those in the course below or above it.

Curing:

The bricks shall be adequately wet before use and brickwork shall be constantly kept wet for at least seven days.

17. FLY ASH BRICK WORK IN FOUNDATION UPTO PLINTH

- (a) Fly ash brick work in foundation shall be with bricks of class designation 75 (average compressive strength not less than 75 kg/Sq.cm) upto plinth level in cement mortar 1:6 (1 cement: 6 coarse sand).
- (b) Fly ash brick work in foundation of walls of rooms, toilets, lift lobby enclosure, and shaft etc. in stilt area shall start from the top of the plinth beam upto the required height as shown on drawings.

18. FLY ASH BRICK WORK IN SUPERSTRUCTURE

Fly ash brick work in superstructure shall be with bricks of class designation 75 (average compressive strength not less than 75 kg/Sq.cm) in cement mortar 1:6 (1 cement: 6 coarse sand).

19. FLY ASH BRICK WORK IN STEPS AND PLANTERS

Fly ash brick work in steps shall be in bricks of class designation 75 (average compressive strength not less than 75 kg/Sq.cm) and in cement mortar 1:4 (1 cement: 4 coarse sand).

20. HALF BRICK WALLS:-

The bricks shall be laid in stretcher bond in cement & sand mortar 1:4 (1 cement: 4 coarse sand) or as indicated. The reinforcement shall be two nos. MS round bar. The diameter of bars shall be 8 mm. The first layer of reinforcement shall be used at second course and then at every fourth course of brick work. The bars shall be properly anchored at their ends where the portions and / or where these walls join with other walls, where the half brick walls are joining with RCC columns/ RCC shear walls, one no, 8 mm dia bar at every fourth course shall be inserted into columns/ shear wall by drilling and then capping the hole with rich mortar in 1:3. The inlaid steel reinforcement shall be completely embedded in mortar. Overlap in reinforcement, if any, shall not be less than 30 cm. The cover i.e. the mortar interposed between the reinforcement bars and brick shall not be less than 8 mm. The mortar covering in the direction of joints shall not be less than 15 mm.

21. BRICKWORK IN STEPS OF STAIRCASES:-

Brickwork in steps of Staircases shall be in bricks (compressive strength not less than 75 kg/ sq. cm.) and in cement mortar 1:4 (1 cement: 4 coarse sand).

22. PARAPETS AND RAILINGS:-

Parapets of Brickwork, RCC and Railings shall be provided to balconies, terraces, roof tops and landings etc. of upper floors as per details shown on drawings.

23. BONDING / ANCHORING OF BRICK WALL WITH RCC COLUMNS:-

1 No. 8 mm dia 700 mm long M.S. bar dowels @ 300 c/c shall be provided in columns at their junction with brick walls of both 230 mm and 150 mm thick as per details shown in structural drawing. Dowels shall be binded on reinforcement of column before pouring concrete so that it is properly embedded in concrete.

24. CLAY FLYASH F.P.S. (NON MODULAR) BRICK MASONRY:-

Brick work with clay fly ash F.P.S. (non modular) brick of class designation 7.5 in Cement mortar 1:4 (1 cement: 4 coarse sand) in manholes/chambers and in Cement mortar 1:6 (1 cement: 6 coarse sand) in cable trench shall be provided at the locations as shown in drawing.

25. The width of RCC lintle, beams , cills columns and like coming in conjunction with masonry wall /pillars shall be kept to actual width of masonry work at that place unless offset have been specified shown in DRG. In case the width as shown on DRG shall be maintained.

26. Centerline dimensions of rooms , verandahs etc shown on DRG shall be maintained internal and overall dimensions if at variance from whatever shown in DRG shall be deemed to have been amended accordingly .The diminutions for various heights shall be maintained as shown on DRG.

27. Mortar bed joint shall be such that four course of masonry work and three joints taken consecutively shall not measure more than 3cm in addition to combined height of masonry themselves.

SECTION -IV
WOOD WORK AND ALUMINIUM WORK

1. DOOR FRAMES

All Door frames of all Plot-Dev shall be factory made using Red Marandi/ Hollock/Sal conforming to IS: 4021. Timber shall be kiln seasoned chemically treated Red Marandi/ Hollock/Sal wood. All members of a frame shall be of the same species of timber and shall be straight without any warp or bow. Frames shall have smooth, well planed surfaces except the surfaces touching the walls, lintels, cill etc. which may be left clean sawn and painted with wood preservative paint/coal tar pitch (conforming to IS: 216:1961). Rebates, rounding or moulding shall be done before the members are jointed into frames. The depth and width of rebate shall be as per drawing. The frame shall be factory made only. Sizes of frames shall be:

- a) Main Door Frames : 150X62.5 mm
- b) Internal Door Frames including toilets : 125X62.5mm

The moulding / architraves shall be of Red Marandi/ Hollock/Sal of size 40 mm X 20 mm for main doors as per design drawings. Samples of the same with different patterns shall be presented to Project Director and Architect for approval.

PROPERTIES OF WOOD

Description	Dry	Unit
Density	777	Kg./Cum
Moisture content	18% (+ 3%)	
Warping allowance	±1-2 mm	
Treatability	As per IS:401:2001	
Weight	592	Kg/m ³

In addition to the above mentioned tests, the test for identification of Red Marandi/ Hollock/Sal wood shall be confirmed by the reputed laboratory.

SEASONING AND TREATMENT

Timber shall be kiln seasoned by a suitable process conforming to IS: 1141: 1993 before being planed and shaped to the required dimension. It shall be chemically pressure treated with suitable preservative (except the water soluble leachable type) as specified in IS: 401: 1982. The portion expected to remain concealed in joinery or in masonry shall be given an additional coat of wood preservative.

JOINTS

The jamb posts shall be through tenoned in to the mortise of the transoms to the full thickness of the transoms and the thickness of the tenon shall be not less than 2.5cm. The tenons shall closely fit into the mortise without any wedging or filling. The contact surface of tenon and mortise before putting together shall be glued with polyvinyl acetate dispersion based adhesive conforming to IS: 4835 or adhesive conforming the WBP or MR grade of IS: 851 and pinned with 10mm dia hard wood dowels or bamboo pins or star shaped metal pins.

FIXING

The frame shall be fixed to the abutting masonry or concrete with hold fast or metallic fastener. A minimum of 3 hold fasts/fasteners shall be fixed on each side of door frame, one at the centre point and other two at 35cm from the top and bottom of the frame. Hold fast shall be of 250 mm long MS flat 40mm x 5mm with one end split into fish tail, fixed to frame with the help of 50 mm long three number screws and the other embedded in wall in CC block 1:3:6 of size 400x230x150mm for 230 mm thick wall and 400 x 150 x 150 for 150 mm thick wall. The frame shall be fixed to RCC columns with metallic dash fastener 100mm long with necessary sleeve and screws. The no. of holdfast shall be three on each side for opening less than 1200 mm and four for opening of 1200 mm and above.

Vertical members of the door frames shall be 50mm more than the specified height and shall be embedded in floor at all floor levels. All members of the frame shall be sand papered to remove all scale etc.

Frames shall be fixed in position true to lines and levels. Necessary opening shall be left in the walls to receive frames. During construction of masonry dry bricks shall be laid in mud mortar in position so that they can be removed subsequently for providing cast in situ concrete blocks for holdfasts.

Overall dimensions of the door frame shown on the drawing shall be maintained.

The factory made wooden frames shall be from one of the approved manufacturers as per the list of approved makes/manufacturers.

2. DOOR SHUTTERS

All main entrance/internal door shutters, shall be provided in all Plot-Dev and other ancillary buildings at locations and as per detail as shown on drawings as approved by Accepting Officer.

- a) All internal door shutters (except as specified below) shall be 30 mm thick factory made Masonite / Venachai skin moulded door shutters, ISI marked. Flush door shutters for toilets shall be provided with 30 mm thick solid core one side teak veneer and other internal side with commercial veneer in all Plot-Dev. Main entrance door shutters shall be factory made 38 mm thick flush door, ISI marked including 4 mm thick teak veneer on both side with grooves as per approved drawings). The flush doors/skin moulded door shall have 60 mm wide top and bottom rails and stiles in hard wood and lock space of 300X75 mm and hard wood pieces of 100 X 75 mm at top and bottom for the provisions of Tower Bolt shall be provided. Infill shall be battens of hardwood confirming to the requirement as per IS 1659-1969. Adhesive used shall be phenol formaldehyde synthetic resin conforming to BWP types specified in IS: 848-1974. Before installation of door shutters, Random checking of shutters will be carried out by saw cutting for confirmation on the sizes and quality of material by Project Director/ Architect. No extra cost will be paid to the contractor for this.
- b) For Driver's rooms with toilets and toilets for maids, MS 40X40X6 mm angled door frame with 30 mm thick flush door shutter to be enamel painted of approved shade. The frame shall be fixed to the wall with MS lugs of size 150 X 25 X 4 mm (3 nos. each side). 18 gauge aluminium sheet to be fixed to the inner face of W.C. door shutters up to the height of 900mm and of bath room door shutters up to full height.

- c) Contractor shall obtain the approval in writing for the name of the manufacturer of the flush door shutters from the Project Director / Architect before placing the supply order.
- d) While asking the approval copy of the "Bureau of Indian Standards" letter under which manufacturer has been authorized to mark the product with ISI marking should be attached. Project Director and Architect before giving the approval shall ensure that the validity date of license has not expired.
- e) The excise duty gate passes shall be submitted by the contractor to the Project Director for each consignment of flush door shutters dispatched by the factory holding valid BIS certification and brought at site for incorporation in the work. The flush shutters shall not be accepted without excise duty gate passes.
- f) Flush door shutters shall be procured from any of the approved manufacturers as given in the list of approved makes/manufacturers. Contractor may place order on one or more manufacturers keeping in view the delivery schedules to ensure that there is no delay in supply and fixing of flush door shutters. The contractor shall handover one copy of supply order placed on the approved manufacturer to the Architect and Project Director within one week of placing the supply order.
- g) Fire Door shutters shall be 55mm thick asbestos free, fully insulated composite fire & smoke check shutters having 60 minutes fire resistance rating conforming to BS:476 Part-22, IS:3614 Part-II. Shutters shall have two non combustible boards each 12 mm thick, sandwiching 25 mm thick fire resistant filler, faced with 3 mm commercial ply facing on both faces and hardwood lipping all around the shutters with heat activated intumescent fire seal strip of size 20mm x 4mm mounted in the grooves in the shutter on all sides except bottom. Frames shall be 100X62 mm made of 16 SWG MS sheet with built-in MS holdfast of size 250X40X5mm- 3 nos. each side. Frames will be duly filled with concrete mix 1:2:4 before fixing in position. The frames shall be fixed in position by embedding the holdfasts in concrete blocks of mix 1:2:4- size 300X150mm to entire thickness of wall. Frames and Shutters shall be painted with fire retardant paint conforming to IS: 12777, BS:476, Part-7, over a coat of fire retardant primer, in desired shade including cleaning and preparation of surface. The shutter shall have one no. aluminium extruded section body tubular type hydraulic door closer of size (to withstand approx. 80 kg. wt. of door) as approved by Project Director/Architect.
- h) Fire Rated Glass (Viewing panels fire rated doors) : 6 mm thick clear fire rated wire glass tested up to 1 hour/2 hours (as per door rating) and complies with BS 476 Part 22 and BS 6206 relating to fire resistant and impact performance and is monolithic wired glass of Pilkington be provided as directed by the Architect and Project Director.
- i) PANIC EXIT DEVICES : Briton /Monarch/Von Duprin fire rated single/double leaf Panic Exit Devices tested in accordance with BSEN 1125 : 1997 & BSEN 179 : 1997, EN 1670 (corrosion resistant) and BS 476 Part 22 (for fire rating) with 5 years warranty shall be provided as directed by the Architect and Project Director.

3. Contractor shall inform in writing to the Architect and Project Director the names of one or more firms out of manufacturers listed in para 2 above whose shutters he proposes to incorporate in the work. Keeping in view the delivery schedule, the Contractor may place order on one or more manufacturer, to ensure that there is no delay in supply and fixing of door shutters. The Contractor shall hand over one copy of supply order placed on the manufacturer to the Architect and Project Director, within one week of placing the supply order. In case, the Contractor is procuring shutters of more than one manufacturer, then he shall ensure that all shutters in a particular block shall always be of one manufacturer only.

With each consignment of shutters brought at site for incorporation in works, the Contractor shall submit excise duty gate passes issued by the factory holding valid BIS Certification. Without these excise duty gate passes, the material shall not be accepted.

4. **TESTING OF DOOR SHUTTERS**

On receipt of the shutters at site the Project Director and the Architect shall be entitled to get the samples of door shutters tested in any approved laboratory. From each lot of approximately 500 shutters, one shutter shall be selected at random by the Project Director / Architect. The cost of replacement of the door shutters as samples, their transportation to laboratory and the cost of testing by the laboratory shall be borne by the contractor, and shall be deemed to be included in the lump sum rates quoted in Schedule 'A', Part-I. The bottom of the door shutters shall not be more than 5mm above the finished floor level.

5. **Glazing-** Glazing to windows, ventilators and doors shall be as follows and of quality as approved by Architect and Project Director:-

(a)	Main Entrance Lobby Doors	-	5.5 mm thick float glass
(b)	Balcony Door shutters	-	5 mm thick float glass
(c)	Window/ ventilators (openable & fixed except in toilets)	-	4 mm thick float glass for glass panes of area upto 0.5 sq.m and 5 mm thick for panes area more than 0.5 sq.m.
(d)	Window/ ventilators in all toilets	-	4 mm thick pin headed glass

Note: - Glass shall be provided of approved make as per the list of approved makes.

6. **POLYESTER POWDER COATED ALUMINIUM DOORS, WINDOWS AND VENTILATORS**

- a) Aluminium doors, windows and ventilators shall be provided at location and as per detail as shown on drawings. These shall be standard aluminium sections of alloy with chemical composition and technical properties conforming to IS: 733-1983 and IS: 1285-2002 and sections shall be (makes as given in the list of approved makes/manufacturers) of designation 63400 given in IS 13871-1997 and polyester powder coated of approved shade.
- b) **Aluminium Doors/ Windows and Ventilators :** Polyester powder coated in required shade (e.g. steel grey / nut brown colour) of approved manufacturer giving 10 years written performance guarantee of approved colour and shade (50 microns as per IS :1868-1996 of required shade). All gaps are to be filled with approved quality silicon sealant of Dow Corning/Wacker brand all as per drawings and details to be provided for all types of flats for fixed and openable door / windows as per the drawings.
- c) Outer frame (sizes as shown in drawing) of external doors, windows and ventilators mounted on sub-frame of cross sectional size 50mm x 12mm, by means of screws @ 300 mm C/C and flush with plastered surfaces of openings and required mullions made of best quality extruded aluminium sections with inter-locking arrangement with well finished mechanical joints and all required standard accessories, fly mesh top hung/side hung (doors/ windows) shutters opening inside

including Stainless Steel wire mesh of average width of aperture 1.18 mm etc., float / frosted glass encased in EPDM gaskets Push type in openable / glazed side / top hung, sliding window shutters and door shutters as per drawing and conforming to IS-3400. Openable shutters shall be fixed with heavy duty Stainless Steel concealed stay hinges of approved brand/make and approved quality locking arrangement. For sliding shutters each shutters provided with two ball-bearing rollers, two anti-rolling pieces / guides one each at top and bottom, weather strip all-round complete and concealed type locking arrangement of approved quality. All other hardware fittings and fixtures etc. complete all as shown on drawings. The gap between outer frame and plastered surface shall be filled by silicon.

- d) The weight of the section of the aluminium windows/ventilators (fixed/openable) and external doors shall not be less than as shown in the drawings. Variation in weight up to +/- 5% to 6% shall be permitted in composite frame of windows/door- window/ ventilators as per the weight of section of the aluminium specified by different vendors from approved list.
- e) **Aluminium sub frames** : Providing and fixing aluminium work for sub-frame of external doors, windows, ventilators & partitions with extruded built up of standard section of 50x12mm weighing not less than 0.5 kg/m, fixed with expanded fasteners 50mm long with necessary plastic sleeves and galvanized MS screws including drilling holes in masonry work/ CC/ RCC and making good etc. complete. Aluminium section shall be smooth rust free straight mitred jointed mechanically wherever required including cleat angle.

7. **SAMPLES AND SHOP DRAWINGS**

The contractor shall submit the fabrication (shop) drawings for the approval of Project Director and Architect before starting of the fabrication. On getting approval of the shop drawing, the contractor shall produce the sample piece of each profile with required fittings for final approval of Project Director and Architect before mass production. Polyester powder coated Aluminium Doors, windows and ventilators to be manufactured at site.

- 8. The weights specified in drawings are minimum weights for guidance only and may vary from manufacturer to manufacturer and design. The actual provision shall be as per manufacturers design.

9. **EPDM Gasket:-**

EPDM Gaskets shall be of size and profile as required to render the glazing, doors, windows etc. air and water tight. Samples of Gaskets shall be submitted for approval by Architect / Project Director.

EPDM Gasket shall meet the requirement as given below:-

Sr.no	Description	Standard	Specification
1	Tensile strength Kg.f/cm ²	ASTM-D 412	70 Min.
2	Elongation at break %	ASTM-D 412	250 Min.
3	Modulus 100% Kg.f/cm ²	ASTM-D 412	22 Min.
4	Compression set % at 0 ⁰ CC 22 Hrs	ASTM-D 395	50 Max.
5	Ozone resistance	ASTM-D 1149	No visible cracks

10. POLYESTER POWDER COATED ALUMINIUM GRILLS (in windows not opening in balcony/terrace):-

Polyester Powder Coated Aluminium Grills of approved colour and shade (50 microns as per IS: 1868-1996 of required shade) shall be provided at location and as per detail as shown on drawings. Aluminium Grills shall be of approved design / pattern with approved standard section and fixed to the existing window frame with C.P. brass /stainless steel screws @ 200 mm centre to centre, including cutting the grill to proper opening size for fixing and operation of handles and fixing approved Polyester Powder Coated aluminium standard section around the opening, all complete as per requirement and direction of Architect / Project Director.

11. Fly proof mesh to Door & Windows:-

Providing and fixing fly proof wire gauze (mesh) to windows & doors with aluminium flat 15x3 mm and nuts & bolts complete. Fly proof wire gauze shall be stainless steel (grade 304) wire gauze of 0.5 mm dia wire and 1.18 mm aperture on both sides.

SECTION - V
BUILDER'S HARDWARE

1. Mongery shall be provided to all doors with necessary steel matching screws of suitable size.
2. Fittings and fixtures to all doors (except steel door, aluminium door and windows) shall be stainless steel ISI marked of approved makes as given in the list of approved makes/manufacturers.
3. Butt hinges for doors shall be SS (SS mat finish) heavy quality 125mm long with SS screws.
4. Stainless Steel (Matt finish) Mortice locks with SS screws and lock body with cylinders as listed below shall be provided. The make and model of locks shall be as described here in after:-
5. The following Mortice locks / latch with handles and plate shall be provided. The make and model shall be of **Godrej / Dorset**. Samples will be submitted to Architect and AWHO for their approval.
6. The make and model shall be as under:-

ITEM		GODREJ	DORSET
(a) Main Entrance Door :-			
i.	Handle with plate	: SS Mortise handle on 10 inch plate with CY hole in SS finish Product Code 8183.	SS Mortise handle on 10 inch plate with CY hole in SS finish Product Code MSY 10 SS.
ii.	Lock Body	: Mortice lock body in SS finish Product Code 8447.	Mortice lock body in SS finish Product Code ML 100 SS.
iii.	Cylinder	: 60mm long, both side keys cylinder in SS finish Product Code 8451.	60mm long, both side keys cylinder in SS finish Product Code CL 200 SS.
iv.	Other fittings	: Brass Magic eye of Wide range and chain link.	Brass Magic eye of Wide range and chain link
v.	SS matt finish sliding bolts	: 250 mm long with sliding bolt rod of 16mm dia with bolts and nuts complete Product Code 8540.	250 mm long with sliding bolt rod of 16mm dia with bolts and nuts complete.
(b) All other doors (except toilet doors) :			
i.	SS matt finish sliding bolts	: 200 mm long with sliding bolt rod of 16mm dia with bolts and nuts complete.	200 mm long with sliding bolt rod of 16mm dia with bolts and nuts complete.
ii.	Handle	: SS matt finish D type 200 mm long with plate on both sides of door shutter Product Code.	SS matt finish D type 200 mm long with plate on both sides of door shutter.
(c) Toilets Doors :			
i.	Handle	: SS matt finish D type 200 mm long with plate on both sides of door shutter	SS matt finish D type 200 mm long with plate on both sides of door shutter
ii.	Latch	: Baby latch in SS finish 12 mm dia rod & 75 mm long	Baby latch in SS finish 12 mm dia rod & 75 mm long

7. Tower bolts shall be 250mmx8mm, 150mmx8mm with base plates in stainless steel (SS matt finish) and shall be fixed from inside on top and bottom side respectively in all type of doors of Plot-Dev.
8. SS Matt Finish single leg door stopper shall be hanging floor type with single PVC cushion on all doors of the Plot-Dev as shown in schedule of mongery as shown in drawing.
9. All fittings shall be ISI marked or conforming to relevant IS.
10. PVC buffers shall be of 50 mm dia, 65 mm long shall be fixed behind each door to protect handles and avoid door banging against the back wall.
11. Hinges shall be SS pin type 125X65X2.5 mm thick, 4 nos. for main door and 3 nos. for other doors.
12. One sample piece of each fitting shall be produced for approval of Project Director and Architect. Supply order shall be placed by the contractor only after approval is accorded by the Project Director/ Architect.

13. **SCHEDULE OF BUILDER'S HARDWARE**

Schedule of builder's hardware/ fittings to doors of all Plot-Dev including common areas, fire doors, toilets under stilts, mumties and panel/pump room shall be as shown in drawings.

NOTES:-

- i. It shall be ensured that all builders' hardware are from one approved manufacturers only for the entire work. However, if due to any reason contractor proposes to provide part quantity from other approved manufacturer given in Para 2 here-in-before, then he may be permitted but he will have to obtain specific approval of Project Director and Architect for this change in brand. This will be subject to that all items and fixtures in any particular blocks/building shall be always of one approved manufacturer only.
- ii. Contractor shall obtain the approvals for the name of the approved manufacturer of builders hardware from the Project Director and Architect before placing the supply order. While asking for the approval, copy of the "Bureau of Indian Standard" letter under which manufacturer has been authorised to mark the product with ISI marking should be attached. Project Director and Architect before giving the approval shall ensure that the validity date of license has not expired.
- iii. Those fittings which are not manufactured as ISI marked shall also be of the one brand of which the ISI marked fittings are approved by Project Director/ Architect.
- iv. For Aluminium doors and window, the nos. and types of hardware shall be as listed in the drawings.

SECTION - VI
STEEL REINFORCEMENT, STEEL AND IRON WORK
INCLUDING STEEL DOOR SHUTTERS

1. STEEL AND IRON WORK

1.1 The entire steel required for incorporation in the work shall be arranged by the contractor and shall comply with the requirement of following specifications:-

(a) **REINFORCEMENT STEEL**: High strength deformed steel bars produced by ThermoMechanical Treatment process (TMT) steel bars of Grade Fe 500 (D) meeting all other requirements of IS-1786-2008. The procurement shall be done as per procedure given below.

(b) **STRUCTURAL STEEL**:-Standard quality : Fe-410-S Conforming to IS- 2062, Structural Steel Tube shall be YST-310 grade.

(c) **HOLD FASTS ,GRILLS ETC & OTHER THAN STRUCTURAL**:Fe-310-0 conformingto IS –1977

(d) **GALVANISED SHEETS PLAIN OR CORRUGATED**: Conforming to IS -227.

(e) **FABRIC REINFORCEMENT FOR CONCRETE**: Conforming to IS- 1566 . Wire fabricfor General use, window Grills, etc shall be conforming to IS-4948 and all as per CPWD Specificaion.

1.2 Steel and iron work shall be executed as indicated in drawings and as per standard practice. The entire steel required for incorporation in the work shall be arranged by the contractor and shall comply with the requirement of following specifications:-

2. Quality of steel shall conform to the following specifications:

• Mild steel (miscellaneous)	- IS: 432 - 1982 (Part - I)
• MS reinforcement bars	- IS: 432-1982 (Part-II)
• TMT or high strength Steel deformed bars	- IS: 1786 - 1985 (III Revision)
• MS Tubes	- IS: 1161 - 1998 (IV Revision)
• M.S. Square Bars	- IS: 432 - 1982 (Part II)
• M.S. Hollow Sections	- IS: 4923 - 1994
• Structural Work	- IS: 226 - 1962

3. REINFORCEMENT
APPLICABLE CODES & STANDARDS

The codes and standards generally applicable to the work of this section but not limited these are listed hereinafter including latest corrections and revisions:

IS:280	Mild steel wire for general Engineering purposes.
IS:432	Part-I mild steel and medium tensile steel bars Part-II hard drawn steel wire.
IS:456	Code of practice for plain and reinforced concrete.
IS:814	Covered electrodes for metal ace welding of structural steel.
IS:816	Code of practice for use of metal arc welding for general construction in mild steel.
IS:1439	Hot and rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement.

IS:1566	Hard drawn steel wire fabric for concrete reinforcement.
IS:1786	Cold twisted steel bars for concrete reinforcement.
IS:2502	Code of practice for bending and fixing of bars for concrete reinforcement.
IS:2629	Recommended practice for hot dip galvanizing of iron and steel.
IS:3370	Code of practice for concrete structures for storage of liquid.
IS:4759	Hot dip zinc casting on structural steel and other allied products.

The following clauses are intended to amplify the requirements of the reference documents listed above and the contractor shall comply with these clauses.

4. SUBMITTALS

BAR BENDING SCHEDULE

At least a fortnight before commencement of fabrication of any steel reinforcement, the contractor shall submit the Bar bending schedule to the Project Director and Architect for his approval. The approval of Project Director and Architect shall in no way absolve the contractor of his responsibilities under the contract.

5. MATERIALS

Reinforcement Steel : All Reinforcement Steel shall be of High strength deformed steel bars produced by Thermo Mechanical Treatment process (TMT) steel bars of **Grade Fe-500D**) meeting all other requirements of IS-1786-1985 except 6 mm dia bars which shall conform to IS-432-1982 (Part-I), Grade-I as shown on drawings. However the Contractor shall take prior approval of Project Director to use steel bars of Fe- 500 strength in case of procurement bottlenecks up to 16 mm dia bars. This will be at no extra cost to AWHO.

6. PROCUREMENT

TMT steel bars shall be procured directly from any one of the approved manufacturer as given in the list of approved makes/manufacturers. The contractor must intimate in advance the Architect and Project Director in writing his intention to procure steel from any of the approved manufacturers. As far as possible the contractor must make efforts to procure steel from two or three approved manufacturers. However in case of any problem of supply, prior permission of the Project Director will be taken by the contractor to procure from other approved suppliers given in the list of approved makes/manufacturers.

7. DOCUMENTATION

- a) The contractor shall produce original purchase vouchers from the manufacturer for the total quantity of steel supplied under each consignment to be incorporated in the work. The Project Director along with relevant documents before acceptance shall inspect all the consignments received at the work site. The original purchase vouchers and test certificates shall be defaced by Project Director and kept on record in the office of the Project Director duly authenticated and with cross reference to the control number recorded in the steel acceptance register.
- b) The Steel Acceptance register shall be signed by Architect, Project Director and contractor. The entire quantity of steel be suitably recorded in the measurement book "not to be abstracted" before incorporation in the work and shall be signed by Architect/ Project Director and contractor.

8. TESTING OF STEEL

- a) The contractor shall submit the approved manufacturer's test certificate in original along with test sheet giving the results of physical and chemical characteristics as applicable or authenticated copy thereof, duly signed by the manufacturer with each consignment. The Architect/ Project Director shall record these details in Steel Acceptance Register as given in Annexure 'B' after due verification and send a certified true copy of test sheet to Project Director for record. The Architect/ Project Director shall also organize independent testing of random samples of each lot of steel from NABL accredited labs/reputed labs approved by Project Director. Samples from each lot should be tested for quality and elongation. In case of failure on random sampling the complete lot will be taken out of side by the contractor. Any additional cost for testing removal/replacement will be borne by the contractor.
- b) Independent testing of reinforcement steel by Project Director is optional at the discretion of Project Director in case of procurement of steel from main approved producers and in case of testing, charges shall be borne by the AWHO if test results are found in order otherwise these shall be borne by the contractor.
- c) Independent testing of reinforcement steel by the Project Director is mandatory in case of procurement of steel from approved secondary producers, conversion agents, authorized dealers and testing charges shall be borne by contractor irrespective of outcome of test results.
- d) Contractor shall provide chemical solution at site for ring testing of TMT bars in respect of all the lots of TMT bars for all sections of steel. The record of testing shall be maintained in material testing register duly signed by contractor and Architect/Project Director.
- e) In all cases, the contractor at his own cost shall provide all facilities required for testing and cost of material consumed in tests and transportation charges shall be borne by contractor.

MINIMUM FREQUENCY TABLE

Sl. No.	Nominal size of steel for concrete Reinforcement	Quantity
i.	Bars of size less than 10mm	1 sample (3 specimen) for each test for every 25 tonne of steel or part thereof
ii.	Bars size 10mm to 16mm	1 sample (3 specimen) for each test for every 35 tonne of steel or part thereof
iii.	Bars size over 16mm	1 sample (3 specimen) for each test for every 45 tonne of steel or part thereof
STRUCTURAL STEEL		
iv.	Tensile Test	1 Test for every 25 tonne of steel or part thereof
v.	Bend Test	1 Test for every 10 tonne of steel or part thereof
vi.	Elongation Test	1 Test for every 10 tonne of steel or part thereof

10. STEEL IN COILS ETC.

Any bar of any dia for reinforcement may be procured in round bundles or coils and the cost of straightening the same shall be borne by the contractor. When bars are procured in bundles, the length of each bundle shall be worked out on the basis of unit weight predetermined by the Project Director by getting suitable length (not less than 3 metres) out of each consignment received, getting it straightened, length measured and weighed in presence of contractor's accredited representative. The said length and the weight shall be recorded from which unit weight (weight per unit length) shall be calculated. The length of bars worked out on the basis of unit weight determined as above shall form the basis for the purpose of calculating quantity of steel used/to be used in work and making payment of materials lying at site. However if the unit weight works out more than the unit weight given in IS, then unit weight given in IS shall be followed for computing weight of steel for the purpose of making payment of steel lying at site.

11. STORAGE

Steel of different sizes shall be stacked separately. For each classification of steel, separate areas shall be earmarked. Steel shall be marked with distinct painting marks for easy identification. All steel shall be so stored that it is always at least 15cm above the GL Steel shall be stored in a manner so as to prevent distortion and corrosion. Any section that has deteriorated and corroded or if considered defective by Project Director shall not be used in the works and shall be removed by the contractor without any extra cost. It will be the responsibility of the contractor to make sure that all possible arrangements are made for the safe custody of the steel. In case of any loss of steel only contractor will be responsible and the loss will/shall be made good without any delay or claim what so ever.

12. SCHEDULING AND SUPPLY

Schedule of supply of steel shall be finalised by contractor with Project Director and shall be incorporated in CPM chart so that supply of steel is monitored in a way to avoid any delay in completion of the work. The complete requirement of steel of various sizes will be worked out before making any RAR payment and procurement of steel by the contractor will be completed sufficiently in advance of the date of completion, No extension of time will be considered for non availability of any section of steel. The steel procured at site will be recorded in measurement book (not to Abstract) and documented in the "Steel supply acceptance forms" (refer Annexure 'B' on page 210)

13. Assembly of reinforcement shall be as per clause 12 of IS 456-2000.**14. BINDING WIRE**

Binding wire shall be black annealed steel wire conforming to IS:280 and of minimum 18 guage, except for galvanized reinforcement the wire shall be galvanized steel wire.

15. WELDING ELECTRODES

Electrodes used for welding of steel bars shall be ordinary mild steel grade electrodes confirming to IS: 814 and shall be of the best quality approved by the Architect and Project Director.

16. FABRICATION

- a. Reinforcement steel shall be carefully and accurately cut, bent or formed to the dimensions and configurations as shown on the drawings and approved bar bending schedules.
- b. All reinforcement shall be bent cold using appropriate pin sizes. (Bars maybe preheated only on approval of the Architect and Project Director. Bars shall not be cooled by quenching. Bends and tolerances shall be in accordance with IS: 2502.
- c. It shall be ensured that the bars are not bent or straightened in any manner that will injure the material. Any bars incorrectly bent shall be used only after straightening and re-bending such as not to affect the material adversely.
- d. Reinforcement shall be fixed without forcing in the position shown on the drawings with a tolerance of 5mm or 5% of the minimum dimension of cross section which ever be the greater and maintained so that it is not displaced during concreting or other operations.

LAPPING

- e. As far as possible bars of maximum length available shall be used. All bars shall be in one length unless otherwise shown on the drawings or agreed with the Architect and Project Director.
- f. Laps shown on the drawings or otherwise specified shall be based on the use of bars of maximum length by the contractor. In case the contractor wishes to use shorter bars such laps shall be provided at the Contractor's cost in the manner and locations approved by the Architect.
- g. Not more than 1/3rd of the bars or as specified in the drawings shall be lapped at one section.
- h. Reinforcement bars shall not be welded unless shown on the drawings or instructed by the Architect and Project Director.

PLACEMENT

- i. All reinforcement shall be placed accurately and maintained in the position indicated on the drawings. The contractor shall provide approved type of supports for maintaining the bars in position and ensuring required spacing and correct cover of concrete to the reinforcement as called for in the drawings. Pre-cast cement concrete blocks as approved PVC chairs of required shape and size, MS or other approved chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. Pre-cast concrete blocks shall be cast well in advance and shall be at least equal in quality to the class of concrete specified in the work.
- j. Should any difficulty arise during the placing of steel in obtaining the appropriate cover the contractor shall immediately draw the attention of the Architect and Project Director to the difficulty and shall carry out such corrective measures as directed by the Architect and Project Director.
- k. All intersections of the reinforcements shall be securely tied with two or more strands of binding wire twisted tight to make skeleton or net work rigid so that the reinforcement is not displaced during placing of concrete.

- I. Tack welding of crossing bars shall be done as authorized or directed by the Architect and Project Director. Nothing extra will be paid for tack welding.
- m. The contractor shall take all reasonable precautions to ensure that when handling or erecting reinforcement no damage shall be done to finished concrete. Bars that are partially embedded in concrete shall not be filed bend unless concurrence has been obtained from the Architect and Project Director.
- n. Walkways and borrow runs for placing and compacting the concrete shall be independent of the reinforcement.
- o. Loose binding wire and other extraneous matter shall be removed from inside the form work prior to concrete placing.
- p. Without relieving the contractor of the responsibilities for the correctness thereof, the reinforcement shall be inspected and approved by the Architect and Project Director in writing before any concrete is placed and the contractor shall allow sufficient time for such inspection and any subsequent remedial action to be carried out.
- q. No part of the reinforcement shall be used for conducting electrical currents.

CLEANING

- r. After placing, the reinforcement shall be maintained in a clean condition until the concrete is placed. On no account the bars shall be oiled or painted or mould oil used on the form work be allowed to come in contact with the bars.
- s. Before concreting is commenced, the base shall be thoroughly cleaned with dry gunny bags if they are coated tightly with rust or other impurities.

17. HOLDFASTS

Holdfasts shall be made out of MS flats of size as specified in Section IV with split fish tail ends coated with anti-rust paint/ tar. Hold fasts shall be fixed to door/window frame as specified in Section- IV.

18. STEEL DOORS

Steel doors shall be provided to the openings at Electrical room, /Elec./TV/Tel. ducts/Fire fighting ducts, pump room for underground water tank, Mumty and Panel room and as per details as shown on drawings. Specifications in respect of frames and shutters shall be as under:

- a) Frames for Steel Doors:-
- i) Frames shall be 40X40X6 mm conforming to IS-4351. The overall size and type of door frames (single rebated) shall be made as shown on drawings:
- ii) Each door frame shall consist of hinge jamb and head mullions where shown on drawings. The whole frame shall be welded. Two base ties of MS angle 25x25x3mm shall be welded to the feet of frame in order to form a rigid unit. The tie shall not be removed after fixing in position. This shall get embedded in the floor concrete. The frame shall be fixed to the wall with MS lugs of size 150 X 25 X 4 mm (3 no's each side)

- iii) Three numbers, 100mm long heavy duty butt hinges shall be provided for each leaf. These shall be welded to the steel frame. Necessary provisions/slots shall be made for fixing locks, tower bolts, sliding bolts etc. Suitable sizes of flat 6mm thickness and mortar guards are to be welded at the rear of frame where slots, holes etc. are to be provided.
- iv) Vertical member of the door frame shall be 30mm more than the specified height and shall be embedded in floor at all levels. All members of the frame shall be sand papered to remove all scale and rust. A coat of red oxide zinc chromate primer shall be applied all round as per manufacturer's specifications.
- b) Steel Shutters for Doors: These shall be fabricated out of shutter frame of MS angle 25x25x4mm welded with 1.00 mm MS sheet. Diagonal braces and central cross piece of MS flat 30X6 mm shall be fixed using gusset plates as shown on drawings. Necessary fitting and locking arrangement shall be made as per drawings. Sample of the shutter shall be approved by Project Director/ Architect. All members shall be sand papered to remove all scale and rust. A coat of red oxide zinc chromate primer shall be applied as per manufacturer's specifications.
- c) All shutters as described in paras 18(b) above shall be factory made. The manufacturer shall be from the approved list of manufacturers.
- c) All the frames and shutters shall be enamel painted.
- d) Hardware for Steel Shutters shall be as shown on drawing.

19. M.S. RAILING TO MAIN STAIRCASE, FIRE STAIRCASE, LIFT LOBBY STEPS & RAMPS TERRACE ATTACHED TO Plot-Dev AND BALCONIES

- a) Main / Fire Stair Case and Lobby Steps / Ramp Railings

The railing for Main / Fire Stair Case and Lobby Steps / Ramp wherever applicable shall be as per details shown on the drawing. The bottoms of supports / verticals shall be welded to heavy duty M.S. base plates well secured to R.C.C. with anchor fasteners / holdfasts and / or covered with M.S. flanges. The work shall be as per the detail drawings / design.

- b) Balcony / Terrace attached to Plot-Dev Railing:

The railing for Balcony / Terrace attached to Plot-Dev shall be as per details shown on the drawing. The bottoms of supports / verticals welded to MS plates shall be embedded in concrete. Granite 15 mm. Thick shall be fixed to a sill as shown on drawings.

20. M.S. GRILL FOR SHAFTS IN FLOORS

MS Grills shall be of pattern as shown in drawing and shall be provided complete fixing, priming & painting to grills at all opening in shafts at all floor levels except at stilt floor . Grills shall be fixed in floors as shown in drawings.

21. M.S. CAGE LADDER

Contractor shall provide Cage Ladders fabricated out of 25mm dia and 16mm dia steel bars. Cage ladder shall be fixed at the locations as shown on detail drawing. Steel surface shall be painted with synthetic enamel paint (two or more coats) over a coat of steel primers of approved shade.

22. WELDING

The process adopted shall be electric arc welding taking all safety precautions. The places to be welded shall be cut angularly so that the welding material does not protrude and the members to be welded join properly. The welds shall be ground clean to give a one piece appearance. The welds shall run around the contact surfaces of two meeting sections. Throat thickness shall not be less than 4mm. spot welding shall not be permitted.

23. M.S. ROLLING SHUTTER

Rolling shutters of approved make and made of 80x1.20 mm M.S. laths with 1.20 mm thick top cover, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside & outside locking with push & pull operation complete, including ball bearing , necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454- part 1 and M.S. top cover of required thickness.

Annexure 'B'**STEEL SUPPLY ACCEPTANCE FORM**

Contract No.

Name of work.

Control No. Date

Details of purchase

(a) Particulars of Manufacturers

(i) Invoice No..... (ii) Invoice Date

(b) Details of supplier (if any)

Details of Test Certificate :

(a) No and Date

(b) Particulars of the issuing authority.....

Sl. No.	Nomen clature & size of steel bars	IS Ref	Quantity (MT)		Physical Properties								Remarks	
			Actual	Conversion	UTS (N/Sqmm)				Elongation (%)					
					IS	Test Shee t	Rando m Test	IS	Test Sheet	Rando m Test	Bend Rest			
1	2	3	4	5	6	7	8	9	10	11	12	13		

J.E.

Architect

Contractor

Remarks with signature
of PD, AWHO

Acceptance / Rejected

SECTION-VII
ROOF COVERING, WATER PROOFING AND RAIN WATER PIPES

1. EXPOSED TERRACES AND ROOF SLABS

All roof slabs of DU's, over head water tank, munties and such other areas shall be cleaned thoroughly and. The slope for Waterproofing shall be minimum 1:80.

1.1 WATER PROOFING TREATMENT. Suitable water proofing treatment shall be carried out all as specified in CPWD Specifications. Contractor shall ensure no water leakage /seepage in Basement , roofs and toilets .

Water treatment on floor/walls shall be as per latest specification/trends . SIKA /FOSROC / STP /Choksey Chemicals as details given in Particular Specifications for minimum life of 10 years shall be used.

1.2 a) Clean the RCC slab surface including sides upto 300mm high by wire brush including raking and cleaning of construction joint if any.

b) Applying and grouting a slurry coat of neat cement using 2.75kg /sqm. of cement admixed with proprietary acrylic based water proofing compound conforming to IS-2645 over the RCC slab and sides upto 300mm high.

c) Lay 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) admixed with proprietary acrylic based water proofing compound conforming to IS - 2645.

d) A gola in concave shape 75 x 75mm in cement mortar 1:4 (1 cement: 4 coarse sand) admixed with acrylic based water proofing compound conforming to IS-2645 with brick bats embedded in it at the junction of horizontal surface and side walls.

e) 20 mm thick cement plaster 1:4 (1 cement : 4 coarse sand) admixed with proprietary acrylic based water proofing compound conforming to IS-2645 over the gola upto 300mm high on side walls. This plaster will be in continuation of plaster provided to horizontal surface as per sub para (g) above.

(f) After testing of terrace it shall be finally finish with crazy ceramic tile (Broken glazed/ ceramic/ non skid/ vitrified tiles) shall be laid as per pattern shown in drawings with under layer of 12 mm thick cement mortar 1:4 (1Cement :4 Coarse sand), with joints not exceeding 5 mm, including filling the gaps with ordinary cement mixture & mixing with synthetic polyester fibres, triangular in shape having specific gravity of 1.34 to 1.40, cross section of size ranging from 10 to 40 micron & length upto 6 mm, mixing fibre @ 125 grams per 50Kg of cement in cement mortar @ 1kg per 50 Kg of cement, all complete as per direction of Architect and Project Director.

2. WATER PROOFING TREATMENT TO SUNKEN / LOWERED SLAB OF TOILETS WITH PLOT-DEV

Water proofing treatment shall be provided to sunken / lowered portions of slabs wherever designed for laying of service pipes above the sunken slab as per design drawings. For these areas, this shall be carried out as under:-

a) All pipes passing through the walls of the sunken floors shall be laid before the waterproofing treatment is carried out. One number 50mm dia, 35cm long uPVC pipe spout with wire gauze on inside mouth shall be provided to each sunken portion at the time of casting of the sunken RCC slab/beam.

- b) Clear the sunken /lowered portion of RCC slab surface (including vertical total depth plus skirting height of floors by wire brush. Chisel out any mortar sticking to the surface thereafter rendering of uneven surfaces with 6 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) mixed with integral water proofing compound to make it even.
- c) All junction points of side walls where pipes are passing through shall be sealed with epoxy putty.
- d) After drying of putty, wash the slab and sides of sunken portion with water and make it clear and clean.
- e) Apply two/three coats of polymer modified cementitious waterproof coating as per manufacturers specifications to bottom and vertical sides up to skirting height of the floors. The proportion and procedure of application of the water proofing treatment shall be as per the recommendations of the manufacturer or the specialist agency carrying out the water proofing treatment.
- f) Test the waterproofed area by filling water for at least 7 days. In case any leakage/seepage is noticed the waterproofing treatment shall be repeated as per para 2 (b) to 2 (e) mentioned above and retested to the satisfaction of the Architect and Project Director.
- g) Plaster the bottom and sides upto bottom of skirting with minimum 20mm thick cement mortar 1:4 mixed with integral water proofing compound as per manufacturer's specifications including rounding of corners and junctions and sloping towards spout.
- h) Test the water proof area by filling water for at least 7 days. In case leakage/seepage is noticed, the water proofing treatment shall be rectified and retested to the satisfaction of Architect and Project Director.
- i) Once pipes are laid, they should be covered with 50 mm thick PCC 1:2:4 all around before PCC filling as mentioned herein after.
- j) Filling with PCC 1:2:4 (1 cement: 2 coarse sand: 4 graded brick aggregate 20mm nominal size).
- k) Floor finish shall be as specified here-in-after.
- l) For pipes passing through slabs/beams, they should be done by means of concrete core cutting by mechanical means of approve size as per direction of Project Director /Architect. No sleeves are permitted during concreting for the above purposes except for the purposes of spout as mentioned above in 2(a).

3. BLANK

4. **WATER PROOFING TREATMENT FOR UNDERGROUND WATER TANK, UNDERGROUND RAIN WATER RETENTION STORAGE AND WATER TANK, UNDERGROUND RCC SEWAGE TREATMENT STORAGE TANK**

- a) Clean the surface of lean concrete (laid below the RCC Base Slab) with wire brushes and pad of cloths to remove all dirt, loose materials and kept dry.

- b) Apply two coats of Single component modified polyurethane Elastomeric liquid LHM of STP or other approved vendor having an Elongation more than 500%, Temp Resistance -15° to +85°C. First coat LHM 800 gms/sqm will be applied over a primed surface, after curing of first coat apply second coat of 800 gms/sqm. The overall thickness after application of two layers shall be 1.50 mm and it forms a seamless monolithic waterproofing membranes confirming to ASTM C – 898 89, C 836 89A.
- c) Apply sand spray about @ 3-4 Kg/ sqm of surface area as per direction of manufacturer and approval of Architect and Project Director.
- d) Lay 30mm thick layer of concrete of mix 1:2:4 admixed with approved water proofing compound conforming to IS-2645 Water curing shall be done as per specification.
- e) All pipes and flanges passing through slab / side walls should be fixed before casting of concrete.
- f) RCC Base Slab and wall shall be cast with the specified grade of concrete admixed with super plasticiser conforming to IS 9103. The proportion shall be as per manufacturer's specification/design mix.
- g) After concreting of RCC walls and curing for 7 days holes of appropriate size shall be made and 18 mm dia Heavy Duty PVC Pipe nozzles shall be fixed in the RCC base slab upto depth of half the thickness of the slab and in walls upto a minimum depth of 25mm in a triangular pattern at interval not exceeding 80 cm centre to centre. It will be ensured that the reinforcement is not damaged during drilling holes for nozzles. Nozzles shall be also be placed along the construction joints and at critical points as considered necessary and shall protrude above the slab/wall to allow grouting hose to be connected to them for grouting. These shall be kept plugged till grouting to keep out grit and dirt. The nozzles shall be strong enough to withstand the pressure of injection grouting.
- h) Injection grouting shall be carried out through the nozzles under pressure to ensure that the grout runs through holes and cracks in concrete and the same are sealed. Free Flow Non Shrink Cementitious Grout of reputed company and approved make shall be used for grouting as per manufacturer's specifications.
- i) After injection grouting, nozzles shall be cut and sealed with proprietary chemical admixed with cement and as per the manufacturer's specifications and approved by Employer/AWHO/Architect.
- j) All corners of tank and junctions of pipes and concrete shall be sealed with Food Grade Epoxy Putty.
- k) Applying two coats of polymer modified cementitious waterproof coating shall be applied on the internal surface of base slab and walls and external surfaces as well
- l) Apply cement plaster 20 mm thick to all sides, bottoms, corners, chamfers etc in cement mortar 1:4 (1 cement : 4 coarse sand) mixed with integral water proofing compound on the internal and external surfaces of the tank
- m) Commercial white Glazed tiles of min. size 200X150mm shall then be fixed on the internal surface of the tank using antifungal tile grout as directed by Architect and Project Director.
- n) **Testing:** The underground tank shall not be kept dry for a period longer than 4 weeks as it may lead to formation of cracks. So it is imperative that all preliminaries including arrangement of water for testing are ready at site. Testing shall be done in as under:-

- i) Water will be supplied to the tank slowly at the rate of 300 to 450 mm depth of reservoir per day and the result closely observed, both from the angle of structural stability whether any crack is being noticed anywhere in the structure at any time and from the point of view of water tightness. At the end of the operation, that is, when full supply level is reached, all valves shall be closed tightly. The water level in the tank shall be properly marked on the wall. Leakage through the valves should be checked and there should not be any drop due to the same. After 24, 48 and 72 hours, the levels shall be checked and the drops in level will be a measure of water-tightness.
- ii) The permissible standard usually adopted is 6 mm drop in 24 hours in case of covered reservoir and 12mm in case of open reservoirs. Necessary adjustment should be made depending on the relative humidity and other local conditions.
- iii) If there is no drop, but dampness is observed in the outer surface, such dampness may vanish in course of time as the free lime ejected out of cement will be plugging the minor pores causing such dampness.
- iv) It is sometimes difficult to locate the source of leakages in case of underground reservoirs. If it is from the floor, it is hardly possible to locate unless clear cracks are noticed and hence complete floor will have to be treated. So in such case of underground reservoir, the drop in level should be recorded for every 300 mm after keeping the water for 24 hours. If at some stage, there is no drop, then it is presumed that floor is in order and the wall above that height is only responsible for leakage. If drops are noticed all through, it may be only the floor which is responsible for the leakage or both floor and the wall. The source of leakages needs to be identified and marked and injection grouting shall be resorted to at the points of leakages.
- v) In cases where the ground water table is higher than the bottom of the tank, test will be carried out against water seeping into the tank by backfilling. The backfill shall be kept wet for a period of at least 7 days and in case of leakage the points of leakages/seepages will be identified and marked and remedial measures shall be taken by injection grouting and application of polymer modified cementitious coating from inside as considered essential.

5. ROOF SLAB OF UNDERGROUND WATER TANK WITHOUT EARTH FILL/ LANDSCAPE:

- a) Clean the RCC slab surfaces by wire brush, raking and cleaning of construction joints, if any.
- b) Apply and grout a slurry coat of neat cement admixed with approved integral water proofing compound conforming to IS 2645 over the RCC Slab.
- c) Lay 20mm thick layer of cement mortar of mix 1:4(1 cement : 4 coarse sand) admixed with approved integral water proofing compound conforming to IS – 2645.
- d) Lay a layer of broken bricks/brick bats (coba) 25mm to 80mm size with 50% cement mortar 1:4 (1cement : 4 coarse sand) admixed with approved water proofing compound conforming to IS – 2645 to required slope.
- e) After two days of curing apply second coat of cement slurry admixed with approved water proofing compound conforming to IS – 2645.
- f) Finish the surface with 20 mm thick joint less cement plaster 1:4 (1 cement : 4 coarse sand) admixed with approved integral water proofing compound conforming to IS – 2645 and finishing the surface with trowel with neat cement and making with 300 x 300 mm false square or as approved by Project Director/Architect.

- g) Average thickness of the above treatment shall be 120mm.
- h) The whole treated portion shall be flooded with water for two weeks for curing and testing. In case any leakage/seepage is noticed then the affected area shall be repeated as per para 5(b) to 5 (f) mentioned above and retested to the satisfaction of the Project Director/Architect.

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8. ROOF SLAB OF UNDERGROUND TANK, RAIN WATER RETENTION STORAGE TANK WITH PUMP, SEWAGE TANK AND SEWAGE STORAGE TREATMENT PLANT

- a) Clean the surface of RCC Slab with wire brushes and pad of cloths to remove all dirt, loose materials and kept dry.
- b) Providing and laying water proofing treatment to vertical and horizontal surfaces consisting of:
 - i) 1st course of applying cement slurry @ 4.4 kg / sq.m. mixed with water proofing compound conforming to IS 2645 in recommended proportions including rounding off junction of vertical and horizontal surface.
 - ii) 2nd course of 20 mm cement plaster 1:3 (1 cement: 3 coarse sand) mixed with water proofing compound in recommended proportion including rounding off junction of vertical and horizontal surface.
 - iii) 3rd course of applying blown or residual bitumen applied hot at 1.7 kg. per sq.m. of area.
 - iv) 4th course of 500 micron thick LDP sheet. (Overlaps at joints of LDP sheet should be 100 mm wide and pasted to each other with bitumen @ 1.7 kg/sq.m).
- c) Laying 25 mm thick layer of cement concrete of mix 1:2:4 (1 Cement: 2 coarse sand: 4 graded stone aggregate 12.5 mm nominal size), over LDP film, admixed with approved water proofing compound conforming to IS-2645 and treating similarly the up stand (if provided) upto 100mm height above the earth filling over the slab including rounding of junctions of up stand and slabs.
- d) The slab shall then be tested by allowing water to stagnate for at least seven days. In case any leakage/seepage is noticed the waterproofing treatment shall be repeat as per para 7(b) to 7(c) above and retested to the satisfaction of the Project Director/Architect.
- e) Supplying, filling, spreading & leveling gravels of size range 5 mm to 10 mm, over the existing layer of screed, in required thickness as shown in drawing, for all leads & lifts, all complete as per direction of the Project Director/Architect.
- f) Apply Two coats of Component Elastomeric Coating EWP having, Temp Resistance -10° to +70°C of STP or other approved venders. First coat of 1.25 kgs/sqm of EWP will be applied over a prepared surface. When first coat is tacky then apply 120 Gsm Needle Punctured non woven polyester geo textile of STP or other approved vender and then finally apply second coat of 1.25 kgs/sqm of EWP.

g) Supplying, filling, spreading & leveling coarse sand of size range 1.5 mm to 2 mm, in required thickness over non woven geotextile sheet, for all leads & lifts, all complete as per direction of the Project Director/Architect.

h) Supplying, filling, spreading & leveling of good earth at site including royalty and carriage.

9. WATER PROOFING TREATMENT OF CHHAJJAS AND SUNSHADES –

Slab of Chhajjas and sunshade shall be cleaned thoroughly including sides up to maximum height of 100mm by wire brush and following treatment /covering shall be provided:-

- a) Apply treatment as per Para 1(b) above in case of brick wall above slab up to a maximum height of 100mm above junction of slab and brick wall.
- f) Coving of radius 80 mm in concave shape in cement concrete 1:2:4 admixed with integral liquid water proofing compound and finished with cement mortar 1:4 (1 cement : 4 coarse sand) admixed with approved integral liquid water proofing compound conforming to IS-2645 stone aggregate, is to be provided at the junction of horizontal surface & side walls.
- c) Finishing with 12mm plaster in cement mortar 1:4 (1 cement: 4 coarse sand) mixed with integral water proofing compound. This shall be applied after treatment at Para 8(b) above.
- d) The treatment as specified herein before shall act as an under layer for external finish.

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11. Rain Water Pipes:

- a) The rain water pipes shall be uPVC of type A confirming to IS 13592-1992 and of approved make. The pipe shall start from ground level with bend as shown on drawing and a Tee junction shall be provided at all terrace levels to collect water and vertical pipe shall be extended upto 15 cms. above top of parapet wall. At top cowl of the same material shall be provided. The arrangement of connecting the vertical R.W.P. with the Khuras at the terrace level, balconies and at any other inlet pipe shall be as per details shown in drawing. Joints in rain water pipes & fittings shall be filled with approved sealant.
- b) Rain water pipes shall be concealed / open in locations as shown on drawing. Where the rain water pipes are to be provided concealed, these shall be embedded in the walls with P.C.C. 1:3:6 (1 cement: 3 coarse sand : 6 stone aggregate 20mm down gauge) and in columns with P.C.C. 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 20mm down gauge) encasing all round. All the open RWP shall be properly clamped by means of MS clamps of approved design.
- c) Cast Iron grating 15cm diameter and weighing not less than 440 grams at the inlet of every pipe at all balcony & terrace levels shall be provided and shall fit snugly on the socket end of the pipe. The perforations in the grating shall be at least 60% of the total areas of grating.
- d) All the exposed R.W.P. shall be properly clamped by means of heavy duty pipe clamps.

12. uPVC SPOUTS: uPVC spouts (medium grade) shall be provided to terrace and in planters at all locations. These shall be 50mm/ 65mm/ 75mm/ 100 mm dia, 300 mm long as per the locations as indicated on drawings.

NOTES:-

1. Water proofing treatments as above shall be carried out through a specialist firm only as approved by the Project Director.

Name of firms for Water Proofing Treatment are given below:-

- a. M/s India Water Proofing Co., Rohit Chambers, S A Brelvi Road, Mumbai- 400001
- b. M/s HinPlot-Devtan Water Proofing Co., 160 corner of Shaukat Ali Road, Mumbai- 400006
- c. M/s Likprof India Pvt. Ltd., Council Court, M Bhushan Road, Mumbai- 400039
- d. M/s Overseas Water Proofing Corporation, 2nd floor, Baldota Bhavan, M Karve Road, Mumbai- 400020

2. The Contractor shall maintain a record of the tests for waterproofing work which will be signed/ certified by the Project Director/ Architec. Tests for waterproofing work shall be carried out by ponding of water for two weeks as per relevant clause of CPWD specifications .
3. Top slab of all overhead water tanks, sunshade, chhajjas and at similar location, these shall be casted giving slope / gradient on all sides so, that water can be drained naturally. It shall then be finished with admixture of approved water proofing compound as per manufacturer's instructions.
4. The Principal guarantor (contractor) along with Specialist firm, who carried out Water Proofing Treatment, shall also give the Guarantee on a Non-Judicial stamp paper of value of Rs. 100/- for a period of ten years as per Appendix 'F' & 'G'. Bank guarantee shall be @ Rs. 1/- per Rs. 2000/- of contract value for Ten years and shall be released after completion of 10 years . .

SECTION-VIII
FLOORING

1. FLOORING:-

Floors shall be provided inside the rooms, passages, entrance lobbies, kitchens, toilets, balconies, attached terraces to Plot-Dev, stairs, landings, ducts, Mumties, common passages, lift lobbies, stilt, electrical meter rooms in stilts, driver's room with toilet and toilets for maids and ramps etc. Floor shall be laid to level and/or to slope as shown on drawings and as required and directed by Project Director/ Architect. Floor shall be carried through all the doors and other openings and over dwarf walls. Exposed edge of floors shall be finished in the same manner as for top surfaces. Skirting shall match with floor unless otherwise specifically specified in succeeding paragraphs. The floor finishes shall be as per schedule of finishes as per drawing and as specified as under:-

a)	Floor of Drawing, Dining, Kitchen, all Bed Rooms and dressing area.	:	Polished vitrified tiles with matching skirting as per design & details shown on the drawing and specifications.
b)	Floor of all toilets of Plot-Dev, store, Walk-in Closets & toilets at stilt floors.	:	Non-skid ceramic tile flooring with matching skirting as per design & details shown on the drawing and specifications.
c)	Balconies and attached terraces to Plot-Dev	:	Non-Skid ceramic tiles with matching skirting as per design & details shown on the drawing and specifications.
d)	Corridor, Lift lobby, main staircase, landings, risers & treads at ground floor & first floor.	:	Flooring in combination of Udaipur Green Marble stone/White Rajnagar marble laid in pattern (Corridor, Lift lobby, main staircase, landings), Udaipur Green Marble in treads & White Rajnagar marble to risers as per design & details and wherever shown on drawing and cills wherever M.S. railing is fitted as shown on drawings.
e)	Main staircase except from ground to first floor and Fire staircase at all floors.	:	Mirror polished kota stone with matching skirting and cills wherever M.S. railing is fitted / shown.
f)	Electrical room in stilts, Driver's Rooms, HT, LT, Transformer, metre, ducts & shafts at ground floors	:	Plain cement concrete (IPS) floor with matching skirting.
g)	Stilts, Podium, Basement and Ramps	:	P.C.C. with non metallic liquid hardener topping.
h)	Plinth Protection	:	Cement concrete with finish as per drawings.
i)	Handicap Ramps to main entry of the block	:	250X250X25 mm chequered cement concrete tiles
j)	Society office at stilt of 'G' block	:	Flooring in white Rajnagar marble with a border of Udaipur Green Marble as per design & details shown in drawing.

Note:- Udaipur green marble stone flooring with combination of Rajnagar white Marble / Jaisalmer flooring pattern and skirting shall be rubbed and mirror polished to granolithic finish as described here in after.

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4. **PLAIN CEMENT CONCRETE FLOORING AND SKIRTING (IPS)**

- a) Plain cement concrete floor shall be 40 mm thick concrete floor 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) with 6 mm thick 38mm wide rigid PVC strips. These strips shall be laid in position to form bays of maximum size 12.50sq. m. as directed by Project Director/Architect. The top surface shall be finished smooth with floating coat of neat cement using steel float while the concrete is green.
- b) **Skirting**: To match P.C.C. floors 18mm thick plaster in cement mortar of mix 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement shall be applied to skirting. The skirting shall be 100mm high and it shall be so provided that it is projected 6mm from plastered surfaces of walls and columns.

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SECTION - IX **WALL FINISHES**

INTERNAL / SMOOTH SURFACES OF BRICK WORK

1. Cement plastering internally on all internal / smooth surfaces including soffits of RCC slabs, chhajjas, lintels, alround loft slabs, toilet counters & shelves, lifts wells and inner sides of parapets excluding lift facia shall be as under :-
 - a) 12 mm thick plaster in cement mortar 1:6 (1 cement : 6 parts of 75% of fine sand and 25% coarse sand) on internal / smooth masonry and concrete surfaces.
 - b) 6 mm thick plaster in cement mortar 1:3 (1 cement : 3 fine sand) on soffits of RCC slabs/beams, chhajjas/cantilevers, soffits of kitchen platforms, lintels, toilet counters, fins, pergolas, facias and base slab of staircases shall be provided.
 - (c) Cornices shall be provided at locations and sizes as shown in drawings.
 - (d) GI chicken wire mesh 24 gauge and 12 mm mesh shall be fixed on electrical conduits in walls and all along RCC and Brick joints in a width of 150 mm with cement slurry pegs/nails before plastering.
 - (e) 12mm thick cement plaster in cement mortar 1:4 (1 cement : 4 coarse sand) mixed with water proofing compound CICO-1 (liquid) or Impermo (Snowcem) or equivalent as per manufacturer's instruction shall be done on the internal surfaces of pipe shaft walls, parapet walls and internal surfaces of 100 / 150 mm thick walls of cupboards, shafts, etc. including dubbing out wherever required.
 - (f) Before plastering it should be ensured that brick masonry joints are raked out (at least on even surfaces) to a depth of 12mm and all concrete surfaces are rough enough for proper adhesion of plaster. If not they shall be made rough by hacking or bush hammering at intervals of 50mm. Efflorescence, if any, and Plot-Devt/dirt shall be removed. The surfaces shall be wetted adequately before plastering.
 - (g) Sand used in plaster shall be within the grading zones as stipulated in the IS, silt contents shall not exceed 4% by weight. Brick surfaces shall be raked out at the end of the day brickwork to afford key to plaster. Plaster surface shall be hard and even without patchy appearance. If they flake or show scratch marks if rubbed by a pointed nail the plaster shall be rejected, dislodged and redone.
 - (h) 12 mm thick cement plaster in cement mortar 1:6 shall be provided to all internal / smooth faces of lift walls, ducts and shafts.
2. **Drip Course:** Drip course of 25mm wide and 10mm deep shall be provided at all projections, soffits of slabs, beams, chhajjas Balcony, etc.

3. EXTERNAL / ROUGH FINISH OF BRICK WORK:-

- (a) 18mm thick cement plaster in two coats shall be provided as described herein-after to all Rough finish surfaces at all locations as shown on drawings.
- (b) Under coat - 10mm thick cement plaster in cement mortar 1:5 (1 cement: 5 part of 75% of fine sand and 25% coarse sand) mixed with Poly Propylene Plast fibre (TASHI India Ltd.) @ 125 gms. Per 50 kgs. of cement, over brick and concrete surfaces. Dubbing out wherever required (i.e., bringing up the undulation on the rough face of brickwork in level with proudest points). Plaster surface shall be brought to a true surface a wooden straight edge and the surface shall be left (rough and furrowed) 2mm deep with a scratching tool diagonally both ways to form a key for the finishing coat. The surface shall be kept wet till the finishing coat is applied.
- (c) Finishing coat - 5mm thick finishing coat in cement mortar 1:4 (1 cement : 4 fine sand) mixed with approved water proofing compound and shall have an average total thickness of not less than 18mm.
- (d) Suitable scaffolding to be used shall have sound and strong supporters tied together with horizontal pieces over which scaffolding planks shall rest to ensure that for horizontal support no holes are made in the walls.
- (e) Before application of undercoat of plaster, the surfaces shall be prepared by raking out joints properly and brushing out the Plot-Devt and loose mortar and washed thoroughly with water and kept wet.
- (f) Contractor to get a sample approved prior to start the work from the Project Director/ Architect.
- (g) At specified locations, grooves of size 20X6 mm shall be provided as per drawing. Grooves shall be treated with cement mortar 1:2 (1 cement: 2 coarse sand) mixed with water proofing compound & pigment as directed.
- (h) Mouldings shall be provided at locations and sizes as shown in drawings
- (i) Rough finish surfaces shall be finished with one coat of primer and two coats of texture paint as per direction and approval of Project Director/ Architect over external plaster as directed at site.

4. **POP CORNICES AND MOULDINGS:-**

POP Cornices and moulding shall be provided in all rooms of each Plot-Dev of each type of blocks and club house with toilets building at all locations as shown in drawings. The size and shape of cornices and moulding shall be provided as per direction of Architect and Project Director and as per design drawings. Material used for Cornices and mouldings shall be of Plaster of Paris of approved make.

SECTION X

WHITE WASHING, WATER PROOF CEMENT BASE PAINT, DISTEMPER AND PAINTING

1. White wash shall be provided to ceilings of stilts, driver's rooms and toilets under stilts, ceiling of basement, podium, electrical / meter / panel rooms and internal wall surfaces of lift wells, ducts, toilets above dado, electrical rooms, meter room etc.
2. Before application of white wash, the surfaces shall be prepared to a clean and even surface.
3. White wash (lime wash) shall be carried out in three coats.
4. White wash shall be prepared from lime slaked on site, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for 24 hours and shall be screened through clean cloth. Four kg. of gum dissolved in hot water shall be added to each cubic Metre of the cream (115 gm/cft). Blue shall be added to give required whiteness. The approximate quantity of water to be added in making cream shall be five litres per kg. of lime. 10% zinc oxide shall also be added to obtain a desired shining in the white wash.
5. White wash and Acrylic washable distemper (with rollers) shall be applied in specified coats by using flat brushes or spray pumps. Each coat shall be allowed to dry before next coat is applied, if additional coats than what have been specified are necessary to obtain uniform and smooth finish it shall be given at no extra cost.
6. Cement based water proof paint in two or more coats including one layer of prime coat shall be applied to walls of fire staircases, ceiling of mumties & soffits of main and fire staircases, wall and columns of stilt, basement & podium, shafts etc.
7. Acrylic washable distemper shall be carried out in two or more coats over one or more coat of cement primer. Before application of Acrylic distemper, the surface shall be prepared with Birla/JK wall putty as per manufacturer's instructions. Surface shall be prepared to clean even and smooth by sand papering etc. Acrylic washable distemper shall be carried out in two or more coats over one or more coat of cement primer as per manufacturer's instructions to give even shades. Acrylic washable distemper shall be applied with rollers.
8. Exterior anti fungal Weather Proof Emulsion paint of approved shade in three coats with rollers including one coat of primer shall be provided to ceiling and internal walls of balconies and attached terrace of Plot-Dev.
9. The finished dry surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed.

PAINTING

10. **Textured Exterior Finish :** All external plastered surfaces of all blocks including outer sides of walls of balconies, attached terraces of Plot-Dev and parapets of balcony & attached terraces, external surface of OH tanks, mumties, etc. shall be finished with two or more coats of textured exterior paint @ 3.84 Kg/ 10 sqm. over one priming coat of exterior primer @ 2.20 kg/ 10 sqm. of approved make. Texture coatings are acrylic quartz coatings made from Acrylic co-polymer binders, quartz, silica, minerals aggregates, synthetic inorganic pigments, silicones, uv-resistant pigments, biocides, fungicides and various other chemicals as per manufacturer's instructions. The work includes vertical and horizontal grooves and patterns as directed including preparing the base surface, attending to broken edges, corners or patches of plastered surface and filling with cementitious grout, scaffolding, staging, cleaning the surface etc. complete as per direction of Project Director and Architect.

11. CEMENT BASE WATER PROOF PAINT

Two or more coat of cement base paint shall be applied, over a coat of cement primer, to give even shade on plaster of areas mentioned above. The shade of paint shall be used as approved by Project Director/ Architect. Each coat shall be cured well by wetting surfaces for at least three days.

12. PAINTING/POLISHING TO WOODEN SURFACES

- a) All main entrance door frames & shutters and internal door frames and shutters with teak finish shall be spirit polished in the required shade. Surfaces to be painted shall be prepared and given primer coat of approved quality as approved by the Project Director/Architect. All the wooden surfaces to be painted/polished, shall be bodied in with liquid wood filler of approved make allowed to dry and rubbed with sand paper, the surface shall be cleaned then two or more coats of synthetic enamel paint/required number of coats of spirit polish as the case may be applied to give an even shade of approved quality. Readymade polish conforming to IS:348 shall be used.
- b) For internal door shutters, it shall be satin finish enamel painted in three coats including one coat of primer.

13. PAINTING TO STEEL SURFACES

All exposed steel surfaces shall be prepared, cleaned with sand paper to completely remove scales and rusts and shall be painted with two or more coats of synthetic enamel paint to give an even shade over one coat of steel primer. The shade of synthetic enamel paint shall be as approved by Project Director/Architect.

14. PAINTING TO C.I. AND.G.I. PIPES

All exposed CI and GI pipes shall be painted by applying two or more coats of synthetic enamel paint over one coat of steel primer. The shade and quality shall be approved by Project Director/Architect.

15. ANTI-TERMITIC SOLUTION TO WOOD WORK

- (a) Anti-termite solution shall be 'ASCUPS2' colourless or other equal approved preservative.
- (b) Surfaces of timber which are in contact with and/or buried in concrete/masonry/plaster and concealed surfaces of timber/ board/ plywood shall be treated with two coats of anti-termite solution before being built in or covered up.

16. Synthetic enamel paints, steel / wood primer, Cement base paint, Texture paint and Acrylic Washable Distemper of approved firms as per the list of approved makes / manufacturers shall be used. Only first quality brand of approved manufacturer's materials shall be incorporated in the work.

SECTION-XI INTERNAL ELECTRIFICATION WORK

1. SCOPE

The scope of internal electrification work for all Plot-Dev and other associated buildings shall be measured and paid under schedule A .However, the brief of scope of work is described in the subsequent paras.

The internal electrification work of each building shall include all electrical work of all Plot-Dev, club house, Guard room, shops, basement, podium, passage, basement parking , toilets, entrance lobby, stilt area, common areas, stairs, corridor, lift well/shaft, mumty & aviation lights etc as applicable.

For all Plot-Dev: All internal wiring shall be from rising main onward including rising main, meter board installed in electrical shaft connected to rising mains to distribution boards in each Plot-Dev, distribution boards with isolator/2/4 pole MCB as a incomer & DP earth leakage circuit breaker (ELCB/RCCB/RCBO), one on each phase and with MCBs on all outgoing circuits and internal wiring for all points shown in drawings etc complete including modular type switches, sockets two module fan regulators including GI boxes, plates etc.

For club house, Guard room, shops, basement, podium, passage, basement parking , toilets, entrance lobby, stilt area, common areas, stairs, corridor, lift well/shaft, mumty & aviation lights: Provision of floor mounted lift panel in space provided near lift shafts(terrace). Lift panel has dual supply one from main LT panel through rising main & one from common area MDB located on the stilt floor. Provision of distribution board with ELCBs/RCBOs and outgoing MCBs and internal wiring of all points such as lights, exhaust fans, light plug & power plugs in stilt ,basement, podium, passage, basement parking , toilets, entrance lobby, stilt area, common areas, stairs, corridor, lift well/shaft, mumty other ancillary buildings & aviation light. Provision of floor mounted common area MDB in stilt .Details of common area common area MDB shown in the drawings .Submain wiring to all DBs from common area MDB in stilt.

All internal wiring shall be with PVC insulated FRLS copper conductor cable of 1100V grade ISI marked in concealed type PVC rigid conduit of heavy quality ISI marked & in MS conduit in basement area/lift shaft.

The meter board shall be located at each floor in the electrical shaft as shown in the drawings in each block. Meter board shall get the supply from rising main connected through suitable adaptor box/end feed unit indicated in relevant drawings.

The incoming electric service connection upto electric meter board excluding dual meters are in the scope of internal electrification. However ,provision of meter board as per electricity department requirement or as approved shall be erected at each floor. Provision of common area DB, lift panel, common area MDB are installed at stilt/near lift shaft (terrace)/basement. However provision of incoming electric cable 3.5CX70 sqmm AI XLPE power cable on cable tray to lift panel is in the scope of the contract.

All PVC pipes shall be laid 550 mm below FFL of stilt area and shall be encased with 50mm thick PCC 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size).

Providing & fixing of light fittings, ceiling fans & exhaust fans in Plot-Dev are not included in the scope of work. Under schedule A Part-1 ,Providing & fixing of connectors at all light points , fan points & ceiling rose for exhaust fan point and a holder at one light point in each room , kitchen , toilet , balcony & living/Dining. However, provision & fixing of light fittings, ceiling fans & exhaust fan in common area, club house, Guard room, shops, basement, podium, passage, basement parking , toilets, entrance lobby, stilt area, stairs, corridor, lift well/shaft, mumty are included in the scope of work.

The scope of work also includes brick masonry chambers 600mm x 600mm x 600mm deep with suitable MS/RCC cover for each block as shown in drawings.100 mm dia PVC pipes from connecting masonry chambers in the block and leading outside upto point marked on drawings.TV splitter boxes each of 600mm x 300mm x 100mm deep made of 1SWG sheet and fixed on wall. Providing & fixing of junction boxes , draw boxes & outlet boxes. All PVC pipes laid under floors/in ground shall be enclosed in 50 mm thick PCC 1:3:6.1 no.6A 5 pin socket outlet with switch dually wired as per approved make shall be provided in each TV outlet inside the Plot-Dev.

2. REGULATIONS AND STANDARDS

The installation shall strictly comply with the following acts/rules/ specifications amended up to date:

- a) Indian Electricity Act.
- b) Indian Electricity rules.
- c) Code of practice for electrical wiring Installation IS 732 of 1963 amended up to date.
- d) As per latest CPWD specifications for internal electrifications as amended up to date.
- e) The works shall also conform to any special requirement of M.S.E.D.C.L. (State Electricity Authority).
- f) Wherever the specifications given herein call for a higher standard of material / workmanship, then these shall take precedence over (a) to (e) above.
- g) The work will be carried out by licensed electrical contractors only. Details of electrical contractor along with a copy of valid license issued by competent authority shall be handed over to Project Director/Architect before commencement of work.

3. NUMBER OF POINTS

Number of light points, telephone points ,TV points , call bell points , socket outlets, AC socket & switch outlet shall be as per drawings for each Plot-Dev , stilt area, basement , podium, club house, shops, meter room, common area ,stairs , corridor, entrance lobby , lift well shafts.

The general layout of wiring points, switches, plug fittings, TV points, telephone points shall be as shown on the drawings. The exact location of points, fittings, and fixtures may be altered to suit site requirements and the contractor shall have no claim on any extra on this account.

4. DETAIL OF WIRING

All internal wiring shall be with PVC insulated FRLS copper conductor cable of 1100V grade ISI marked in concealed type PVC rigid conduit of heavy quality ISI marked & in MS conduit in basement area/lift shaft. Minimum size of PVC conduit for electric wiring shall be 25 mm dia and for sub mains it shall be 32/40mm dia . All conduits in slabs and beams shall be placed before casting of concrete.

No chase cutting in RCC at any location shall be permitted after slab/beams/columns have been cast. In brickwork, PVC conduit shall be provided and concealed after cutting suitable chase in wall and fixed with suitable chase in wall and fixed with suitable iron hooks and making good in cement mortar 1:6 (1 cement : 6 coarse sand).

Number of points in each light circuit shall not be more than 10 points/800 W and shall be as shown in drawings & distribution details. However in case of light points (CFL) where load per point may be less, no. Of points may be increased as shown in drawings.. All power plug points shall be maximum two per circuit irrespective of what is shown in drawing.

Size of cables shall be as under:

- i) 1.5 sqmm and earthing wire with 1.5 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V grade ISI marked for light circuits, light points & 6A plug sockets.
- ii) 4 sqmm and earthing wire with 4 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V grade ISI marked for power points (for 16A plug socket).6 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V grade ISI marked for AC points with earthing wire of 6 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V grade ISI marked.
- iii) FRLS PVC insulated single core stranded copper conductor cable of 1100V grade ISI marked for sub mains from meter boards to distribution board of respective Plot-Dev as 4 x 10 sqmm in 40mm PVC conduit with 2 x 6 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V grade ISI marked in green colour.
- iv) FRLS PVC insulated single core stranded copper conductor cable of 1100V grade ISI marked for sub mains from meter boards to distribution board of respective Plot-Dev as 4 x 10 sqmm in 40mm PVC conduit with 2 x 6 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V grade ISI marked in green colour. Two nos. of 3.5x10 sqmm on cable tray for terrace pump & solar.
- v) Loop in system of wiring shall be used invariably throughout the installation. Live wire shall only be tapped from the controlling switch and neutral from outlet. Tap off joints in the pull boxes/draw boxes will not be permitted. For each 16A power point outlets one 6 pin (6A/16A) socket controlled by 16A switch shall be provided. Three socket & switch points for AC should be as per drawing.

5. **DISTRIBUTION BOARDS**

Each Plot shall have one distribution board as under which shall be located in the respective Plot as directed by Project Director/Architect and as shown in drawings.

6. i) Rising Main shall confirm to IS 8623 & IEC 439 and shall be suitable for 415 V 3 phase , 50 Hz supply and insulation of rising main shall be capable of withstanding of voltage 660 V AC.

ii) Enclosure: The enclosure shall be made from sheet steel of 1.6 mm thickness.

iii) Busbar: Busbar shall be made of wrought aluminium or aluminium alloy confirming to relevant Indian standards. Cross section of the busbar shall be sufficient for normal current density 130A/sqcm (800A/sqinch).

iv) Cross section of neutral bus bar shall be same as that of the phase busbar for the busbar of capacities upto 200 A. For higher capacities neutral bus bar shall not be less than half the cross section of that of phase busbar.

v) Insulation: Each busbar shall be suitably insulated with PVC sleeves/tapes.

vi) Busbar supports : Bus bar supports insulator shall be class F insulators made of non hygroscopic, non combustible ,track resistant and high strength FRP/SMC/DMC material and shall be suitable size and spacing to with stand the dynamic stresses due to short circuit currents. The spacing between two insulators should be provided by the manufacturers according to the design approved by CPRI for their busbar supports.

vii) Busbar Clearances : The minimum clearance to be maintained for enclosed indoor air insulated bus bars for medium voltage applications shall be as ,Between Phase to earth - 26 mm & phase to phase – 32 mm.

viii) Expansion joint made of aluminium strip shall be provided wherever necessary ,to take care of expansion & contraction of the bus bars under normal operating conditions. This shall be invariably provided whenever the length of the rising mains exceeds 15 m.

ix) Thrust Pads: The bus bar shall be provided with thrust pads so that the expansion of the conductors is upwards only. The bus bar clamps and insulators shall be designed to withstand the forces due to short circuit current. They shall also permit free vertical movement of the bus bar during expansion & contraction.

x) Mounting : Incoming cable will be connected to the rising main through an end feed unit, consisting of MCCB of required capacity & cable end box. Tap off boxes at specified intervals and height shall be provided on rising main to tap power .The box shall consist of MCCB.

xi) Construction Features: The rising mains shall be manufactured in convenient sections to facilitate easy transportation and installation. The sections shall be connected to form a vertical run at site. Each section shall be provided with suitable wall straps at convenient intervals for fixing to the wall.

The enclosure shall be sturdy so as to withstand the internal and external forces resulting from the various operating conditions. The front cover shall be detachable .Neoprene gaskets shall be provided between the covers and the side channels. The enclosure shall have a degree of protection not less than IP 42.

The rising main shall be designed for temperature rise not exceeding 40 degree C over ambient temperature of 45 degree C. Built-in fire proof barriers having 2 hr fire rating shall be provided to restrict the spread of fire through the rising main from one section to the adjacent section. Necessary provisions for ventilation shall be made at suitable intervals. These shall be complete with welded non-ferrous metallic mesh to prevent entry of vermin. Two nos. of 20 x 5 mm copper earth strips shall be provided alongside the rising main enclosure and shall be bolted to each section of the rising mains.

xii)Commissioning : Before connecting mains supply after installation ,pre- commissioning checks comprising megger test, checking the tightness of connections, body earth connection ,body earth connection etc shall be carried out and recorded.

7. **METER BOARD**

Meter board made up of 14 gauge MS sheet powder coated with hinged detachable doors and mounted on rising mains, as shown in drawings. Connection to meter board shall be from Tap off box. Meter board shall have provision of glass for meter reading of three Phase Dual reading Type Electronic KWH Meters.

8. **EARTHING**

Earthing shall be laid down as per Indian electricity rules 1956, as amended time to time and in regulation of electricity supply authority & as per IS 3043:1987 code of practice on earthing.

Separate two nos. of GI plate earthing shall be provided for rising mains, earth connections from earth electrode shall be with 32mm x 6mm GI strip. Earth connection in ground/floor shall be in 40mm GI pipe for protection of any damage. Similarly two nos. of GI plate earthing shall be provided for earthing connections to lift board on terrace. For lightning arrestor, one GI plate earthing for each rising conductor shall be provided as shown in drawings. Each meter board & common area MDBs shall be looped with rising main earth strips with 25mm x 5mm. A record of the resistance of each earth station shall be kept by the Project Director duly signed by the contractor, Architect & the Project Director.

Earthing from meter board to distribution boards in each Plot shall be done with FRLS PVC insulated stranded copper conductor cable of 1100V ISI marked along with sub mains cable earth wire will be terminated to the meter board along with submain cable.

Earthing for all light points convenience outlets, light plug points shall be with 1.5 sqmm FRLS PVC insulated stranded copper conductor cable of 1100V ISI marked along with wiring cable through PVC conduits and for power plug & AC points 4 sqmm & 6 sqmm respectively.

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10. LAYOUT OF CONDUITS IN SLAB & MS GALVANISED SHEET BOXES

Contractor shall prepare drawings for layout of conduits in slab of each floor of each block. These drawings shall be submitted to the Project Director/Architect for approval at least 20 days before the likely date of casting of the particular slab. The approval shall be accorded by Project Director/Architect before casting of the roof slab. Contractor shall ensure that the conduits are laid in the slab as per the layout approved.

Galvanised MS sheet boxes of 1.6 mm thick gauge will be used (CI boxes will not be used) for all sizes. All sizes boxes , draw boxes ,and other boxes etc will have 3 mm thick egg white hylem cover plates necessary brass screws and washers and sizes of boxes as required at site. All boxes shall be suitable for modular switches/sockets with all accessories. All material for fitting accessories etc to be incorporated in this work shall be ISI marked and if Indian standard have not been issued then it shall be as per approval of Project Director/Architect.

11. APPROVAL

Approval of layout at site: Contractor shall mark the location of all switch boards, points and layout of conduits on wall at site and take approval of Project Director/Architect before commencement of cutting of chase and laying conduits/MS galvanised boxes. This shall be recorded, signed and dated by contractor, Project Director & Architect.

Approval of shop drawings: Shop drawings shall be submitted by the contractor and got approved from the Architect/Consultant. Any deviations in the drawings will be brought to Architect/Consultant notice before work is executed as directed by Architect/Consultant. Contractor shall verify all dimensions at site and bring to the notice of Architect/Consultant any or all discrepancy or deviations noticed. The contractor shall submit at least 6 sets of drawings for each.

General: All outlets in stilt, staircase and other common area will be connected to the DBs as shown in drawings through separate conduits. Ceiling fan points with stepped regulator modular type will be with supply and fixing of fan hook with MS box and covered with 3mm thick hylem sheet at bottom duly screwed as per approved sample. A big size call bell shall be provided in each Plot-Dev and shall be as same make as of switch & socket. Outlet boxes will be boxes suitable for modular switches.

12. ELECTRICAL/COMPLETION TESTS

Entire electrical installation shall be tested in the presence of and to the satisfaction of the Project Director/Architect for insulation , earth continuity and other tests as specified under IE rules , CPWD specifications and as required by the state electricity board. Record of these tests duly signed by the contractor , Project Director & Architect shall be kept by the Project Director. Materials to be used will be of makes specified here in after on list of approved makes and shall comply with relevant IS specifications and shall be ISI marked where available.

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SECTION-XII

WATER SUPPLY, PLUMBING, SEWERAGE AND DRAINAGE & GENERAL

1. The scope of water supply, plumbing, internal sewerage and drainage shall consist of provisioning and fixing of the following for each Plot-Dev of each block.
 - a) GI Pipes / cPVC with fitting and valves for cold and hot water supply.
 - b) Solar Hot Water System with piping including solar panels with hot water tanks.
 - c) Sanitary fixtures, C.P. fittings and accessories.
 - d) Soil, waste and vent pipes and fittings uPVC (class- B) IS: 13592.-b class, For rainwater IS 4985 -6Kg/SQ CM class is to be used.
 - e) Overhead water tank at terrace.
 - f) Soil pipes (vertical & horizontal) running underground upto nearest manhole including making connection to the manhole & making good the walls etc. Waste pipes running underground upto nearest gully traps & from gully traps to nearest manhole including 150 dia SWG pipes, gully traps, making connection to the gully traps & making good the walls etc. Rain water pipes from terrace and balcony (vertical and horizontal) upto nearest road gully chambers including making connection & making good the walls etc.
2. The entire work shall be carried out by the agency of reputed Licensed Plumbers as approved by Project Director and Architect, who will also be responsible for **getting water connection** for completed project as per statutory requirement. The statutory charges as paid to Architect for making connection to Architect water supply lines shall be reimbursed by the AWHO to the Contractor on production of payment receipt from Architect.
3. **Water supply work** :- Water supply distribution mains including water supply service connection of each plot upto gate valve including gate valve & its chamber of each rising main.

3.1 Pressure Reducing Valves (PRV) with by Pass Arrangement :

For The Detail of PRV (Pressure Reducing Valves) Station Refer drawing & Water Supply Riser Diagram. All accessories like isolation Valves, Pressure gauges Strainers and Pressure Reducing Valves are included tender documents.

Providing and fixing flexible diaphragm based pressure reducing valves in PN-16 With Inbuild Strainer adjustable type with forged brass body ends screws BSP F/F with dynamic pressure compensation feature and stainless steel seat fused on Brass body with pressure as follows :-

Inlet Pressure : more than 3 Kg/cm²

Outlet pressure : 0.75 to 1 Kg/cm² (Minimum)

Pressure reducing stations shall be provided where pressure exceeds 1.8 kg/ cm² in down comer water supply pipe at the location as shown in drawings and directed by Architect / Project Director.

MATERIALS (PIPES, FITTINGS AND VALVES)

4. All GI pipes as specified conforming to I.S. 1239 –B CLASS from any of the approved makes.
5. All G.I./ CPVC fittings shall be ISI marked and of approved make.
6. CPVC pipes shall conform to the requirement of IS 15778 for all pipe sizes. The material from which the pipe is produced shall consist of chlorinated polyvinyl chlorides. The polymer from which the pipe compounds are to be manufactured shall have chlorine content not less than 66.5%. the internal and external surfaces of the pipe shall be smooth, clean and free from grooving and other defects. The pipe shall not have any detrimental effect on the composition of the water flowing through it.

LAYING, FIXING AND FITTING OF G.I./CPVC PIPES

7. All pipes below ground shall be laid in RCC PIPES laid underground. In case .Pipes run through basement shall be hung on ceiling of basement.
8. The runs of the pipes on the terrace shall be over necessary cement concrete (1:3 :6) blocks of suitable sizes at a maximum interval of 2.0m and on walls exposed or concealed shall be straight and pipes shall not run diagonally. Proper bends, elbows, tees at turning / corners shall be used.
9. All G.I. pipes with necessary fittings wherever they are laid on internal faces of the walls shall be concealed in chase. On external faces they will be laid on M.S. angle fixed on walls approx. 100mm away from the wall by means of hold fast , fixed with G.I. Clamps with suitable screws.
10. In the concealed portion of plumbing **no joints** shall be provided in the pipe lines except in the fittings i.e. bends, elbows, tees and nipples where required.
11. (a) Short or long bends shall be used on all main pipe lines as far as possible. Use of elbows shall be restricted for short connections.
 (b) As far as possible all bends shall be formed by means of a hydraulic pipe bending machine for pipes up to 25mm dia(for gi pipes). Bends and elbows may be used for pipe dia greater than 32 mm.
12. All CPVC pipes for water supply (Hot or Cold) within toilets and Kitchen shall be concealed on walls only.
13. Pipes and fittings shall be joined with screwed fittings; care shall be taken to remove burrs from the end of the pipe after cutting by a round file. Threaded joints of GI pipes will be made by applying suitable grade of TEFILON tape used for drinking water supply. (Use of red or white lead and sutli will not be permitted for screwed joints). All pipes shall be fixed in accordance with layout and alignment shown on drawings. Care shall be taken to avoid air pocket. GI pipes inside toilets shall be fixed in wall chases at least 30 cm above the floor.

14. GI pipes in shafts and other locations shall be supported by GI Clamps of design as indicated in the typical detail. Pipes in internal walls, in chase, by cutting suitable chase, anchoring the pipes by iron hooks in chase and making good the chase in cement mortar 1:6 (1 cement: 6 coarse sand).

15. **UNIONS**

Contractor shall provide adequate number of unions on all pipes to enable dismantling later. Unions shall be provided near each gunmetal ball valve, stop cock or check valve, and on straight runs as necessary at appropriate locations as approved by Project Director/Architect.

16. **FLANGES**

- (i) Flanged connections shall be provided on pipes 65 mm and above as required or where shown on the drawings and generally as follows:
 - (ii) On straight runs not exceeding 30m, near bends and at connections to main branch lines.
 - (iii) On all valves ends.
 - (iv) On equipment/ pump connections as necessary and required or as directed by Project Director.

17. All water supply system shall be tested to Hydrostatic pressure test of at least 1.5 times the maximum working pressure but not less than 10 Kg/Sq.cm. for a period of test of not less than 2 hours. Before commissioning the water supply system the Contractor shall arrange to disinfect the entire system.

18. **CONTROL VALVE**

Gun metal stop valves shall be provided in the inlet pipe of the toilet and kitchen to control the water supply for repair work in the plumbing/ fittings in toilets/ kitchens.

19. **PUDDLE FLANGES**

Puddle flanges shall be provided to all connections i.e. inlet, outlet, overflow and scour of the overhead tank wherever required.

20. a) **Pipe Protection**

All G.I. water supply pipes in chases or below ground shall be protected against corrosion by applying two layers of 2 mm thick multi-layer anticorrosive polymeric mix tape 4 mm thick applied over a coat of primer as per recommendations of the manufacturers.

b) **Painting**

All exposed pipes shall be painted with two coats of synthetic enamel paint over one coat of primer. Pipes shall be painted to standard colour code as approved by Project Director/Architect.

21. **VENT PIPES**

Each down take pipe shall be provided with a vent pipe. The height of the vent pipe shall be 150mm above the top of the water tank.

22. APPROVAL OF LAYOUT OF G. I./CPVC PIPES AND POSITION OF FIXTURES AT SITE

The contractor shall mark the location of all fixtures and fittings and layout of G.I./CPVC pipes at site and take approval of Project Director/Architect before commencement of cutting chases for Pipes within the building and digging trenches outside the building.

23. SANITARY, FIXTURES AND C.P. FITTINGS AND ACCESSORIES

All sanitary ware shall be first quality of approved white vitreous china and shall be inclusive of all fixing devices, nuts, bolts and hangers/ brackets. These shall be of approved makes.

24. It will be ensured that all sanitary fixtures are from one manufacturer only for the entire work i.e. for all the Plot-Dev. However, if due to any reason contractor proposes to provide part quantity from other manufacturer approved in Para 26 above then he may be permitted, but he will have to obtain specific approval of Project Director / Architect for this change in the brand. This will be subject to that all types of fixtures in any particular block shall be always of one manufacturer only. In no circumstances items of two manufacturers shall be used in the toilets of particular block.

25. All bib cocks, concealed stop cocks, angle-valves, mixers, shower rose and arm, bottle traps, CP waste and inlet connections and other minor fittings shall be approved make as per the list of makes and brass chromium plated as approved by Architect and Project Director. Contractor shall obtain the approval of the name of the manufacturer and brand of CP brass fittings from Project Director/ Architect before placing the supply order. The fittings shall be from any of the approved manufacturer as per the list of approved makes/manufacturers.

26. It will be ensured that all CP fittings are from one of the approved manufacturer and CAT no. only for the entire work i.e. for all the Plot-Dev. However, if due to any reason contractor proposes to provide part of quantity from other approved manufacturer from the list of approved makes, he may be permitted, but he will have to obtain specific approval of Project Director, Architect for this change in the brand. This will be subject to that all items and fittings in any particular block shall be always of one of the approved manufacturer only. In no circumstances items of two approved manufacturers shall be used in any of the toilets of particular blocks

27. All chromium plated brass fittings and accessories shall be provided with CP cast brass wall flanges.

28. For fixing of CP brass fittings wherever required GI extension pieces shall be provided.

29. Fixing screws shall be half round head chromium plated brass screws with CP washers.

30. All exposed pipes, if any within the toilets and near the fixtures shall be chromium plated brass except otherwise specified.

31. **INSTALLATION OF SANITARY FITTINGS**

- a) Wall hung with slow falling seat cover European seat shall be fixed on the suitable chair as per manufacturer instruction and shall be embedded in the wall in CC 1:2:4 suitably. The seat shall be screwed with chair by means of nuts and bolts complete. It should be coupled with the low level-flushing cistern complete with rubber cone adapters and copper wire joints etc. all as per manufacturer's instructions.
- b) Indian Style Water Closet: All Indian style water closet shall be of size 580 x 440mm, Orissa pattern as per Hindustan Sanitary Ware with P or S (as required at site) or equivalent of other makes mentioned in Para 41 below.
- c) Wash hand basins shall be fixed firmly to under counters or wall with MS angle iron or approved type brackets. The brackets shall be given two coats of white enamel paints over a coat of primer, in addition the wash basin shall be securely fixed to walls with a pair of 25 x 3mm MS clips screwed with rawl plugs to walls (Placing of basin over the brackets without secure fixing on wall shall not be accepted). Under counter wash basin shall be fixed in RCC counter projected upward upto a level of bottom of granite stone.
- d) All fixtures shall be fixed at proper heights as shown in the drawings and workmanship, which shall be of acceptable standards.

32. **LIST OF SANITARY WARE AND CP FITTINGS:**

• **SANITARY WARE - HINDWARE**

- a) WHB size - 560X410 mm over counter (Hindware Cat. No.10017)
- b) WHB size -620 X 520mm table top (Hindware Cat. No. 91058)
- c) Vitreous china EWC Floor mounted with trap and cistern, slow falling seat cover (Hindware Cat. No. S- 20085 / 21053)
- d) Wall hung EWC with cistern and slow falling seat cover (Hindware Cat. No. 20058/ 21028)
- e) EWC floor mounted (Popular) with cistern (sleek plus) and seat cover (Hindware Cat. No. 20044(P-18)
- f) Urinal Flat back Large (Hindware Cat. No. 60002)

NOTE: Cat nos. for Sanitary Ware given above is of HINDWARE make. Sanitary ware of other approved makes may be provided subject to equivalent Cat. nos. of HINDWARE as indicated above.

• **CP FITTINGS - JAGUAR (Florentine/Continental)**

- a) Concealed stop cock (Jaguar Cat. No. 083-Continental)
- b) Pillar tap/cock (Jaguar Cat. No. FLR 5015-Florentine)
- c) Angle valve/angular stop cock (Jaguar Cat. No. FLR 5053 N-Florentine)
- d) Over Head shower 100 mm dia round shape single flow with Rubit cleaning system (Jaguar Cat. No. OHS -1989- Florentine)
- e) Wall mixer for provision of over head shower (Jaguar Cat. No. 5273 UPR-Florentine)
- f) Single lever Sink mixer with swinging spout Wall mounted model (Jaguar Cat. No. 5163-Florentine)
- g) Sink basin mixer with swivel spout table top mounted (Jaguar Cat. No. FLR 5309 NB-Florentine)
- h) Central hole basin mixer w/o pop up waste system (Jaguar Cat. No. FLR-5001B-Florentine)
- i) Bottle trap (Jaguar Cat. No. Florentine ALD-769-L 250 /300 X190-(Florentine)
- j) Towel rod /Rail (Jaguar Cat. No. AQN 7711-Florentine)
- k) Toilet paper holder (Jaguar Cat. No. ACN 1151 N-Florentine)
- l) Soap Dish (Jaguar Cat. No. 1131N-Florentine)
- m) Towel ring (Jaguar Cat. No. ACN-1121BN-Florentine)

NOTE: Cat nos. for CP Fittings given above is of JAGUAR (Florentine/Continental) make. CP Fittings of other approved makes may be provided subject to equivalent Cat. nos. of JAGUAR (Florentine/Continental) as indicated above.

33. SEWERAGE DISPOSAL AND DRAINAGE

Scope of internal sewage disposal and drainage system of all Plot-Dev included in Schedule ' A' Part-I under this contract will include the following and shall be provided as per the layout/locations shown on drawings :

- a) uPVC floor drains in toilets and kitchen.
- b) uPVC waste pipes (Horizontal & vertical) and their connections upto gully trap of each block at Ground floor and SWG pipes including encasing in PCC and their connection with & including gully traps, beyond Gully Trap upto nearest manhole of each block at Ground floor.
- c) uPVC soil pipes (Horizontal & vertical) and their connections upto nearest manhole of block at Ground floor.
- d) uPVC Vertical stacks and Vent pipes including uPVC cowls upto parapet wall of each block.

- e) All gully traps including PVC (B-type) drain vent pipes up to terrace level from starting chamber.
- f) All soil, waste, vent pipes up to gully traps under ground should be encased in 1:4:8 (1 cement:4 coarse sand : 8 stone aggregate 40mm nominal size)
- g) SWG and RCC NP2/ NP3 sewerage/ storm lines as specified above shall be measured and paid separately under Schedule 'A' Part-III (External Sewerage and Area drainage).
- h) In case of towers over basement, all soil ,waste and vent pipes terminating in basement upto nearest manhole shall be included in the lumpsum offer of building upto 450 mm from the stack .

34. SOIL, WASTE, ANTI SIPHONAGE AND VENT PIPES

All Vertical stack & horizontal pipes and fittings shall be of uPVC (B-type) Quality as per IS-13592 and of approved make.

35. All Vertical stacks & horizontal and fittings of soil, waste, Antisyphonage and vent pipes shall be of uPVC (B-type) quality as per IS 13592 class b, Jointing of uPVC (B-type) pipes shall be with rubber ring and lubricant joints. The fixing shall be air and water tight.

36. FLOOR TRAPS

Floor trap shall be uPVC deep seal with an effective seal of 50mm. These shall comply with provisions of IS Code of practice and shall be ISI marked. The trap and waste pipes shall be set in cement concrete blocks firmly supported on the ground floor. The blocks shall be in cement concrete 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20mm nominal size) and extended to 40mm below finished floor level. The inner circular surface of the concrete portion at top of the floor trap inlet shall be finished smooth and water proofed by applying neat cement slurry mixed with water proofing compound. Size of the blocks shall be 30x30cms and of the required depth. The floor trap shall be 100mm inlet and 100mm outlet for kitchen and toilets etc. Floor traps shall have extension pieces to receive waste lines as indicated in details shown on drawings

37 (a) **CLEANOUT PLUGS (ON SOIL AND WATER PIPES)** : Clean out plug of Soil, Waste or Rainwater pipes laid under floors shall be provided near pipe junctions bends, tees, "Y" and on straight runs at such intervals as required as per site conditions. Clean out plugs shall terminate flush with the floor levels. They shall be threaded and provided with key holes for opening. Clean out plugs shall be uPVC suitable for the pipe dia. with screwed to a uPVC socket. The socket shall be fixed by using approved solvent cement to the drain pipes.

(b) **CLEAN OUTS ON DRAINAGE PIPES**: Clean out plugs shall be provided on starting point of each drain and in between at locations indicated on plans or directed by the Architect (Supervision)/Project Director. Clean out plugs shall be of size matching the full bore of the pipe but not exceeding 150 mm dia. CO plugs on drains of greater diameters shall be 150mm dia. Fixed with a suitable reducing adapter.

38. LAYING AND JOINING OF UPVC PIPES

- (a) Pipes and fittings shall be fixed truly vertical, horizontal or in slope as required in a neat workmanship. Pipes shall be fixed in a manner as to provide easy accessibility for repairs and maintenance and shall not cause obstruction in shafts etc.
- (b) Exposed pipes running along ceiling up to vertical Stacks to be hanged with GI suspenders as shown in drawing, not exceeding spacing as required at site and at locations as approved by the Project Director/ Architect.
- (c) Irrespective of what is shown in the drawings, all vertical uPVC pipes shall be fixed in walls using 20X2.0 mm GI strip of make 'Chilly'/HILTI dash fasteners. Branch pipes shall be connected to the stack at the same angle as that of fittings. No collar shall be used in pipes laid in sunken slabs and vertical stacks. Each stack shall be terminated at top with a uPVC (B-type) VENT COWL and to roof parapet level as shown in drawings.
- (d) Joints in uPVC soil, waste and vent pipes shall be done using approved solvent and shall withstand the design pressure of pipes.
- (e) The water closet in ground floor shall be connected with soil pipe directly extended upto first manhole. The water closets at first and upper floors shall be connected with soil pipe extended upto common soil pipe coming vertically downwards along external face of walls with single branch connections with necessary bends/Y junction containing access doors. The common soil pipe shall run vertically downward upto first manhole. The water closets at first and upper floors shall also be connected with uPVC common soil/vent pipe coming vertically downwards as per details shown on drawings. A vent pipe shall be provided from single branch connection at the last floor level (as a continuation of soil pipe/waste pipe stack) taken vertically upwards with 800mm above the top of parapet wall and shall be provided at top with uPVC cowl.
- (f) 90mm (Internal Dia). uPVC (B-type) antisiphonage pipe will be provided with each connection of WC to the vertical soil pipe and will connect to a 90mm (OD). Vertical antisiphonage pipe stack. The vertical antisiphonage pipe will also be taken upto top of parapet wall and shall be provided with a vent cowl on top.
- (g) uPVC pipes laid under floors in kitchen and toilets shall rest in cement concrete 1:3:6(1 cement :3 coarse sand:6 graded stone aggregate 20mm nominal size) 70mm thick(minimum) 300mm wide. All pipes and fittings shall also be encased all around with PCC 1:3:6, 70mm thick.
- (h) Floor traps shall have extension pieces to receive waste pipes from floor traps, wash basin and F.C.O. (floor clean out) etc. and shall be connected to PVC (B-type) 65 mm internal dia. common waste pipe coming downward along the external face of walls with single branch connections with necessary bends/Y junctions containing access doors. The uPVC (B-type) common waste pipe shall run vertically downwards up to gully trap. The floor trap at ground floor connected with waste pipe shall be extended up to gully traps. A vent pipe shall be provided from the single branch connection of waste pipes and shall be taken

vertically upward up to the top level of parapet wall and shall be provided at top with a vent cowl and fixed with clamps and stays etc.

- (j) uPVC drain pipes passing under the building shall be laid before commencement of works in foundations. Where passing through concrete work in slabs, core cutting by mechanical means shall be done of appropriate size as per drawings.
- (k) uPVC drain pipes passing under the building shall be fixed to basement slab ceiling using GI brackets and will run suspended from the basement slab.

39 GULLY TRAPS

Gully traps shall be of the same quality as described for stoneware pipes.

After necessary excavation gully traps shall be fixed on 100mm thick cement concrete 1:5:10 mix (1 cement:5 coarse sand:10 stone aggregate 40mm nominal size). After fixing the gully trap and pipe a brick masonry chamber 600x600mm inside and around the gully trap in cement mortar 1:5 (1 cement: 5 coarse sand) shall be constructed upto the ground level. The space between chamber wall and the trap shall be filled in with cement concrete 1:5:10 (1 cement:5 coarse sand:10 stone aggregate 40mm nominal size). The upper portion of the chamber shall be plastered inside with cement mortar 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement with all comers rounded off sloping towards the grating. A square SFRC grating shall be fixed on trap inlet.

Gully trap cover and frame shall be of steel fibre reinforced concrete of medium duty of size 600 x 600 mm inside shall be fixed on the top of masonry chamber in cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 stone aggregate 20mm nominal size) rendered smooth with neat cement. The finished top of cover shall be kept about 40mm above ground level.

40 TESTING

uPVC (B-type soil, waste and vent pipes: These shall be tested to hydraulic test of 6 mtr. head.

The joints of uPVC (B-type) pipes coming under floors/walls shall be covered up only after testing is carried out satisfactorily and passed by Project Director/Architect.

A test register shall be maintained which shall be signed and dated by Contractor, Architect and the Project Director.

41 APPROVAL OF LAYOUT OF WASTE /SOIL UPVC (B-TYPE) / GI FLOOR TRAPS, GULLY TRAPS

The contractor shall mark the location of these pipes, floor traps and gully trap on floors/ walls/ ground at site and make shop drawings and take approval of Project Director/ Architect before commencement and cutting of holes in walls, digging of trenches and laying of pipe lines. Record of these approvals should be recorded in a register and kept in Project Director's office

42. M.S. PIPE AND FITTING :

General:- All materials shall be new of the best quality conforming to the specifications and subject to the approval of the Project Manager.

- (a) Pipes and fittings shall be fixed truly vertical, horizontal as required in a neat workmanlike manner.
- (b) Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.
- (c) Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceilings and walls.
- (d) Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.
- (e) Pipes and fittings of following types and ISI marked only shall be used:

Type of Pipe / (dia)	Size	Grade	Ends/Fitting	Code
M.S Pipes	Upto 50 mm dia	Heavy	Screwed	IS: 1239 (Part I)
MS Fittings	-do-	Heavy	-do-	IS: 1239 (Part II)
M S Pipes	65 mm & above dia and upto 150 mm dia	Heavy	Bevel, Butt Welded, 3 layers	IS: 1239 (Part I)
MS Fittings	-do-	Heavy, machine formed from IS marked heavy grade pipes	-do-	IS: 1239 (Part III)
M S Pipes	Above 150 mm dia	6.0mm wall thickness	Bevel, Butt welded, 3 layers	IS: 3589
MS Fittings	-do-	Schedule 40	-do-	IS: 3589

- (f) MS pipes for 25 mm and above welded connections shall be used. Only Electro galvanised nuts /bolts shall be used.
- (g) The piping system and components shall be capable of withstanding 150 % of the working pressure including water hammer effects.
- (h) Flanged joints shall be used for connections to vessels, equipment, flanged valves and also on suitable straight lengths of pipeline of strategic points to facilitate erection and subsequent maintenance work.
- (i) Flange thickness shall be as per table below IS: 6392 – 1971. Table – 17/18.

250 mm dia	:	26 mm ;
200 mm dia	:	24 mm ;
150 mm dia	:	22 mm ;
125 mm dia	:	22 mm ;
100 mm dia	:	20 mm ;
80 mm dia	:	20 mm ;
65 mm dia	:	18 mm .

(k) Pipe Protection: All pipes above ground and in exposed locations shall be painted with epoxy paint/anti corrosive paint.

43 **Welding:**

- (a) Joints between M.S. Pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner.
- (b) Weld Electrodes shall be of approved make, of grade and type as suitable for the job and meeting the approval of the engineer.
- (c) Joints shall be given a first weld in full width without burrs on the full dia of the pipe. Welding shall be carried out vertically from the surface to be welded. Weld fluxes shall not be so plastic such as to fall or drip down.
- (d) After application of first coat the weld shall be ground and then another layer of welding shall take place. The weld shall also be cleaned by grinding.
- (e) All pipe cutting shall be by oxy acetylene gas welding only. The cut surface shall be cleaned and ground by a electric grinder before further welding.
- (f) Pipe cutting or welding in inaccessible areas shall be avoided. Pipes shall not welded in trenches unless the bottom edge of the pipe does not have clear space for working with electrode.
- (g) For supports, angle pieces shall be cut by oxy acetylene gas and cleaned by electric grinder. All cutting for bolt inserts shall be by electric drill.

44 **GI PIPES AND FITTINGS:**

- (a) All pipes inside the buildings and where specified, outside the building shall be galvanized steel tubes conforming to IS: 1239 of Class specified. When Class is not specified they shall be Heavy Class.
- (b) Pipes and fittings shall be jointed with screwed joints using Teflon tape suitable for water pipes. Care shall be taken to remove burr from the end of the pipe after cutting by a round file. All pipes shall be fixed in accordance with layout and alignment shown on the drawings. Care shall be taken to avoid air pockets. Necessary vents and drains shall be provided at all high and low points respectively. G.I pipes inside toilets shall be fixed in wall

chases well above the floor. No pipes shall be run inside a sunken floor as far as possible. Pipes may be run under the ceiling or floors and other areas as shown on drawings.

HDPE Pipes	-	6-8kg/cm ² , As per IS: 4984.
uPVC Pipes	-	6-8kg/cm ² , As per IS: 4985.
M.S. Pipes	-	Size upto and including 40 NB As per IS: 1239 Part – I, Heavy Size above 40 NB and upto 150 NB, As per IS: 1239 Part – I, Medium 200 NB to 300 NB, As per IS: 3589, 4.5 mm Thick Above 300 NB, site fabricated from 6.0 mm Thick
G.I. Pipe	-	40 NB and below, Heavy 50 NB and above, Medium
SS Pipes	-	SS 304, Schedule 5
Flanges	-	As per BS10 Table D, 10 mm Thick
Gaskets	-	3 mm Thick, CAF Style 39 for MS and GI Flanges. 3 mm Thick Neoprene Rubber Gaskets for HDPE Flanges

Valves:

CI, Gate Valve	-	Flanged
CI, Butterfly Valve	-	Wafer Type
CI, Ball Valves	-	Flanged
PP, Ball Valves	-	Flanged
CI, Check Valve	-	Wafer Type

45. FORGED BRASS BALL VALVES:

All ball valves shall be heavy duty of approved make. Valves shall have suitable for test pressure of 25 Kg/Sq cm. Ball valves shall conform to the following specifications.

Size	Construction	Ends
15 to 50 mm	Bronze body S.S. Working Part	Screwed

46 BUTTERFLY VALVE:

All butterfly valves shall be heavy duty cast iron of approved make. The valves shall be suitable for 15 Kg/Sqcm test pressure & shall conform to IS : 13095 and the following specifications:

Size	Construction	Ends
65 mm and above	Cast iron	Flanged

47 NON-RETURN VALVES:

All non-return valves shall be provided as shown in the drawings conforming to relevant Indian Standards and in accordance with the following specifications.

Size	Construction	Ends
Upto 50 mm.	Gun metal	Screwed
65 mm and above	Cast iron	Flanged

Non-return valves shall be of approved make. Wafer type non-return valve shall be used & tested to 15 Kg/Sq cm pressure.

48. INSTALLATION AND OPERATING INSTRUCTIONS:

The contractor shall provide detailed operating and installation instructions. Each set of books shall be prepared especially for the type of equipment delivered and all operating instructions shall refer only to that particular equipment. The contractor shall provide a minimum of two bound sets of installation drawings.

49 Motorized Valves / Gear Type Valves:

Wherever required, All **Motorized/Gear Type** valves shall be provided as shown in the drawings conforming to relevant Indian Standards and in accordance with the following specifications. Or As per the Manufacturer's recommendation as required by the work/Plant.

Size	Construction	Ends
65 mm and above	Gun metal/Cast Steel /Cast iron	Flanged

SECTION-XIII
FIRE FIGHTING WORKS

GENERAL

1. The fire fighting system for blocks of stilt + 14 upper floors configurations shall be wet riser type.

SCOPE

2. The scope of fire fighting arrangement to be provided internally to each shaft in each block/tower and deemed to be included in the lump sum quoted rates for blocks under Schedule A and work shall be executed as shown in drawings and all as specified herein after.
 - a) One No. single headed internal hydrant valve 63 mm dia. Including Two Nos. synthetic flex canvas non-percolating fire hose 15 meters long and branch pipe, fire man axe on all floors (landings).
 - b) First aid hose reel wall mounting swinging type with 20 mm dia. water hose consisting of
 - i) 30 meters long 20 mm dia. water hose type 2.
 - ii) 25 mm dia. Gun metal ball valve.
 - iii) Drum with bracket.
 - iv) Connection with riser by 25 mm ms c class pipe.
 - c) Air release valve in all the blocks at the terrace including connection with fire tank complete with valves etc.
 - d) All the M.S. pipe work from basement/stilt to the terrace complete with bends, TEEs, reducers, flanges and connection to all accessories of wet riser system.
 - e) Providing of assorted valves such as butterfly valve, non return valve etc. at appropriate places.
 - f) Piping work shall be included one meter from the edge of the external wall of the block up to the terrace.
 - g) Door frame on each floor of fire shaft.
 - h) Portable fire extinguishers shall be provided on each floor/landing.
 - i) Signage.
 - j) Testing and commissioning
 - k) Details of wet riser system

TECHNICAL SPECIFICATION

All components shall conform to relevant Indian standards. All electric works shall be carried out in accordance with the provision of INDIAN Electricity Act 2003 Indian Electricity Rules 1956. The shall also conform to CPWD General Specifications

3 PIPES AND FITTINGS

(a) Pipes

For internal fire fighting work shall be **MS pipes (heavy grade)** conforming to IS:1239 and ISI marked and as per list of approved make. Pipes and fittings below 65 mm dia will be threaded and above will be welded / flanged. Flanged joints shall be provided for connecting valves, hydrants, and also on suitable straight lengths of pipe line to facilitate laying and subsequently maintenance work. After the flanges are screwed these shall be spot welded. Rubber gaskets for insertions in between flanged joints shall be minimum 3mm thick. The flanges shall be tightened with GI bolts, nuts and washers.

Fixing the pipe on wall or ceiling with suitable clamps /with necessary structure support and painting with two coats of required shade , cutting holes ,and chase in brick wall / RCC slab and making good the same .GI pipe /PVC sleeves of suitable higher size shall be provided ,when ever pipes crossing wall / floor and sealing the sleeves with glass wool in between and fire sealant compound at either end as required.

(b) Pipe Fittings

- (i) Pipes fittings means tees, bends, coupling, flanges, reducers etc. and all such connecting devices that are need to complete the piping work in its totality.
- (ii) Screwed fittings shall be approved type black malleable iron with round /hexagonal reinforced ring on all edges of the fittings suitable for screwed joints.
- (iii) Forged steel fittings of approved type with "V" groove for welded joints.
- (iv) Fabricated fittings shall not be permitted under normal circumstances.

Jointing:

- (i) Screwed Joints: Joint for black steel pipes and fittings shall be metal to metal thread joints using teflon tape on the threads for pipes up to 65mm dia.
- (ii) Welded: Joints between MS pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner for pipes above 50 mm dia. Butt welded joints are not acceptable.

Flanges:

Flanges shall be provided long lengths at each 12 mt.

Both ends of any ISI marked fittings e.g. bends, tees etc. of 65mm dia or larger diameter. (When permitted).

For jointing all types of valves, apparatuses, connections with other type of pipes, to water tanks and other place necessary and required as good for engineering practice.

Flanges shall be as per I.S. with appropriate number of G.I. nuts and bolts, 3 mm insertion rubber gasket complete.

The cost of flanges is included in the rates of pipes along with fittings.

Unions:

Provide approved type of dismountable unions on pipe lines 50 mm and below near valves or inspector test /drain and assemblies and as required as per site conditions.

4. ORIFICE PLATE:

The orifice plate shall be of 6 mm thick gun metal to reduce pressure on individual hydrant to operate on 3.5 kg/ sq cm. The design of the same shall be given by contractor.

5 AIR VALVES (ISI marked)

25 mm dia screwed inlet gunmetal single acting air valve shall be provided on all high points/on top of all vertical risers in the system and as shown on drawings.

6 VALVES**(a) Ball Valves**

Valves 50mm dia and below shall be screwed type ball valves with stainless steel balls spindle Teflon seating and gland packing tested to a hydraulic pressure of 20 Kg/ sq.cm. and accompanying couplings and steel handles to BIS - 5351.

(b) Valves above 50mm dia. shall be double flanged Sluice Valves.

Butterfly Valves shall be cast iron IS 210 grade FG 260 conforming to PN 1.6 heavy duty cast iron disc with anti corrosive nickel plating, nitrile seat and stainless steel 410 stem with lever / gear operation and powder coated finish. Valve 50 mm and below shall be brass ball valves with brass body hard chrome plated and Teflon seat.

7 NON RETURN VALVES

Non Return Valves shall be ISI marked of cast iron with gun metal seat. Non Return Valves shall be of flanged type conforming to IS : 778-1971. Spring loaded valves shall not be used. These valves shall be suitable for a test pressure of 21 Kgs/ sq. cm. These shall be as per the list of approved makes

8. HYDRANT:

Hydrant valve shall be as per IS 5290 of gun metal and inlet of 80 mm dia with 63 mm dia outlet. The valve shall be oblique type complete with hand wheel, quick coupling connection spring and gun metal blank cap as per IS 5290. The hydrant shall be installed at all the floors of the buildings as shown in the drawings. **The hydrant shall be IS marked.** Orifice plate in 6mm thick stainless steel with orifice of 32 / 40 / 50 mm dia shall be provided with each hydrant.

The hydrant shall have inlet of 80 mm dia. flanged type, 4 no's holes .The outlet shall be 63 mm female instantaneous oblique type. The spindle shall be of gun metal with cast iron wheel.

The hydrant shall be tested to 25 Kg / sq. cm test pressure; all threaded joints shall be sealed. Lugs shall be wing type.

9 FIRE HOSE PIPES

All hose shall be ISI marked IS 636, Type A., of canvas jacket cotton warp synthetic weft and lining of fabric reinforced 63 mm dia. 15 meter long with instantaneous spring lock type make suitable for a bursting pressure of not less than 10 Kg/ Sq. cm and capable of withstanding pressure of 7 Kg / Sq. cm. without leakage and undue seating.

10 HOSE REEL

Hose Reel shall be ISI marked conform to IS-884 and shall be rubber hose of 20mm dia. two ply suitable for a bursting pressure of 21 Kg/sq. cm. 30 meter long fitted with gun metal 6.25mm dia. nozzle, M.S. pressed reel drum which can swing up to 180 degree wall brackets of cast iron finished with red and black enamel complete. As per approved makes shall be used.

11. HOSE CABINET

Door of hose cabinet shall be glass fronted with single or double door shutter with dead lock. The door shall be made of 18 guage MS Sheet as per details and size as shown in relevant drawings and duly powder coated to scarlet red colour. The hose cabinet shall be of suitable size to accommodate the **Landing valves (single headed), Hose pipe (two no.s of length 18 metre), Hose reel of 30 metre long, one set of Branch pipe and nozzle, two nos. Fire extinguishers (5kgs ABC type and 4.5 kg CO2 type).**

12 COUPLINGS :

Couplings shall be of gun-metal machined and polished. Both male and female couplings shall be fitted in to each other smoothly. The male coupling shall be provided with lugs for inserting female coupling.

13. BRANCH PIPES AND NOZZLE

Branch Pipes shall be ISI marked of gun metal with landed tin bronze ring at the discharge end to receive the nozzle and provided at the other end with a loaded tin bronze ring to fit into the instantaneous coupling. Nozzle shall be of spray type of dia not less than 16mm and not more than 25mm. Nozzle shall be of loaded tin bronze branch pipe and nozzle shall be of instantaneous pattern conforming to IS:903, as per approved makes shall be used.

14 AIR VESSEL:

Air vessel of continuous welded construction shall be fabricated from 10 mm thick MS plate with 8 mm dished end and suitable supporting legs. It shall be provided with 100 mm dia. flanged connections, Air release valve and pressure gauge with shut off valve shall be provided. All valves shall be ball valves gun metal and all accessories. Air vessel shall be 1.2 m high and 250 mm dia. for operation jockey.

15 PRESSURE GUAGE:

The pressure gauge shall be constructed die cast aluminum and stove enameled. It shall be stainless steel burden tube type with a scale range from 0 to 16 kg / sq cm.

16 PAINTING:

All hydrants shall be painted with post office red colour paint. After cleaning pipe surface and two coats of primer coat, two coats of enamel paint shall be applied. Where ever required all pipe headers shall be worded indicating the direction of flow in pipe. Gate valve and non-return valve shall be painted light grey. Nuts and bolts should be painted.

17 TESTING**INITIAL TESTING:**

- a) During laying of pipes, the same shall be subjected to 10 kg./cm² hydraulic pressure for a period of 24 hours, in sections.
- b) After completion of the work, all valves/fittings shall be installed in position and entire system shall be tested for 24 hours at a pressure of 10kg/ cm². The drop of pressure up to 0.5kg/cm² shall be accepted.
- c) Testing of fire fighting system in the building as provided above shall be tested along with external fire fighting system as laid down in relevant clause of Particular Specifications.

SECTION-XIV
MISCELLANEOUS

All Miscellaneous items as described and specified here in after shall be provided.

1. NUMBERING OF EACH PLOT

- a) Plates for numbering of each Plot-Dev shall be of size 200x75mm made out of acrylic sheet of 6mm thickness with stickers of lettering of suitable size as approved & shall be provided and fixed with dash fasteners on the wall/ beam above main entrance door.
- b) Signage board shall be fixed as per direction of Project Director and Architect.

PARTICULAR SPECIFICATIONS PART I-B

UNDERGROUND WATER TANK WITH PUMP ROOM UNDERGROUND RAIN WATER RETENTION STRORAGE TANK, UNDERGROUND RCC SEWAGE TREATMENT STORAGE TANK

GENERAL

1. Under Ground water tank including pump room (consisting domestic, flushing and fire tank including pump room) shall be constructed at location and as per actual drawings and specifications described hereunder.
2. For materials and workmanship of all items of work described below refer to identical items under Particular Specification Part I-A.
3. Although all the details of construction have been by and large covered in these documents, any item or detail of construction not specifically covered but implied essential to consider civil works and all internal services complete and functional shall be deemed to cover in lump sum rates quoted. The tenderer, however may consider a minimum level of specifications conforming to IS code or National Building Code specifications to cover these missing details.

4. EXCAVATION / EARTH WORK AND ANTI-TERMITE TREATMENT

- (a) Earth work in excavation over area in existing soil (any type of soil and rock i.e. ordinary/hard rock) for raft foundation shall be carried out as indicated on drawings.
- (b) The earth work shall also include filling back to required formation with proper consolidation and disposal of surplus earth in AWHO plot as directed by Project Director / Architect.
- (c) Level chart of the plot is given in drawing. The reduced levels recorded in this drawing are in relation to the permanent bench mark and temporary bench mark as indicated and show on drawing.
- (d) for lump sum offer for construction of Under Ground Tank and pump room indicating in Schedule 'A' Part-I. Depth of excavation from existing ground level and finished level of top of underground water tank shall be as per drawing.
- (e) Immediately after excavation over areas the record of the following levels as actually executed at site shall be recorded in measurement book and jointly signed by the contractor, Architect and Project Director and record kept with the Project Director.
 - i. Level of bottom of lean concrete below RCC raft of UG tank and pump room.
 - ii. Finished top level of slab of Under Ground Tank.
 - iii. Finished ground level.
 - iv. Existing ground level.
- (f) The work shall be executed at site as per levels approved by the Architect and Project Director. In case of variations between the levels as indicated above and levels actually executed then the same shall be measured and adjusted as variation under clause 84-86 of General Conditions.

5. **CONCRETE (PLAIN & REINFORCED)**

(a) Mix of the cement concrete/Reinforced Cement Concrete required to be used in various locations shall be as per structural drawing if it is not mentioned shall be as under :

i	Lean concrete below raft	:	PCC 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)
ii	All RCC work	:	M-25 (Design mix)
iii	Sub base in floors	:	PCC 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20mm nominal size)

(b) RCC work in raft and walls of water tank and pump room shall be admixed with approved water proofing compound in recommended proportion with non-shrink polymeric compound of approved make as per direction of Architect/ Project Director.

(c) At all construction joints PVC water stops 150mm of approved make shall be provided and placed as per manufacturer's instructions to ensure to water leakages.

(d) Water proofing treatment shall be provided to RCC raft and walls as specified in section VII of Particular Section Part 1A.

(e) Testing and waterproofing treatment shall be carried out as per Section-VII of Particular Specifications Part-I-A by approved agency.

6. **MASONRY WORK**

All masonry work including steps at entrance shall be fly ash bricks in a mix 1:6 (1 cement: 6 coarse sand) as specified in section III of Particular Specifications Part I-A

7. **STEEL DOORS**

Steel doors shall be provided to the door openings at pump room entry and doors for sky light openings in roof slab for underground water tank, as per details as shown on drawings. Specifications in respect of frames and shutters shall be as under:

a) Frames for Steel Doors / openings on roof slab-

i) Frames shall be 40X40X6 mm conforming to IS-4351. The overall size and type of door frames (single rebated) shall be made as shown on drawings:

ii) Each frame shall consist of hinge jamb and head mullions where shown on drawings. The frame shall be welded. Two base ties of MS angle 25x25x3mm shall be welded to the feet of frame in order to form a rigid unit. The tie shall not be removed after fixing in position. This shall get embedded in the floor concrete. The frame shall be fixed to the wall with MS lugs of size 150 X 25 X 4 mm (3 nos each side)

iii) Three numbers, 100mm long heavy duty butt hinges shall be provided for each leaf. These shall be welded to the steel frame. Necessary provisions/slots shall be made for fixing locks, tower bolts, sliding bolts etc. Suitable sizes of flat 6mm thickness and mortar guards are to be welded at the rear of frame where slots, holes etc. are to be provided.

- iv) Vertical member of the door frame shall be 30mm more than the specified height and shall be embedded in floor at all levels. All members of the frame shall be sand papered to remove all scale and rust. A coat of red oxide zinc chromate primer shall be applied all round as per manufacturer's specifications.
- b) Steel Shutters for Doors/ opening in roof slab : These shall be fabricated out of 1.00 mm steel sheets. Diagonal braces and central cross piece of MS flat 30X6 mm shall be fixed using gusset plates as shown on drawings. Necessary fitting and locking arrangement shall be made as per drawings. Sample of the shutter shall be approved by Project Director/ Architect. All members shall be sand papered to remove all scale and rust. A coat of red oxide zinc chromate primer shall be applied as per manufacturer's specifications.
- c) All shutters as described in paras 7(b) above shall be factory made. The manufacturer shall be from the approved list of manufacturers.
- d) All the frames and shutters shall be enamel painted

8. **STEEL AND IRON WORK**

- (a) Reinforced steel and welding etc. shall be provided as per details shown on drawing and as specified in Section VI of Particular Specifications Part I-A.
- (b) PVC Coated steel Rungs: PVC coated steel rungs with 16 mm dia MS steel bar shall be provided and fixed inside water tanks at locations and as per details shown on drawings and as directed by Project Director.
- (c) Steel railing shall be fabricated out of 65 mm dia and 25 mm dia GI pipes light grade and shall be provided and fixed as per details shown in drawings.

9. **ROOF COVERING AND WATER PROOFING TREATMENT**

Water proofing treatment and covering of roof slabs of water tanks and pump room shall be as specified in Section VII of Particular Specifications Part I-A.

10. **FLOOR FINISHES**

- (a) Floor finishes shall be provided as per schedule of finishes drawings and are as under-:
 - (i) Pump room and treads of staircase and steps 40mm thick flooring with PCC 1:2:4 (1 cement : 2 coarse sand:4 graded stone aggregate 20mm nominal size) finished smooth with neat cement slurry.
 - (ii) Inside water tank Finished with commercial tile laid on 15 mm thick cement mortar mix in 1:4 cement: sand mortar with cement grout in joints.
- (b) Risers of staircases and steps at entrance shall be provided with 15mm thick plaster in mix 1:4 (1 cement: 4 coarse sand) finished smooth using neat cement slurry.
- (c) Below lean concrete RCC raft compacted 230 mm thick dry rubble stone soling shall be provided over rammed earth as per specifications laid down in Section VIII of Particular Specifications Part I-A.

11. **WATER PROOFING TREATMENT TO RAFT AND WALLS OF WATER TANK AND PUMP ROOM**

- a) Water proofing treatment shall be provided to RCC raft and walls as specified in section VII of Particular Section Part 1A.
- b) Testing and waterproofing treatment shall be carried out as per Section-VII of Particular Specifications Part-I-A by approved agency.

12. **INTERNAL & EXTERNAL WALL FINISHES**

- a) Internal surfaces of water tank shall be finished with commercial tile laid in 15mm thick cement plaster in CM 1:4 (1 cement : 4 fine sand) admixed with approved water proofing compound in as per manufacturer's recommended proportion and finished smooth using neat cement slurry.
- b) Internal surfaces of pump room shall be finished with 15 mm thick cement plaster in CM 1:4 (1 cement: 4 fine sand) finished smooth.
- c) External surfaces of water tanks and pump room above ground level shall be provided same as block / tower as specified in Section IX of Particular Specifications Part IA.

13. **WHITE WASH AND PAINTING**

- a) Ceiling of pump room and all internal surfaces of pump room shall be provided with white wash para 4 and 5 of Section X of Particular Specifications Part I-A.
- b) Painting to steel surfaces shall be provided as specified in Section X of Particular Specifications Part I-A.
- c) Painting of external surfaces with textured paint shall be provided as specified in Section X of Particular Specifications Part I-A.

14. **INTERNAL ELECTRIFICATION**

- a) All internal wiring including distribution board, all points for lights, Exhaust fans, light plug and power etc. and earthing shall be provided as shown in drawings and as specified in Section XI of Particular Specifications Part I-A.
- b) Number of points shall be as under:-

i)	Light point controlled by one switch	6 Nos.
ii)	Exhaust fans points controlled by 6 Amp switch	2 Nos.
iii)	6 Amp. 5 pin plug points with 6 Amp. Switch	2 No.
iv)	6 pin 16 Amp. Power plug points with 16 Amp. Switch	10 Nos.

15. MISCELLANEOUS ITEMS OF WORK

- a) Manhole Covers: Manhole frames and covers in the roof slab of water tank shall be provided and fixed as per details shown on drawing.
- b) Windows Shutter and Frame: All windows shall be in aluminium pure polyester powder coated frames and shutters shall be provided as per details shown on drawing and as per specifications as per Section IV of Particular Specifications Part I-A.
- c) Puddle Flanges: They shall be fixed in roof slab/walls of underground water tank at locations as shown on drawings and as directed by Project Director and Architect.
- d) Yard Gully Chambers and Over Flow Pipes: Yard Gully chambers and over flow pipes concreted to those chambers shall be provided as per details shown on drawings. The yard gully chamber shall be brick masonry chambers and shall be constructed with same specifications as specified in Particular Specifications Part-IX.

16. DRAINAGE

All works of drainage complete in all respect as shown in drawings and as specified in Section XII of Particular Specifications Part I-A shall be applicable.

PARTICULAR SPECIFICATIONS PART I-C
RAIN WATER HARVESTING PIT AND DESILTING CHAMBER

GENERAL

1. Rainwater Harvesting Tank shall be constructed at location/s and as per details shown in the drawings. The work shall be carried out strictly in accordance with Particular Specifications and drawings. The drawings & specifications shall be taken complimentary and also supplementary to each other and shall form part of this contract. Any work shown on the drawings and not specially included in specifications or vice versa shall be executed and deemed to be included in the scope of work for lumpsum rate. The tenderer shall consider a minimum level of specifications confirming to general specifications of CPWD, relevant IS codes or National Building Code to cover these missing details, for which nothing extra shall be paid.

SCOPE OF WORK

2. The scope of work of Rainwater Harvesting includes full, final and entire completion of all works including all internal services in all respects described in Part-ID and as shown on drawings forming part of the contract. The items of work included in the scope of this work for purposes of the lump sum contract are as under:-
 - a) Rainwater Harvesting Tank and desilting chambers including all civil works as per drawings.
 - b) Boring for pipes for rain water harvesting pits, RCC pipes, uPVC pipes blind/ perforated type, foot rests, gravel/ boulders packing, sand filter media around uPVC pipes in boring, manholes cover & frame.
 - c) For materials and workmanship of all items of work described in succeeding paragraphs refer to identical items under Particular Specifications Part I-A and as per direction of Project Director and Architect.

3. EXCAVATION / EARTHWORK

- a) Earth work in excavation over area in existing soil and rocks (any type i.e. soil and ordinary / hard rock) for raft foundation shall be carried out as indicated on drawings.
- b) The earth work shall also include back filling to required formation with proper consolidation and disposal of surplus earth in AWHO Plot/outside AWHO plot as directed by Project Director and Architect.
- c) Level chart of the plot is given in drawing. The reduced levels recorded in this drawing are in relation to the permanent benchmark and temporary benchmark as indicated and shown on drawings.
- d) Immediately after excavation over areas, the record of the following levels as actually executed at site shall be recorded in measurement book and jointly signed by the contractor, Architect and Project Director and record kept with the Project Director.
 - i) Level of bottom of lean concrete below RCC raft of Rainwater harvesting tank and depth of bottom level of excavation/ top of approved bearing strata
 - ii) Finished top level of slab of Rainwater harvesting tank.
 - iii) Finished ground level
 - iv) Existing ground level/s.

e) The work shall be executed at site as per the in invert levels obtained the inlet of Rainwater harvesting tank or as may be approved by Project Director/Architect.

4. **CEMENT CONCRETE AND BRICK WORK**

- a) Mix of lean cement concrete shall be 1:3:6 (1 cement 3 coarse sand 6 graded stone aggregate 40mm nominal size)
- b) Brick work at all locations shall be with fly ash bricks in foundation and super structure.
- c) Controlled quality concrete of grade M-25 shall be used as per clause 13 of Section II of Particular Specifications Part 1A.

5. **MANHOLE COVER**

- i) Rain water harvesting tank: - Two nos. Manhole with frames in top slab & clear opening of 560 mm dia size with **SFRC Heavy duty cover**, frame as per relevant IS code & locking arrangement. PVC coated steel footrests @ 300 mm interval vertically shall be embedded in walls with PCC bed blocks in Rainwater harvesting tank at spacing and at locations as shown in detail drawings and as directed by Project Director/ Architect.

6. **RCC INLET & OVERFLOW PIPES**

RCC pipes shall be provided in Rain water Harvesting Tank at the locations shown or as directed by Project Director/ Architect and shall be connected to the nearest storm water drain both for inlet and overflow pipes as directed. The work beyond 2 M of Rainwater harvesting tank shall not be in the scope of Lump sum rate which shall be measured and paid for separately as per Schedule 'A' Part-IX.

- 7. Boring shall be done mechanically of size as mentioned in drawing upto the depth of saturated sand strata and Blind/ perforated uPVC pipes of size as shown in drawings of type class B shall be provided and lowered. Filter media sand shall be filled all around of uPVC pipe in boring as shown in drawings
- 8. Boulders, pebbles, pea gravels and coarse sand shall be filled in bottom of tanks for filtration of rain water as shown in drawings.
- 9. Desilting chambers shall be constructed as per location shown in drawings.

Note:-

All relevant specifications related to this section may be referred to relevant Sections of Particular Specifications Part I-A shall be applicable.

PARTICULAR SPECIFICATIONS PART I-D
GUARD ROOM WITH TOILETS AND MAIN ENTRY GATE
INCLUDING INTERNAL SERVICES

Scope of Work

- 1 Guard rooms and gate shall be constructed near the main gates entry as shown on design drawing. It shall be constructed strictly in accordance with particular specifications as described herein before as per details shown on the drawings. The drawings and specifications shall be taken complementary to each and shall form part of this contract. Any work or material shown on drawings and not specifically included in the specifications or on drawings and not specifically included in the specifications or on drawings and so on and vice versa, shall be executed and deemed to be included in the scope of work for lump sum rates.
- 2 In case there are no specifications for items shown on drawings or where items are not exhaustively described, the general specification of C.P.W.D. shall be followed for which nothing extra shall be paid.
- 3 Specifications for all materials and workmanship of all items of work shall be same as of identical items for the building work described in particular specifications Part 1A except with the changes as described in succeeding paragraphs.

PARTICULAR SPECIFICATION PART - II
EXTERNAL WATER SUPPLY

1. Scope of work : Work of External Water Supply shall consist of furnishing all labour, materials, equipment and appliances necessary and required to install complete external water line lying in his contract area from underground reservoir upto gate valve of each rising mains of each block including pipe connections for terrace tank filling including connections from mains of Jal Board.

2 Sample of Materials: The Contractor shall produce samples of all materials and shall obtain approval to these in writing from Project-in-Charge / Project Director / Architect before he places bulk order for the materials for incorporation in the works. Materials to be incorporated in the work shall conform to the latest relevant ISI marked goods where manufactured.

3. Approval of Layout: The layout of all external water supply lines including valves and chambers shall be marked out on the site and get approved from the Project-in-Charge / Project Director / Architect before execution and also before laying of pipe lines.

4. External Water Supply Pipes

4.1. G.I. Pipes for borewell & municipal connection

(i) Materials:

- a). All pipes fittings accessories etc to be incorporated in the work shall be of standard quality strictly complying with the current appropriate Indian Standard Specifications, conforming to IS 1239 (Part I of 1979) and IS 1239 (Part II of 1969) and ISI marked.
- b). Water supply tubing fittings and accessories shall be galvanized steel. The galvanized steel pipes shall be screwed and socketed of medium grade and of approved make and ISI marked.
- c). Fittings shall be of malleable iron galvanized of approved make. Each fitting shall have manufacturer's trade mark stamped on it. Fittings for G.I. pipes shall include couplings, bends, tees, reducers, nipples, unions and bushes. Fittings shall conform to I.S. 1879 (Part - I to X).
- d). Contractor shall provide adequate number of unions on pipes 65mm and below to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve, stopcock, or check valve and on straight run as necessary at appropriate locations as required and /or directed by Architect / Project-in-Charge / Project Director .

(ii). Workmanship:

a). Trenches:

The width and depth of trenches of different pipes shall be as under: -

S.No.	Dia of Pipe	Width of Trench	Depth of Trench
aa).	15 mm to 50mm	30 cm	60 cm
ab).	Exceeding 50 mm and Upto 100 mm	50 cm	60 cm
ac).	Exceeding 100 mm but not exceeding 150 mm	60 cm	90 cm
ad).	Exceeding 150 mm	75 cm	90 cm

At joints the width of trench shall be widened where necessary. No extra payment shall be made for excavation more than the specified to cross the line from below the other line/sewer line, drain etc.

iii). Cutting and Threading of G.I. Pipes: Where pipes have been cut or rethreaded the ends shall be carefully filed out so that no obstruction to flow is offered. The ends of pipes shall then be carefully threaded, in such a manner as will not result in slackness of joints.

iv). Jointing of G.I. Pipes: GI pipes shall be jointed with screwed and socketed/flanged joints. Flanged joints shall be provided for connecting valves and also at suitable locations in straight lengths of pipe line to facilitate laying and subsequently maintenance work. Rubber gasket for insertion in between flanged joints shall be minimum 3mm thick. The flanges shall be tightened with GI bolts, nuts and washers. All screwed joints shall be examined before jointing to ensure that the threads are perfect for the full depth of the joints. Pipe threaded joints will be made by applying suitable grade of TEFILON tape used for drinking water supply. (Use of red or white lead and sutli will not be permitted for screwed joints).

v). Protection: All G.I. water supply pipes in chases or below ground shall be protected against corrosion by applying two layers of 2 mm thick multi-layer anticorrosive polymeric mix tape applied over a coat of primer as per recommendations of the manufacturers.

vi). Trench, Filling of GI Pipes : The pipes shall be laid on layer of 10 cm sand and filled with upto 10 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth and the surplus earth shall be disposed off as directed within the AWHO plot.

4.2). HDPE Pipes for External Water Supply & Irrigation

All external water supply pipe except borewell/municipal shall be HDPE pipe conforming to IS: 4986

Garden Hydrants

Garden hydrants shall be 25 mm dia gunmetal valves installed on G.I. pipes as per details or quick coupler valve.

Valves

Valves shall be as specified in section for irrigation.

Trenches

All pipes below ground shall be laid in trenches with a minimum cover of 100 cms. The width and depth of the trenches shall be as follows:

Dia of pipe	width of trench	depth of trench
15 mm to 50 mm	30 cms	100 cms
65 mm to 100 mm	45 cms	100 cms

This will not apply to drip irrigation pipes which may be laid just below the surface or on surface.

Testing

All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 7 kg/sq.cm or 1.5 times the working pressure, whichever is higher.

Pressure shall be maintained for a period of at least thirty minutes without any drop.

A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and Project Manager.

In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the pumping system. He shall rectify all leakages and shall replace all defective materials in the system. any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

After commissioning of the water supply system, Contractor shall conduct performance test to ensure that the system operates as specified. The test shall be conducted over a period of 15 days.

Measurement

Pipes shall be measured per linear meter (to the nearest cm) and shall be inclusive of fittings, e.g. couplings, tees, bends, elbows, unions, deductions for valves shall be made. Rates quoted shall be inclusive of all fittings.

5. Cast Iron Spun Pipes & Fittings:

The cast iron pipes for water supply shall be centrifugally spun type conforming to IS:1536-1976 with latest amendments and of approved makes. The pipes shall be either with spigot and socket ends or flanged ends. The spun iron pipes shall be of cast iron casted centrifugally class LA.

All cast iron pipes and fittings shall be jointed with spun yarn and best quality soft pig lead conforming to IS:782-1978 with latest amendments. It shall be free from impurities.

For cast lead joints, the spigot shall be centered in the adjoining socket by tightly caulking in sufficient turns of tarred gasket or hemp yarn to leave unfilled half the depth of socket for lead. When gasket or hemp yarn has been caulked tightly home, a jointing ring shall be placed round the barrel and against the faces of the socket. Molten pig lead shall then be poured in to fill the remainder of the socket. The lead shall then be solidly caulked with suitable tools and hammers of not less than 3 kg weight, right round the joint to make up for the shrinkage of the molten metal on cooling and shall be preferably finished 3mm behind the socket face.

The approximate depth of pig lead laid for various diameters of C.I. pipes and specials shall be as given below with a tolerance +/- 5 percent.

Nominal size of Pipe (mm)	Lead per joint (kg)	Depth of lead joint (mm)
80	1.8	45
100	2.2	45
125	2.6	45
150	3.4	50
200	5.0	55

C.I. Specials:

The specials shall conform to IS:1538-1976 heavy class with latest amendments.

6. Testing:

a). On completion the pipe line, it shall be tested to a hydraulic pressure of 7kg/sqcm (70 metre). Pressure shall be maintained for a period of two hours without drop. Any joint found leaking shall be redone and all leaking pipes removed and replaced. Testing shall be done before the trenches are refilled. The contractor shall arrange all the equipment required for testing and the rate quoted shall be deemed to be inclusive of this cost.

b). Contractor shall maintain a test register and tests shall be recorded in it. The entries shall be signed and dated by Project-in-Charge / Project Director / Architect and Contractor. The register shall be handed over to the Project-in-Charge / Project Director on completion of work.

7. **Disinfection of pipe lines:** All G.I. & C.I. pipelines shall be disinfected by flushing with water containing bleaching powder at 0.5 gms per litre of water and cleaning the same with fresh water operation to be repeated three times including getting the samples of water from the disinfected main & tested in the Municipal laboratory. Cost of disinfecting the pipes shall be deemed to be included in the rates quoted against the respective items of pipes in Schedule A Part II.

8. Pipes shall be measured per linear Metre (to the nearest centimeter) and shall be inclusive of all fittings, earth work, pipe protection and required all other items as specified.

9. **Ball Valve:** Valves 65 mm and below shall be brass ball valves with brass body (nickel coated), brass ball (hard chrome plated) and teflon seat. Valves shall be tested at manufacturer's works and of sizes as specified.

10. **Sluice Valve:** Valves 80 mm and above dia shall be cast iron double flanged with non-rising spindle. Sluice valves below ground shall be provided with caps suitable for operations by a key. Sluice valves shall conform to IS:14846-2000 Class I, tested to 10 kg/sqcm (100 Metre head) and ISI marked. The fixing of the valve shall be done by means of bolts and nuts and 3mm thick rubber insertions with the flanges.

11. NON RETURN VALVE:

a). Where specified non return valve (swing check type) shall be provided through which flow can occur in one direction only. It shall be single door swing check type of best quality conforming to IS: 5312.

b). Each slim type swing check valves shall be provided with a pair of flanges screwed or welded to the main line and having the required number of galvanized nuts, bolts and washers of correct length.

12. ANCHOR THRUST BLOCKS:

a). Contractor shall provide suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer & high pressure.

b). Thrust blocks shall be provided at all bends & tees & such other location as required by site conditions.

c). Exact location, design and size of the concrete block shall be approved by the Architect (Supervision) and Project-in-Charge / Project Director prior to execution of work.

13. **Masonry Chambers with C.I. surface Box:** Masonry chamber with C.I. surface Box shall be provided as described in Schedule 'A' Part II for quality of material and workmanship respective items in particulars specifications part I shall be followed.

14. All materials and labour required to make the connection with mains of Delhi Jal Board including cutting and making of joints in the Dwarka mains providing and fixing Tee of suitable size, excavation, filling back and getting the tee connection passed from Delhi Jal Board authorities, shall be deemed to be included in the quoted rates against items 1 & 2 in Schedule 'A' Part-II. Contractor shall be responsible to take permission for making connection of AWHO water supply lines with mains of Delhi Jal Board and shall coordinate the date and time for making the actual connection. The statutory charges as paid to Delhi Jal Board for making connection to Delhi Jal Board, water supply lines shall be reimbursed by the Project-in-Charge / Project Director to the Contractor on production of receipt from Delhi Jal Board.

15. AIR VALVE :

Air valves shall be as per IS : 14845 and double orifice type. Air valve shall be provided with an isolating sluice valve fixed in lying position with meter gear arrangement. All flanges of Air valves shall be flat faced in accordance with IS-1535 Part IV & VI.

Air valve shall have kinetic features for easy flow of airs and to avoid the ball getting caught in high velocity. One of the orifice of Air valve shall have smaller size vulcanite rubber coated timber ball to rest on a bronze orifice nipple. The other orifice of the Kinetic Air valve should have larger size vulcanite rubber coated timber ball to rest on neoprene molded seat.

Body	:	C.I. to IS-210 Gr. FG 200 - for PN 1
Cover & cowl	:	C.I. to IS-210 Gr. FG 200 - for PN 1
Buoyant Balls	:	Vulcanite coated seasoned teak
Orifice Nipple	:	Gun Metal to IS-318 Gr. LTB - 2
Large Orifice	:	Neoprene Rubber

16. Water meter and connection with main line -

(a) It shall be provided and installed including fittings as per schedule work mentioned in Sch 'A' part II and Making connection from Existing Water Supply line including necessary excavation & making good the same including cutting, boring and tapping the Existing line by providing and installing ferrule / Tee connections with necessary fittings as required and making good the same.

(b) The rate for this item also includes complete services from the contractor for liaisoning works such as filing necessary applications, submission of forms for approval to the municipal authorities, depositing the fees/other amounts as required for getting the premises/ installations, inspected and approved. and all other formalities required till the water connection is obtained. All the expenses incurred in this regard shall be borne by the Contractor except for the official payments to be made for any security deposit etc. which will be reimbursed on production of original voucher.

PARTICULAR SPECIFICATION PART-III
EXTERNAL SEWERAGE AND DRAINAGE

1. **Scope of Work:** Work under this section shall consist of furnishing all labour, material, equipment and appliances necessary and required to completely install the sewerage and drainage system as specified hereinafter shown in the drawings and given in the schedule of quantities.
2. Work of external sewerage shall start beyond the first manhole which shall be deemed to be included in the lumpsum cost of buildings marked as internal in external development Drawing, which shall be deemed to be included in lump sum cost of the building as per para-42(h) of Section-XII of particular specifications Part 1-A.

GENERAL REQUIREMENTS:

3. All materials shall be of the best quality conforming to specifications and subject to the approval of the Project-in-Charge / Project Director / Architect.
4. Drainage lines shall be laid to the required gradients and profiles.
5. All sewerage and drainage work shall be done in accordance with the local bye-laws.
6. The layout of all pipe lines, manholes and their locations as shown in the drawings shall be marked out on site with relative levels and got approved from the Architect / Project-in-Charge / Project Director before excavation and also before laying of the pipe lines.
7. Excavation for manholes shall NOT be measured separately and shall deem to be included in the rates quoted for the construction of manholes including extra depths where required. This shall also be inclusive of disposal of surplus soil within AW HO plot as directed by Project-in-Charge / Project Director / Architect.
8. All excavation for laying of pipe lines marked external shall be measured and paid separately as provided in schedule of quantities. The rate for excavation shall deem to include filling back where necessary and disposal of surplus soil within AW HO area as directed by Project-in-Charge / Project Director / Architect.
9. Width of the trench for 150mm dia SWG pipe at the bottom of the trench and width of bed concrete shall be 55 cms. Width of trench for 200mm and above. SWG pipe at the bottom shall be nominal dia of pipe plus 40cm. No extra payment shall be admissible for width excavated greater than the specified.
10. SN-4 pipes are made of High-Density Polyethylene (HDPE) Raw material using state of the art German Equipment and Technology. The outer wall is corrugated type for the maximum load bearing strength and the inner wall is smooth for easy installation of cables without any friction.

The pipes shall conform to IS : 16098 (part-2)

All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. SN-4 pipes are have good Resistance to Corrosion, Chemically Inert & Environmentally safe; they have Good Impact strength, are Light in weight and easy to handle and transport.

SN-4 HDPE are resistant to a broad range of corrosive chemicals. Do not support biological growth. The corrosion of pipe occurs due to electro chemical activity occurring in the presence of acid, alkaline salt, organic waste etc. Fundamentally, this electro chemical corrosion occurs vigorously incase of metals. On the other hand SN-4 HDPE Pipe being nonconductors are not vulnerable to this phenomenon. Hence, these pipes are suitable for drainage and sewerage even with acidic or alkaline fluids.

11. Laying

SN-4 pipes shall be laid on cement concrete bed of cradles as specified and shown on the detailed drawings. The cradles may be precast and sufficiently cured to prevent cracks and breakage in handling. The invert of the cradles shall be left 12 mm below the invert level of the pipe and properly placed on the soil to prevent any disturbance. The pipe shall then be placed on the bed concrete or cradles and set for the line and gradient by means of sight rails and boning rods, etc. Cradles or concrete bed may be omitted, if directed by the Engineer in charge.

12. Jointing

Elastomeric sealing rubber ring as per IS : 5382

13. Measurement:

- i) Excavation: Measurement for excavation of pipes trenches shall be made per linear meter.
- ii) Trenches shall be measurement between outside walls of manholes at top and the depth shall be the average depth between the two ends to the nearest cm. The rate quoted shall be for a depth upto 1.5 metres or as given in the Bill of Quantities.
- iii) Payment for trenches more than 1.5 m in depth shall be made for extra depth as given in the Bill of Quantities and above the rate for depth upto 1.5 m.
- iv) Pipes shall be measured for length of the pipe line per linear meter.
- v) Length between manholes shall be recorded from inside of one manhole to inside of other manhole.
- vi) Length between gully trap and manhole shall be recorded between socket of pipe near gully trap and inside of manhole.

14. TESTING

All the drainage lines and manholes / chambers / trenches below ground shall be flushed before testing and cleaned thoroughly for any debris or mud.

The Contractor shall notify the Engineer in charge ten days in advance of any test so that the Engineer can witness the tests if he so wishes.

All rights of the sewer and drain shall be carefully tested for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be carried out from manhole to manhole. All pipes shall be subject to a test pressure of 1.5 meter head of water. The test pressure will however, not exceed 6 meters head at any point. The pipes shall be plugged preferably with standard design plugs or with rubber plugs on both sides, the upper end shall, however, be connected to a pipe for filling with water and getting the required head poured at one time.

System shall be tested in sections and such sections shall be entirely retested on completion.

Sewer lines shall be tested for straightness by :

i) Inserting a smooth ball 12 mm less than the internal diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball shall roll down the invert of the pipe and emerge at the lower end.

ii) Means of a mirror at one end a lamp at the other end. If the pipe is straight the full circle of light will be seen otherwise obstructions or deviations will be apparent. The contractor shall give a smoke test to the drain and sewer upto the satisfaction of the Engineer in charge. A test register shall be maintained which shall be signed and dated by contractor and Project-in-charge.

(b) **Sewer lines shall be tested for straightness by :-** Inserting a smooth ball 12mm less than the diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end.

(i). Means of a mirror at one end and lamp at the other end, if the pipe line is straight the full circle of light will be seen otherwise obstruction of deviation will be present.

(ii). The contractor shall give a smoke test to the drains and sewer at his own expense and carry out changes if directed by the Project-in-Charge / Project Director / Architect.

(c). A test register shall be maintained which shall be signed and dated by the contractor(s) and Project-in-Charge / Project Director / Architect and shall be handed over to Project-in-Charge / Project Director on completion of work.

(d). No payment for testing the sewer lines for water tightness and straightness as stated above shall be admissible. The rates quoted for the items of sewer lines shall be deemed to include the cost of testing the pipe lines.

15. **P.C.C. in Encasing** : The bed concrete and the concrete for encasing of SWG pipes shall be of mix 1:5:10 (1cement : 5 coarse sand : 10 graded stone aggregate 40mm nominal size) and shall be laid to the dimensions as shown on the drawings. The pipes shall be covered with 15cm thick concrete above the crown of the pipe and sloped off to meet the outer edges of the concrete to give a minimum thickness of 15cm all around the pipes.

16. **Measurement:** For providing, laying and jointing of stoneware pipes measurements shall be recorded for the finished length of the pipe line i.e. the length of pipe shall be recorded from inside of one manhole to the inside of other manhole.

17. **Refilling** : After the sewer or other work has been laid and tested and passed by Project-in-Charge / Project Director / Architect as per para 14 above, the trench or other excavations shall be refilled. Utmost care shall be taken in doing this so that no damage shall be caused to the sewer and other permanent work. The filling upto 75 cms above the crown of the sewer shall consist of the finest selected materials placed carefully in 15 cms layer and flooded and consolidated. After this has been laid, the trench and other excavations shall be refilled carefully in 15cms layers with material taken from the excavation, each layer being watered to assist in the consolidation unless the Project-in-Charge / Project Director / Architect otherwise direct.

18. **Manholes** : Manholes shall be constructed as per the details indicated in the drawings. Foundation concrete shall be PCC 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40mm nominal size) for rectangular / circular manholes. Side wall shall be with bricks of class designation 7.5 in cement and coarse sand mortar 1:4 (1 cement : 4 coarse sand) inside of the manholes shall be plastered, 12mm thick cement mortar 1:3 (1 cement : 3 coarse sand) with a floating coat of neat cement and external plaster 12mm thick with cement mortar 1:6 (1 cement : 6 fine sand) and PVC rungs heavy duty shall be embedded in PCC blocks of mix 1:3:6 (1 cement : 3 coarse sand : 6 stone aggregate of 20mm nominal size) in manholes exceeding 700mm depth. Concrete in benching and channels shall be PCC 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) trowled smooth using extra cement. All junctions and changes in direction in PCC channels shall be formed by smooth curve. The benching shall have slopes of 10cms towards the channel. The depth of the channel shall be full diameter of the pipe. The manholes frames and covers shall be of steel fibre reinforced concrete heavy duty with clear opening of 560mm dia for circular manholes and 450 x 600mm rectangular manholes, thickness of frames should be 130mm and thickness of cover 80mm and confirming to IS 12592.

19. All manholes shall be measured by numbers and shall include all items specified above and accessories, excavation, refilling and disposal of surplus earth.

20. Manholes with depth greater than specified under the main item shall be paid for under "extra depth" and shall include all items as given for manholes. Measurement shall be done to the nearest cm. Depth of manhole shall be measured from top of the manholes cover to bottom of the channel.

21. **Drop channels** : Drop channels shall be provided between branch sewer and main sewer on or in the main sewer itself in steep ground when the difference in invert level of the two exceeds 45cms. of required sizes.

22. **Foot Rests** : Foot Rests shall be minimum 6mm thick plastic encapsulated as per IS : 10910 on 12 mm dia steel bar conforming to IS : 1786 having minimum cross section as 23mmx25mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2mm tread on top surface by ribbing or chequering besides necessary adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to withstand the bend test and chemical resistance test as per specifications and having manufacturer's permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) complete as per design and shall be fixed at 300mm c/c staggered.

23. **Storm Water Drainage** : Laying and jointing of RCC pipes shall be same as Clause no. 11 to 17 herein before. Brick masonry catch basins shall be constructed of size 50x45x60cm with bricks of class designation 7.5 in cement mortar 1:5 (1 cement : 5 coarse sand) including 500x450 mm precast RCC horizontal grating with frame complete as per standard design. Brick masonry drains will be constructed as per **Architectural Drawing** The drain will be covered with heavy duty SFRC perforated covers.

24. Percolation Pit and Silt Trap :

Percolation pit and Silt trap shall be constructed as per the detailed Drawing and the following items shall be included:

Necessary Excavation.

Foundation concrete and retaining (Brick / R.C.C.) walls.

2 Nos. 160 OD. PVC Slotted & Blind Pipes in 300mm bore hole in each Pit.

For P.V.C. slotted pipes, 80 Nos. of slots per Metre of size 4mmx80mm shall be provided. Coarse Sand (1.5-2mm size), Gravel (3-6mm size) and River Stone (2.5-90cm size) filling. P.V.C foot rests.

R.C.C. slab on top. S.F.R.C. man hole covers.

Pea gravel all round the P.V.C. slotted pipe including development of Bore for 40 hours by air compressor. The rate of percolation pit includes all the items as listed above and as shown in drawing.

25. At the end of the drain 450 dia R.C.C. Pipe shall be laid upto the external storm water disposal manholes.

26. The contractor shall be responsible to take permission for making connection of AW HO sewer/ storm water lines with sewer/ storm water lines of Prayagraj Maha Nagar Nigam / Prayagraj Jal Santhan and shall co-ordinate the date and time for making actual connection under the respective item of Schedule 'A' Part-III. The statutory charges as paid to Prayagraj Maha Nagar Nigam / Prayagraj Jal Santhan for making connections shall be reimbursed by the Project-in-Charge / Project Director to the Contractor on production of receipt from Prayagraj Maha Nagar Nigam / Prayagraj Jal Santhan.

PARTICULAR SPECIFICATION PART – IV
(ROADS, PATHWAYS AND EARTH FILLING OVER AREAS)

1. Scope of Work: The road work in this contract comprises of provisions of road with sub base course 150mm thick consolidated, base course 150mm thick consolidated, bituminous top layer in roads, precast cement concrete paver in pathways etc. and earth filling as described in schedule items and as specified in succeeding paragraphs.

MATERIALS

2. Sub Base: This shall be water bound macadam with stone aggregates. Stone aggregate shall be quartzite. This shall be Crushed/ Broken stone as per grading requirement given in the table shown below :-

a). Grading requirements of stone aggregate:

Grading No.	Size Range	Sieve designation	Percent by weight passing	Test requirement the sieve
i. (Sub Base course)	90mm to 45mm	100mm	100	One test per 100 cum
		80mm	65-85	
		63mm	25-60	
		40mm	0-15	

b). The stone shall be hard, durable and free from excess of flat elongated soft and disintegrated particles, dirt and other objectionable matter.

3. a). Stone Screenings for Sub base: Screening to fill voids in the stone aggregate shall consist of the same material as the stone aggregate.

aa). The screenings shall have gradings shown in the following table :-

Grading Classification	Size of Screenings	Sieve Designation	Percent by weight passing the sieve	Quantity reqd. for 10 sqm.
Sub base course	12.5mm	12.5mm	100	0.63 cum
10.0mm			90-100	-
4.75mm			10-30	-
150 micron			0-8	-

ab). The screening shall be clean, durable, free from disintegrated pieces and other objectionable material.

4. Physical requirements of Stone aggregate for WBM:

S. No.	Type of Construction	Test	Test Method	Requirements	Frequency of test
i.	Sub Base course	Los Angeles Abrasion value or Agg.impact value	IS:2386(Part IV) IS:2386(Part IV) IS:5640 ***	60% mix. *50% max.	One test per 200cum of aggregate
ii.	Screening/ Stone Chipping	a).Los Angeles Abrasion value or Agg. impact value b). Flakiness Index c) Stripping value	IS:2386 (Part IV) IS:2386(Part I) IS:6241		One test per 50-100 cum One test per 50-100 cum of aggregate One test per 50-100 cum of aggregate

* Aggregate may satisfy requirements of either of the two tests.

** The requirements of flakiness index shall be enforced only in case of crushed broken stone and crushed slag.

5. Binding Material : The binding material shall consist of fine grained material possessing plasticity index value 4-6 which shall be determined in accordance with IS 2720 (Part V). The quantity of binding material required shall be as under :-

per 10 sqm

Sub base 0.15 cum

WORKMANSHIP:

6. Preparation formation:

a). **Preparing formation** : The ground shall be formed to proper gradient, camber, super elevation, etc. corresponding to the required surface, by trimming the surface. Surplus soil (if any) shall be thrown clear of the road formation. The formation shall be watered and rolled.

b). **Preservation of property**: Road side trees, shrubs, poles, fences, monuments, buildings, pipe lines, sewers etc. within or adjacent to the road which are not to be disturbed shall be protected from injury or damage.

7. **Preparation of sub-grade**: The surface of the formation for a width equal to that of sub base course shall first be cut to the depth below the proposed finished level, equal to the combined depth of base course and wearing courses (due allowance being made of consolidation). It shall then be cleared off all foreign substances and sub-grade dressed off parallel to the finished profile.

8. Consolidation of sub-grade: The sub-grade shall then be sprinkled with water and rolled with minimum of 5 numbers of passes of 8-10 tonne Power Roller (and Sheep Foot Roller, if required) to obtain a density of not less than 95% of the density at optimum moisture content obtained in the lab by proctor method.

9. All undulations in the surface that might develop due to rolling shall be made good with earth or quarry soil as the case may be and sub-grade e-rolled.

BOTTOM LAYER (Sub Base Course):

10. The sub-base course shall be water bound macadam with stone aggregate of size 90mm to 45mm. This shall be laid on prepared sub-grade in conformity with line, grades and thickness. The consolidated thickness of the sub-base shall be 150mm. Loose quantity of the aggregate shall be 2.02 cum per 10 sqm. The stone aggregate shall be mechanically inter-locked by rolling and voids thereof filled with screening and binding material with the assistance of water, laid on a prepared sub-grade. The coarse aggregate shall be spread uniformly and evenly upon the prepared sub-grade in required quantities with a twisting motion to avoid segregation. In no case shall these be dumped in heaps directly on the area where these are to be laid. This shall be laid on proper profile, grades, by using templates. The surface of the aggregate spread shall be carefully trued up and all high or low spots corrected by removing/adding aggregate as required. Sub base course shall project 300mm beyond the age of concrete slab, if kerbs are not set on the slabs.

11. Rolling : Immediately after spreading of the coarse aggregate it shall be compacted to the full width by rolling with a power roller of 8 to 10 tonne capacity. Initially light rolling is to be done which shall be discontinued when the aggregate is partially compacted with sufficient voids to permit application of screening. The rolling shall begin from the edges with roller runner forward and backward and adding the screenings simultaneously until the edges have been firmly compacted. The roller shall then progress gradually from the edges to the center, parallel to central line of the road and overlapping uniformly each preceding rear wheel track by $\frac{1}{2}$ (half) width and shall continue until the entire area of the sub base has been rolled by the rear wheel. Slight sprinkling of water may be done during rolling. On super-elevated curves the rolling shall proceed from the lower edge and progress gradually continuing towards the upper edge of the road.

12. Application of Screening : After the coarse aggregate has been lightly rolled to the required surface, screening shall be applied gradually over the surface to completely fill the inter-stices. Dry rolling shall be continued while screenings are being spread so that the jarring effect of the roller causes them to settle in the voids of the aggregate. The screening shall be spread uniformly in successively thin layers, which shall be applied at a slow rate. The ensure filling of all voids, rolling and brooming shall continue with the spreading of screenings. Damp and wet screening shall not be used under any circumstances.

13. Sprinkling and Grouting: After spreading the screening and rolling, the surface shall be copiously sprinkled, swept in brooms and rolled, to distribute the screenings evenly, additional screenings be applied wherever necessary, until the stone aggregate is well bonded and firmly set for the entire depth and until a grout has been formed of screening and water and form a wave of grout ahead of the wheels of the roller.

14. Application of binding material : After the application of screening and rolling, the binding material shall be applied at a uniform and slow rate into two or more successive thin layers. After each application, the surface shall be copiously sprinkled with water and the resulting slurry swept in with hand broom to fill the voids. The surface shall then be rolled by an 8-

15. Setting and drying: After final compaction of the sub base course, the road shall be allowed to cure overnight. Next morning, the defective spots shall be filled with screening or binding material lightly sprinkled with water if necessary and rolled. No traffic shall be allowed till the macadam sets.

16. Surface Evenness: The surface evenness of the completed W.B.M. sub base course in the longitudinal and transverse direction shall be as under :-

Longitudinal profile undulation when measured with a 3 Metre, straight edge shall not be more than 15mm. Cross profile - undulation when measured with a camber template shall not be more than 12mm.

17. Rectification of Defects: When the surface irregularity of the WBM sub base course exceeds the tolerance specified above, or where the base course is other wise defective due to sub-grade soil mixing with the aggregate, the layer of its full thickness shall be scarified over the affected area, re-shaped with added material and re-compacted. The depressions shall not be filled with screening and binding material.

18. Middle Layer:

(a). 150 mm thick (consolidated thickness) water bound macadam – 40 – 63 mm size hard stone shall be laid over prepared sub base course in the required profile and camber. The top surface shall be finished, leveled and smooth.

19. TOP LAYER:

(a). Providing and laying semi-dense bituminous concrete using crushed stone aggregates of specified grading, premixed with bituminous binder and filler, transporting the hot mix to work site by tippers, laying with paver finisher equiped with electronic sensor to the required grade, level and alignment and rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction and density as per specification, complete and as per directions of Project-in-Charge. 25mm compaction thickness with bitumen of grade VG-30 @5% (percentage by weight of total mix) and lime filler @2% (percentage by weight of Aggregate) prepared in batch type hot mix plant of 100-120 TPH capacity. The design of semi-dense / dense bituminous concrete and testing shall be done by the Contractor as per the relevant clause no 16.46 of CPWD / MORTH specifications.

(b). Tack coat/ seal coat as per specification

20. Precast Saucer Drain:

(a). The sizes of Saucer Stone shall be as per approved sample or as shown on drawing.

(b). **Laying of Saucer Drain**

(i) The surface area should be leveled & consolidated.

(ii) Prepare the sub-base by as per item specifications.

(iii) Setting in position with cement mortar 1:2 (1 cement: 2 coarse sand).

(iv) The joints shall be filled up with cement mortar 1:2 (1 cement: 2 coarse sand) finished properly & cured well.

(c) The Saurcer drains, shall be provided at locations as shown on drawing & as directed by the Architect & Project-in-Charge / Project Director.

21. Earth filling over areas: Earth filling over areas shall be by bringing earth from outside AW HO land by the contractor. The entire plot levels shall be taken in a grid of 3m x 3m and jointly signed before fillings. Earth shall be spread in layers of 20cm. Each layer shall be rolled with a roller of minimum ½ tonne weight by providing 5 passes. Every 3rd layer and top most layer shall be consolidated with a power roller of minimum 8 tonne weight by giving 5 passes. Light watering shall also be done for each layer while consolidating. Final levels shall be attained as indicated by Project-in-Charge / Project Director / Architect.

22. Computing the gross filling volume shall be by Prismoidal formula, Simpsons Rule or Trapezoidal formula as the case may be. Area covered by buildings shall be deducted. Any excess excavation in foundation after plinth filling etc. shall also be deducted. The net payable volume shall be arrived after deducting 10% from the gross volume arrived after above procedure. Rate quoted shall be deemed to include all operations and above provisions including for net volume only. Compaction under optimising moisture conditions to give at least 95% of the maximum dry density (Project Density).

23. **Ramps**

(a). **Under Layer:**

Under layer shall be of 150mm thick WBM as specified here-in-before.

(b). **Topping:**

275mm thick P.C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) mixed with hardener shall be laid over rammed and consolidated base as per sub para(a) above and as per details shown on drawing. Width of ramp shall be as shown on drawing. As soon as concrete starts setting, 12mm M.S. square bars shall be pressed on concrete surface by wooden mallet and bar shall be so hammered to get horizontal groove of 10x20mm @ 150mm c/c to form antiskid surface in the required pattern as per instructions of Architect.

PARTICULAR SPECIFICATIONS PART-V**BOUNDARY WALLS & GATE ETC.****1. GENERAL**

Scope of work of Boundary Wall and Gates as per Schedule-A shall comprise of providing boundary wall including railing with three gates as per drawing and as per layout shown on drawing. All items shall be provided as catered in schedule-A and as specified hereunder and as shown on drawing.

2. MATERIAL AND WORKMANSHIP

Specification of material and workmanship in respect of all items of Schedule A shall be same as of identical items of the buildings work as described in schedule except with the changes described in succeeding paragraphs.

3. SITE CLEARANCE, SITE LEVELS AND SURFACE DIGGING:

Refer relevant clauses of various sections of Particular specifications Part I-A.

4. LAYOUT

After setting out of work as per stage of para 3 above the layout of boundary wall shall be got approved form the Project-in-Charge / Project Director /Architect.

5. EXCAVACTION IN TRENCHES

Earthwork in excavation in any type of soil for foundation of wall shall be carried out as per details shown in drawings.

6. The detailed specifications for earth work, earth filling, plinth filling, cement concrete (plain or reinforced), brickwork, DPC, steel and iron work, paint shall be as per particular specifications Part I-A and Item specifications as per Schedule A.

7. M.S. RAILING OVER BOUNDARY WALL – Not Applicable

8. MS STEEL GATES: Steel gate shall be fabricated, welded and erected as per details shown on drawings. MS Channel shall be embedded in R.C.C. columns. The posts shall be truely vertical in plumb. The pivot hinges and pin shall be welded to the frame of gates. Necessary locking arrangements shall also be provided. After erection the gates shall be painted with two coats of synthetic enamel paint of approved shade over one coat of approved steel primer. (Rates quoted against respective items of Schedule 'A' shall be inclusive of all operations described above).

9. WELDING

This shall be done by electric arc process. Refer relevant clause of Section of Particular Specifications Part I-A.

10. COPING PLASTER

The surface of boundary wall shall be provided with CC coping as per drawing finished complete as per specifications and approval of Project-in-Charge / Project Director / Architect.

11. FINISHES

(a) External face of boundary wall including coping with grooves as per drawing and approval of Project-in-Charge / Project Director / Architect.

(b) Internal surfaces shall be finished with specified paint as per specifications of approved shade and colour (two or more coats) to give an even shade on all cement plastered surfaces. The shade of the paint shall be used as approved by Project-in-Charge / Project Director / Architect.

12. PLASTER

On internal face of the boundary wall, 15 mm thick cement plaster in cement mortar 1:6 (1cement: 6 parts of coarse sand) including dubbing out i.e. bringing up the undulation on the rough surface of brick work in level with proudest points where required) complete all as specified shall be provided on area as per instruction of Project-in-Charge / Project Director & Architect. Prepared plastered surfaces to be finished with two or more coats of exterior quality paint of desired shade as approved by Project-in-Charge / Project Director / Architect.

13. EXPANSION JOINTS:

Expansion joints shall be provided in the boundary wall in the location shown on drawings.

14. SIGNAGE:

Providing and fixing signage, one near each gate made of M.S. Z-section box with acrylic sheet cladding, 4mm thick acrylic sheet panels including provisioning of 3 nos. flourescent tube lights and supported over 100mm dia M.S. pipes painted with enamel paint and embedded in ground. The acrylic sheet shall have a digital printout of A-0 (Azero) size on waterproof acrylic sheet and pasted over the base acrylic sheet as per detail as shown on drawing and as per item specification as per Schedule. Nothing extra shall be paid beyonf quoted rate.

15. RED/DHOLPUR SAND STONE CLADDING: - Not Applicable**16. DAMP PROOF COARSE**

There shall be horizontal damp proof coarse in boundary wall wherever required matching with the existing boiundary wall at the lowest exposed level and shall have water proof plaster on internal face upto 100mm above the level of earth inside as shown in Architectural Drawing as per item specifications of Schedule.

PARTICULAR SPECIFICATIONS PART-VI**EXTERNAL SEWERAGE**

1. Work under this section shall consist of furnishing all labour, material, equipment and appliances necessary and required to completely install the sewerage system as specified hereinafter shown in the drawings and given in the Schedule of quantities.
2. Work of the External Sewerage shall consist of all manhole and sewer lines as indicated in the drawing.

GENERAL REQUIREMENT

3. All Material shall be of the best quality conforming to specifications and subject to the approval of the Project Director /Architect.
4. Drainage Lines shall be laid to the required gradients and profiles.
5. All Sewerage and drainage work shall be done in accordance with local bye laws and through an approved agency of licensed plumber.
6. The Layout of all pipe lines, manhole and their locations as shown in the drawings shall be marked out on site with relative levels and got approved from the Architect / Project Director before excavation and also before laying of the pipe lines.
7. Excavation for manholes shall not be measured separately and shall deem to be included in the rates quoted for the construction of manhole including extra depths where required. This shall be also inclusive of disposal of surplus soil within AW HO Plot as directed by Project Director /Architect.
8. All Excavation of laying of pipe lines marked external shall be measured and paid separately as provided in schedule of quantities. The rate for excavation shall deem to include filling back where necessary and disposal of surplus soil within A WHO areas as directed by Project Director /Architect.
9. Width of for 150mm dia. RCC hume pipes at the bottom and width of bed concrete shall be nominal dia. of pipe plus 100 mm both sides. RCC hume pipe at the bottom shall be nominal dia. of pipe plus 150mm mm both sides. No extra payment shall be admissible for width excavated greater than the specified.
10. **R.C.C. NP2 CLASS PIPE DRAIN (HUME PIPE DRAINS)**

Reinforced Cement Concrete Pipes : Cement Concrete Pipes where called for on the drawing shall be centrifugally spun reinforced cement concrete pipes. Pipes shall be true perfectly round, free from cracks, cylindrical, straight with a uniform bore of specified internal diameter, throughout. Cracked or warped pipes with uneven texture shall not be used. Pipes shall be of Class NP2 and conform to IS: 458-1971. Adequate number of collars as required shall also be supplied along with the pipes.

11. LAYING AND JOINTING CONCRETE PIPES

Concrete pipes shall be laid and jointed as described in IS:783-1959 (Code of practice for laying of cement concrete pipes).

After setting out the pipes to correct grade/alignment, the collar shall be centered over the joint and filled in with the tarred spun yarn, till sufficient space is left on either side of the collar to receive the mortar. This space shall then be filled with cement mortar 1:2 (1 cement : 2 washed coarse sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 degrees to the longitudinal axis of the pipe on both sides of the collar. The joint shall be cured for at least four days. The joints shall be tested to a head of 0.6 Meters.

12. LAYING AND JOINTING OF RCC HUME PIPE

- a) Laying: The pipes shall be carefully laid to the levels and gradients shown on the plans and sections with socket.
- b) Jointing: Spun yarn soaked in neat cement wash shall be passed round the joint and inserted in it by means of caulking tool. More skeins of yarn shall be added and well rammed home. Cement mortar with one part of cement and one part of sand shall be slightly moistened and must on no account be soft or sloppy and shall be carefully inserted by hand into the joints. The mortar shall then be punched and caulked into the joint completely with tightly caulked mortar. The joint shall then be finished off neatly outside the socket at an angle of 45 degrees.

13. TESTING

- (a) All length of sewer shall be fully tested for water tightness by means of water pressure maintained for not less 30 minutes. Testing shall be carried out from manholes. All pipes shall be subjected to a test pressure of at least 1.5 meters head of water at highest point of these sections under test. In long lengths the test pressure shall not exceed 6 meters head at any point. The pipes shall be plugged preferably with standard drain plugs on both ends. The upper end shall however be connected to a pipe of filling with water and getting the required head.
- (b) Sewer Lines shall be Tested for Straightness by
 - i) Inserting a smooth ball 12mm less than the diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end.
 - ii) Means of a mirror at one end and at the other end, if the pipeline is straight the full circle of light will be seen otherwise deviation will be present.
- (c) The contractor shall give a smoke test to the drains and sewer at his own expense and carry out changes if directed by the Project Director/Architect.
- (d) A test register shall be maintained which shall be signed and dated by the contractor(s) and Project Director and Architect and shall be handed over to Project Director on completion of work.
- (e) No payment for testing the sewer lines for water tightness and straightness stated above shall be admissible. The rates quoted for the items of Providing and Laying stoneware Pipes shall be deemed to include the cost of testing of the pipe line .

14. PCC IN ENCASING AND HAUNCHING

The bed concrete and the concrete for haunching and encasing of RCC hume pipes shall be mix 1: 5: 10 (1 Cement : 5 Coarse Sand : 10 graded Stone aggregate 40mm grade) and shall be laid to the dimensions as shown on the drawings. The pipes with their crown levels as 1.5 Meter depth and less from ground shall be covered with 15 cm thick concrete above the crown of the pipe and sloped off to meet the outer edges of the concrete to give a minimum thickness of 15 cm all round the pipe. Pipe laid at this depth of greater than 1.5 Meter at crown shall be concrete at the sides upto levels of the centre of the pipe and sloped off from the edges to meet the pipe tangentially.

15. MEASUREMENT

For providing and laying and jointing of RCC pipes measurement shall be recorded for the finishing length of the pipe i.e. measurement shall be recorded from inside of one manhole to the inside of the other manhole.

16. REFILLING

After the sewer or other works has been laid and tested and passed by Project Director / Architect as per para 13 above trench or other excavation shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the sewer and other permanent work. The filling in the haunches and upto 75 cms above. The crown of the above sewer shall consist of the finest selected material placed carefully 15 cm layer and flooded and consolidated. After this has been laid the trench and the other excavation shall be refilled carefully 15 cm layer with material taken from the excavation, each watered to assist in the consolidation unless the Project Director, Architect otherwise direct.

17. MANHOLES

Manholes shall be of sizes as indicated in schedule 'A' Part-III and shall be constructed as per the details indicated in drawings. Foundation concrete shall be PCC 1:4:8 (1 cement : 4 coarse Sand : 8 graded stone aggregate 40mm nominal size) side wall shall be with fly ash brick of class designation 75 in cement and coarse sand mortar 1:4 (1 Cement: 4 Coarse Sand). Inside of manholes shall be plastered, 12mm thick with cement mortar 1:3 (1 Cement: 3 Coarse Sand) with a floating coat of neat and external plaster of 12mm thick with cement mortar 1:3 (1 cement: 3 coarse sand). PVC foot rest shall be embedded in PCC block of mix 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20mm nominal size) in manholes. Concrete in benching and channels shall be PCC 1:2:4 (1 Cement : 2 Coarse Sand : 4 Graded Stone aggregate 20mm nominal size) trowelled smooth using extra cement. All junctions and changes in direction in PCC channels shall be formed by smooth curve. The benching shall have slopes of 10 cms towards the channel. The depth of the channel shall be full diameter of the pipe. The manhole frames and covers shall be of reinforce cement (heavy duty SFRC)

18. All manhole shall be measured by numbers and shall include all items specified above and accessories, excavation in any type of soil refilling and disposal of surplus earth.
19. Manhole with depths greater than specified under the main item shall be paid for under extra depth and shall include all items as given for manholes. Measurement shall be done to the nearest cm. Depth of manhole shall be measured from the top of the manholes cover to the bottom of the channel.

DROP CONNECTION

20. Drop channels shall be provided between branch sewer and main sewer on or in the main sewer itself in steep ground when the difference in invert level of the two exceeds 60cms. of required sizes.

21. Foot Rests

Foot Rests shall be minimum 6mm thick plastic encapsulated as per IS : 10910 on 12 mm dia steel bar conforming to IS : 1786 having minimum cross section as 23mmx25mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2mm tread on top surface by ribbing or chequering besides necessary adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to withstand the bend test and chemical resistance test as per specifications and having manufacturer's permanent identification mark to be visible even after fixing, including fixing in manholes with 20x20x10cm cement concrete block 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) complete as per design and shall be fixed at 300mm c/c staggered.

22. At the end of the drain 450 dia R.C.C. Pipe shall be laid upto the external storm water disposal manholes.

23. Making connection for sewer to Municipal sewer including necessary excavation and breaking the wall of municipal manhole and making good the same with Cement mortar 1:3, finished with a floating coat of neat cement and making drains etc. complete. Removing the excavated surplus material. Necessary work is also included in the rates quoted for liaisoning work such as filling necessary applications, submission of forms for approval to the municipal authorities, depositing and the necessary fees and other amounts as required for getting the premises / installations inspected and approved and all other formalities required till the sewer / storm water connection is obtained. All the expenses incurred in this regard shall be borne by the Contractor, except for the payments to be made for any security deposits which will be reimbursed on production of original voucher.

PARTICULAR SPECIFICATIONS PART-VII
STORM WATER DRAINAGE

SCOPE OF WORK

1. Work under this Part shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install the drainage system as specified hereinafter shown in the drawings and as given in the schedule of quantities.

GENERAL REQUIREMENTS

2. All materials shall be of the best quality confirming to specifications and subject to the approval of the Project Director/Architect.
3. Drainage lines shall be laid to the required gradients and profiles.
4. All drainage work shall be done in accordance with local bye-laws and connected to Municipal drain.
5. The layout of all pipelines, yard gully chamber and their locations as shown in the drawings shall be marked out on site with relative levels and got approved from the Architect and Project Director before excavation and also before laying of the pipelines.
6. Excavation for yard gully chambers shall not be measured separately and shall deem to be included in the rates quoted for the construction of manholes including extra depth where required. This shall also be inclusive of disposal of surplus soil within AW HO Plot as directed by Project Director/ Architect.

7. STORM WATER DRAINS

Storm water drains shall be constructed with RCC NP2 ,NP3, HDPE pipes PE63 PN6 and uPVC pipes as per details shown in the drawing to the following specifications:

- a) Excavation : In any type of soil and rock.
- b) Bed Concrete : 150 mm thick cement concrete 1:4:8 (1 cement: 4 fine sand: 8 graded stone aggregate 40mm nominal size) in bed with 100 mm extra width over the outer diameter of RCC NP-2/ NP-3pipes on both sides and all around of pipes at joints.
- c) Brick work for manholes : Fly ash brick In cement mortar 1: 4 (1 cement : 4 coarse sand)
- d) Finishing for manholes : 20 mm thick cement plaster on cement mortar 1:4 (1 cement : 4 fine sand)
- e) Benching for manholes : PCC 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregates 20mm nominal size) 50mm thick with a floating coat of neat cement laid to slope including rounding of junction.
- f) Coping for manholes : PCC 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregates 20mm nominal size) in coping and finished fair and smooth in cement mortar 1:4 (1 cement : 4 fine sand)

8. **LAYING AND JOINTING RCC PIPES** Trenches: The width and depth of trenches for different diameter of RCC pipes shall be as under:

- (a) Width of trenches at bottom upto 150mm diameter shall be 550 mm and for the above diameter from 150 mm dia, width of trench shall be nominal dia of pipe plus 400 mm. additional width shall be provided at the position of sockets.
- (b) The depth of the trench shall not be less than 1.00 metre measured from the top of the pipe or the surface of the ground under road and not less than 0.60 m elsewhere. The required depth to be excavated at any point of the trenches shall be regarded as directed by the Architect / Project Director. Contractor shall not be entitled for any extra payment if he makes the trenches width more than specified.
- (c) After the pipes has been laid and tested and passed by Project Director and Architect the trench or other excavation shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the permanent work. The filling in the haunches and upto 75 cms above the crown of the pipe shall consist of the finest selected materials placed carefully in 15 cms. layers with materials taken from the excavation, each layer being watered to assist in the consolidation unless the Project Director / Architect otherwise direct.
- (d) The bottom of trench excavations shall be carefully prepared so that the barrels of the pipes when laid are well bedded for their whole length on firm ground and are true to line and gradient. Joint holes shall be made to such dimensions as will allow the joints to be conveniently made thoroughly caulked.

9. **REINFORCED CEMENT CONCRETE PIPES**

All underground storm water drainage lines where specified shall be centrifugal spun RCC pipes class NP2 and 3 light duty confirming to IS: 458-1971 shall be true to shape and straight with uniform bore throughout. Cracked, wrapped pipes shall not be used on the work. All pipes shall be tested by manufacturer and the contractor shall produce, when directed, a certificate to this effect from the manufacturer.

(i) Laying: RCC spun pipes shall be laid on cement concrete bed or cradles as specified and shown on the detailed drawings. The cradles may be precast and sufficiently cured to prevent cracks and breakage in handling. The invert of the cradles shall be left 12mm below the invert level of the pipes properly placed on the soil to prevent any disturbance.

The pipe shall then be placed on the bed concrete or cradles and set for the line and gradient by of sight rails and bonding roads etc. Cradles or concrete bed may be omitted if directed by the Architect.

(ii) Jointing: After setting out the pipes the collar shall be entered over the joint and filled in with tarred gasket, so that sufficient space is left on either side of the collar to receive the mortar 1:2 (1 cement: 2 fine sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 deg. to the longitudinal axis of the pipe on both sides of the collar neatly.

(iii) Testing: All pipes shall be tested to a hydraulic test of 1.5 m head for at least 30 minutes at the highest point in the section under test. The smoke test shall be carried out by the Contractor, if directed by the Architect.

- (iv) **Measurement:** For providing, laying and jointing RCC NP2 pipes, measurements shall be recorded for the finished length of the pipe line i.e. lengths between manholes shall be recorded from inside of one manhole to the inside of other manhole.

10. Road GULLY CHAMBERS

The chamber shall be of brick masonry with fly ash bricks of class designation 75 in cement mortar 1:4 (1 cement : 4 coarse sand) and shall have a precast RCC gully grating with frame fixed in 150 mm thick cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 hard stone ballast 20mm nominal size) on top the size of the chamber shall be taken as the clear internal dimensions as specified in the schedule of quantities. The brick walls, the top of the bed concrete 1:3:6 (1 cement: 3 coarse sand: 6 hard stone ballast 40 mm and down gauge) of the chamber shall be plastered inside and outside with 12mm thick cement plaster 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement. The excavation shall be done true to dimensions and level shown in the drawings.

All yard gully chambers wherever required shall have precast SFRC gratings (Heavy Duty) with frame including necessary excavation, dewatering, refilling, watering, ramming, removing, the surplus excavated material and making good the same complete as required as per drawings.

11. CONNECTION TO MUNICIPAL STORM WATER DRAIN

Connection to Municipal storm water drain Making connection to Municipal storm water drain including necessary excavation and breaking the wall of municipal manhole and making good the same with Cement mortar 1:3, finished with a floating coat of neat cement and making drains etc. complete. Removing the excavated surplus material. This also includes the contractor for liaisoning work such as filling necessary applications, submission of forms for approval to the municipal authorities, depositing and making channels for the necessary fees and other amounts as required for getting the premises / installations inspected and approved and all other formalities required till the sewer / storm water connection is obtained. All the expenses incurred in this regard shall be borne by the contractor as these are included in the quoted rate, except for the payments to be made for any security deposits which will be reimbursed on production of original voucher.

PARTICULAR SPECIFICATIONS PART-VIII

EXTERNAL WATER SUPPLY PIPES G.I. PIPES FOR BOREWELL & MUNICIPAL CONNECTION

(i) Materials:

- a). All pipes fittings accessories etc to be incorporated in the work shall be of standard quality strictly complying with the current appropriate Indian Standard Specifications, conforming to IS 1239 (Part I of 1979) and IS 1239 (Part II of 1969) and ISI marked.
- b). Water supply tubing fittings and accessories shall be galvanized steel. The galvanized steel pipes shall be screwed and socketed of medium grade and of approved make and ISI marked.
- c). Fittings shall be of malleable iron galvanized of approved make. Each fitting shall have manufacturer's trade mark stamped on it. Fittings for G.I. pipes shall include couplings, bends, tees, reducers, nipples, unions and bushes. Fittings shall conform to I.S. 1879 (Part - I to X).
- d). Contractor shall provide adequate number of unions on pipes 65mm and below to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve, stopcock, or check valve and on straight run as necessary at appropriate locations as required and /or directed by Architect / Project-in-Charge / Project Director .

(ii). Workmanship:

a). Trenches:

The width and depth of trenches of different pipes shall be as under: -

S.No.	Dia of Pipe	Width of Trench	Depth of Trench
aa).	15 mm to 50mm	30 cm	60 cm
ab).	Exceeding 50 mm and Upto 100 mm	50 cm	60 cm
ac).	Exceeding 100 mm but not exceeding 150 mm	60 cm	90 cm
ad).	Exceeding 150 mm	75 cm	90 cm

At joints the width of trench shall be widened where necessary. No extra payment shall be made for excavation more than the specified to cross the line from below the other line/sewer line, drain etc.

iii). **Cutting and Threading of G.I. Pipes:** Where pipes have been cut or rethreaded the ends shall be carefully filed out so that no obstruction to flow is offered. The ends of pipes shall then be carefully threaded, in such a manner as will not result in slackness of joints.

iv). **Jointing of G.I. Pipes:** GI pipes shall be jointed with screwed and socketed/flanged joints. Flanged joints shall be provided for connecting valves and also at suitable locations in straight lengths of pipe line to facilitate laying and subsequently maintenance work. Rubber gasket for insertion in between flanged joints shall be minimum 3mm thick. The flanges shall be tightened with GI bolts, nuts and washers. All screwed joints shall be examined before jointing to ensure that the threads are perfect for the full depth of the joints. Pipe threaded joints will be made by applying suitable grade of TEFLON tape used for drinking water supply. (Use of red or white lead and sutli will not be permitted for screwed joints).

v). **Protection:** All G.I. water supply pipes in chases or below ground shall be protected against corrosion by applying two layers of 2 mm thick multi-layer anticorrosive polymeric mix tape applied over a coat of primer as per recommendations of the manufacturers.

vi). **Trench, Filling of GI Pipes :** The pipes shall be laid on layer of 10 cm sand and filled with upto 10 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth and the surplus earth shall be disposed off as directed within the AWHO plot.

4.2). HDPE Pipes for External Water Supply & Irrigation

All external water supply pipe except borewell/municipal shall be HDPE pipe conforming to IS: 4986

Garden Hydrants

Garden hydrants shall be 25 mm dia gunmetal valves installed on G.I. pipes as per details or quick coupler valve.

Valves

Valves shall be as specified in section for irrigation.

Trenches

All pipes below ground shall be laid in trenches with a minimum cover of 100 cms. The width and depth of the trenches shall be as follows:

Dia of pipe	width of trench	depth of trench
-----	-----	-----
15 mm to 50 mm	30 cms	100 cms
65 mm to 100 mm	45 cms	100 cms

This will not apply to drip irrigation pipes which may be laid just below the surface or on surface.

Testing

All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 7 kg/sq.cm or 1.5 times the working pressure, whichever is higher.

Pressure shall be maintained for a period of at least thirty minutes without any drop.

A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and Project Manager.

In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the pumping system. He shall rectify all leakages and shall replace all defective materials in the system. any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

After commissioning of the water supply system, Contractor shall conduct performance test to ensure that the system operates as specified. The test shall be conducted over a period of 15 days.

Measurement

Pipes shall be measured per linear meter (to the nearest cm) and shall be inclusive of fittings, e.g. couplings, tees, bends, elbows, unions, deductions for valves shall be made. Rates quoted shall be inclusive of all fittings.

5. Cast Iron Spun Pipes & Fittings:

The cast iron pipes for water supply shall be centrifugally spun type conforming to IS:1536-1976 with latest amendments and of approved makes. The pipes shall be either with spigot and socket ends or flanged ends. The spun iron pipes shall be of cast iron casted centrifugally class LA.

All cast iron pipes and fittings shall be jointed with spun yarn and best quality soft pig lead conforming to IS:782-1978 with latest amendments. It shall be free from impurities.

For cast lead joints, the spigot shall be centered in the adjoining socket by tightly caulking in sufficient turns of tarred gasket or hemp yarn to leave unfilled half the depth of socket for lead. When gasket or hemp yarn has been caulked tightly home, a jointing ring shall be placed round the barrel and against the faces of the socket. Molten pig lead shall then be poured in to fill the remainder of the socket. The lead shall then be solidly caulked with suitable tools and hammers of not less than 3 kg weight, right round the joint to make up for the shrinkage of the molten metal on cooling and shall be preferably finished 3mm behind the socket face.

The approximate depth of pig lead laid for various diameters of C.I. pipes and specials shall be as given below with a tolerance +/- 5 percent.

Nominal size of Pipe (mm)	Lead per joint (kg)	Depth of lead joint (mm)
80	1.8	45
100	2.2	45
125	2.6	45
150	3.4	50
200	5.0	55

C.I. Specials:

The specials shall conform to IS:1538-1976 heavy class with latest amendments.

6. Testing:

a). On completion the pipe line, it shall be tested to a hydraulic pressure of 7kg/sqcm (70 metre). Pressure shall be maintained for a period of two hours without drop. Any joint found leaking shall be redone and all leaking pipes removed and replaced. Testing shall be done before the trenches are refilled. The contractor shall arrange all the equipment required for testing and the rate quoted shall be deemed to be inclusive of this cost.

b). Contractor shall maintain a test register and tests shall be recorded in it. The entries shall be signed and dated by Project-in-Charge / Project Director / Architect and Contractor. The register shall be handed over to the Project-in-Charge / Project Director on completion of work.

7. **Disinfection of pipe lines:** All G.I. & C.I. pipelines shall be disinfected by flushing with water containing bleaching powder at 0.5 gms per litre of water and cleaning the same with fresh water operation to be repeated three times including getting the samples of water from the disinfected main & tested in the Municipal laboratory. Cost of disinfecting the pipes shall be deemed to be included in the rates quoted against the respective items of pipes in Schedule A Part II.

8. Pipes shall be measured per linear Metre (to the nearest centimeter) and shall be inclusive of all fittings, earth work, pipe protection and required all other items as specified.

9. **Ball Valve:** Valves 65 mm and below shall be brass ball valves with brass body (nickel coated), brass ball (hard chrome plated) and teflon seat. Valves shall be tested at manufacturer's works and of sizes as specified.

10. **Sluice Valve:** Valves 80 mm and above dia shall be cast iron double flanged with non-rising spindle. Sluice valves below ground shall be provided with caps suitable for operations by a key. Sluice valves shall conform to IS:14846-2000 Class I, tested to 10 kg/sqcm (100 Metre head) and ISI marked. The fixing of the valve shall be done by means of bolts and nuts and 3mm thick rubber insertions with the flanges.

11. NON RETURN VALVE:

a). Where specified non return valve (swing check type) shall be provided through which flow can occur in one direction only. It shall be single door swing check type of best quality conforming to IS: 5312.

b). Each slim type swing check valves shall be provided with a pair of flanges screwed or welded to the main line and having the required number of galvanized nuts, bolts and washers of correct length.

12. ANCHOR THRUST BLOCKS:

a). Contractor shall provide suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer & high pressure.

b). Thrust blocks shall be provided at all bends & tees & such other location as required by site conditions.

c). Exact location, design and size of the concrete block shall be approved by the Architect (Supervision) and Project-in-Charge / Project Director prior to execution of work.

13. Masonry Chambers with C.I. surface Box: Masonry chamber with C.I. surface Box shall be provided as described in Schedule 'A' Part II for quality of material and workmanship respective items in particulars specifications part I shall be followed.

14. All materials and labour required to make the connection with mains of Delhi Jal Board including cutting and making of joints in the Dwarka mains providing and fixing Tee of suitable size, excavation, filling back and getting the tee connection passed from Delhi Jal Board authorities, shall be deemed to be included in the quoted rates against items 1 & 2 in Schedule 'A' Part-II. Contractor shall be responsible to take permission for making connection of AW HO water supply lines with mains of Delhi Jal Board and shall coordinate the date and time for making the actual connection. The statutory charges as paid to Delhi Jal Board for making connection to Delhi Jal Board, water supply lines shall be reimbursed by the Project-in-Charge / Project Director to the Contractor on production of receipt from Delhi Jal Board.

15. AIR VALVE :

Air valves shall be as per IS : 14845 and double orifice type. Air valve shall be provided with an isolating sluice valve fixed in lying position with meter gear arrangement. All flanges of Air valves shall be flat faced in accordance with IS-1535 Part IV & VI.

Air valve shall have kinetic features for easy flow of airs and to avoid the ball getting caught in high velocity. One of the orifice of Air valve shall have smaller size vulcanite rubber coated timber ball to rest on a bronze orifice nipple. The other orifice of the Kinetic Air valve should have larger size vulcanite rubber coated timber ball to rest on neoprene molded seat.

Body PN 1	:	C.I. to IS-210 Gr. FG 200 - for
Cover & cowl PN 1	:	C.I. to IS-210 Gr. FG 200 - for
Buoyant Balls	:	Vulcanite coated seasoned teak
Orifice Nipple	:	Gun Metal to IS-318 Gr. LTB - 2
Large Orifice	:	Neoprene Rubber

PARTICULAR SPECIFICATIONS PART - IX
PANEL AND STARTOR WITH EACH PUMPSET

Operates the pumps in an alternative and sequential fashion to maintain uniform system pressure. This is done utilizing minimum energy and by alternating the supply between pumps, which in turn maintains relatively equal pump operating hours.

As the flow begins, one of the pumps starts at low speed and as the demand increases the pump speeds up until it reaches the full RPM level. At this point the second pump becomes operational (start). The speed of the two pumps varies till they reach the full RPM. At this stage, the next pump starts. The same sequence is repeated for the additional pumps and each pump in turn changes over automatically and maintains the system pressure according to the demand, time and fault.

When the water demand is zero the system shuts-off automatically and when the system is running continuously, the lead pump alternates based on the time set. Say if the system includes an optional standby pump the controller initiates this pump at the time specified or as per the duration set.

In case of a low-suction pressure or other suction faults the controller responds to the input by safely shutting down the system. The controller incorporates a keypad and LCD display screen.

The system's functions are programmable and can be done through the keyboard.

The pump condition :- The elapsed running hours for each pump System pressure set-point Actual system pressure Pump speed Pump Min./Max. speed System faults Pressure transducer design settings Pump priority Standby pump designation The current pump rotation order Friction Loss Compensation (Set point) Shut-down limit for high and low discharge pressure Low-suction pressure shut-down limit Analog input for remote set-point (OPTIONAL) Digital input for remote stop / start Clock program.

The suction and discharge manifold can be fabricated on MS/GI/SS. Both manifolds designed to attach themselves to the system piping at either end of the manifold. While the delivery manifold includes a glycerin filled pressure gauge,

The suction manifold has the provision for fitting a pressure switch which can detect low suction pressure and other suction fault inputs (optional).The delivery manifold includes a stainless steel pressure transducer (DANFOSS / HONEYWELL) with a 0 - 16mA output. This pressure transducer is factory installed and wired.

Isolation valves are installed on the suction and delivery side of each pump and a NRV can be installed on the delivery manifold of each pump. The system optionally includes a diaphragm type tank customarily sized by the system manufacturer.

The controller which is mounted on a control panel comes with a keypad and display screen mounted on its outer door. In addition to the electronic pump controller, the control panel includes circuit breakers for each pump,

The control circuit and control relay for alarm functions auto / manual options. Pump run Indication Pump Fault Indication Visual Alarm Audible Alarm Phase Monitor Lightning Protection I Dry Run Protection Single Phase Preventer BUS Communication - Optional Pump elapsed time monitoring. The entire packaged pumping system is mounted on a MS/GI/SS fabricated unit. The control cabinet can be mounted in one of the following ways depending on the size of the cabinet

1. On a MS/GI/SS fabricated control wherein the cabinet stand is attached to the system.
2. On a MS/GI/SS fabricated skid separate from the system or mounted on its own base.

PARTICULAR SPECIFICATIONS PART - X

LIGHTING FIXTURES, FANS, PVC /RCC PIPES AND CHAMBERS

1. SCOPE OF WORK

Scope of work shall cover installation, fixing, testing and commissioning of light fixtures, ceiling fans and exhaust fans in common areas, stilts, stairs, lift wells, machine rooms, meter room of all blocks, basement, podium, LT/HT/ Transformer rooms and pump room.

2. The light fixtures shall be of any of the following makes but shall be as per the Catalogue (CAT) Nos. as approved by PD.
 - (a) Philips
 - (b) Crompton
 - (c) Bajaj
3. The contractor shall get the sample of each light fixtures approved from Project Director / Architect before the bulk supply order is placed.
4. The light fixtures shall be fixed with brass screws and washers. All accessories like flexible wire etc. for connecting the fixtures to the light point shall be included in the quoted rates in Schedule-A I.
5. Provisioning of all accessories such as flexible wire required for connecting the light fittings, ceiling fans and exhaust fans to the electrical points in ceiling and ceiling roses on the walls shall be included in the quoted rates in Schedule-A .

6. PVC PIPES

These shall be PVC pipes ISI marked and of 6.0 kg/sq.cm laid in ground/floor at locations indicated by Project Director and Architect at site and making joints as per manufacturers instructions.

7. RCC HUME PIPES

These shall be RCC Pipes non pressure NP-2 class with collar, joined with the stiff mixture of cement mortar 1 : 2 (1 cement :2 fine sand) of sizes as given below, 1000 mm deep under the road for passing electric cables & low voltage cables for Telephone / TV.

8. MASONARY CHAMBERS

These shall be provided at locations as shown on drawings and as directed by Project Director. Specifications with respect to excavation, foundation concrete brick work, plastering, benching covers etc. for these masonry chambers shall be as specified in Particular Specifications

Part I-A.

PARTICULAR SPECIFICATIONS PART - XI**ELECTRICAL WORKS****EQUIPMENTS****CABLE WORK****DESCRIPTION OF WORK**

Supply, laying, testing and commissioning of cables as per specifications, schedule of quantities and drawings.

APPLICABLE CODES & STANDARDS

IS: 1554 (Part-I)	:	1.1KV Grade PVC insulated Cables.
IS: 10242 (Part-3, Section-12)	:	Installation of cables for low voltage System
IS: 7098 (Part-1&2)/IS:5831/IEC:60502 /BS:6746/BS:5467.	:	Cross linked polyethylene insulated PVC sheathed cables
Part-I	:	For working voltages up to & including 1100 Volts.
Part-II	:	For working voltage from 3.3 KV up to & including 11 KV.
IS: 1081	:	Method of test for cables
IS: 1255	:	Code of practice for installation & maintenance of power cables up to & including 11 KV rating.
IS: 8130/IEC: 60228	:	Conductors for cables
IS: 10418	:	Drums for electric cables.
IS: 2062, IS: 800, IS: 816	:	Structural welding steel

SUBMITTALS

Cable schedule as per site conditions & good for construction drawings. Layout of various cables on Ground/Hume pipe/cable tray / trench etc along with sections showing no. of cables, distance between cables etc, size of cable trench trays etc. Cable tray layout, as per site condition, duly coordinated with other services.

TEST REPORTS: Routine test certificates for each drum of cable brought to site.

SPECIFICATIONS

GENERAL

Cable shall be supplied inspected, laid, tested and commissioned in accordance with drawings, specifications, relevant Indian Standards Specifications and cable manufacturer's instructions. The cable shall be delivered at site in original drums with manufacturer's name clearly written on the drum.

MATERIAL

The MV power cable of 1100 V. grade shall be XLPE insulated Aluminium conductor armoured cable. The MV control cables shall be PVC insulated copper conductor armoured cable.

INSTALLATION

GENERAL

The cable installation including necessary joints shall be carried out in accordance with the specifications given herein. For details not covered in these specifications, I.S. 1255 shall be followed. No straight through joint shall be permitted in the system. The cables shall be supplied as per cable schedule submitted by the contractor & approved by Project-in-Charge / Project Director / Project Director.

ROUTE

- i. Before the cable laying work is undertaken, the route of the cable shall be decided by the Project-in-Charge / Project Director / Project Director with help of GFC Drawing.
- ii. While shortest practicable route shall be preferred, cable runs shall generally follow fixed developments such as roads, foot-paths etc. with proper offsets so that future maintenance, identification etc. are rendered easy. Cross country run to shorten the route length is not desirable as it would lead to route identification and maintenance problems, besides posing difficulties during later development of open areas etc.
- iii. While selecting cable routes, corrosive soils, ground surrounding sewage and effluent etc. shall be avoided. Where this is not feasible, special precautions as approved by the Project-in-Charge / Project Director / Project Director shall be taken.
- iv. As far as possible, the alignment of the cable route shall be decided taking into consideration the present and future requirements of other agencies and utility services affected by it, the existence of any cable in the vicinity as may be indicated by cable markers or cable schedules or drawing maintained for that area, possibilities of widening of roads/lanes, storm water drains etc. Cable routes shall be planned away from the drains and should be within the property.

v. Whenever cables are laid along well demarcated or established roads, the MV cables shall be laid further from the kerb line than HV cables.

vi. Cables of different voltages and also power and control cables shall be kept in different trenches with adequate separation. Where available space is restricted, MV cables shall be laid above HV cables. Where cables cross one another the cable of higher voltage shall be laid at a lower level than the cable of lower voltage.

PROXIMITY TO COMMUNICATION CABLES

Power and communication cables shall as far as possible cross at right angles. Where power cables are laid in proximity to communication cables the horizontal and vertical clearances shall not normally be less than 30 cm.

LAYING ON CABLE TRAY

Cables, where indicated in approved shop drawings, shall be laid on overhead cable trays which are suspended from ceiling or supported from wall, by anchor fasteners as required. The Contractor shall provide for all accessories for the installation of the cable trays, such as bends, tees, reducers coupler plates, and structural steel members (comprising of channels, angles, flats, rods) for structural supports for cable trays etc.

CABLE TRAY MOUNTING

Unless otherwise specifically noted on the relevant layout drawing, all cable tray mounting works to be carried out ensuring the following:

- a) Cable tray mounting arrangement type to be as marked on layout drawing.
- b) Assembly of tray mounting structure shall be supplied, fabricated, erected & painted by the contractor.
- c) Cable tray running along the wall should be supported at intervals not exceeding 1.5 m. In case of branching, there should be a support on all branches at a distance of 30 cm from the point of branching. Support should not be less than 40 mm x 40 mm x 5 mm MS angle-secured in an approved manner where runs are along the walls. In case of ceiling suspended cable tray horizontal supports made of 40 mm x 40 mm 5 mm MS angle iron shall be provided. The horizontal interval between two such supports shall be 1.0 meter. These supports shall be suspended from C.I. boxes or suitable approved suspension devices such as dash fastener of suitable sizes in the ceiling by means of 10 mm diameter GI threaded rods. All above mounting accessories form part of installation of cable trays.

TESTING & COMMISSIONING

INSPECTION

All cables shall be inspected upon receipt at site and checked by the Project-in-Charge / Project Director / Project Director for any damage during transit.

TESTING

- i. All 650/1100 Volt grade cables before laying shall be tested with a 500 V megger or with a 2,500/5,000 V megger for cables of higher voltages. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance to earth/sheath/امour and insulation resistance between conductors.
- ii. All cables shall be subject to above mentioned tests during laying, before covering the cables by protective covers and back filling and also before the jointing operations.

CABLE TAGS

Cable tags shall be made out of 2mm thick aluminium sheets. Each tag shall be 2" in dia or 3" x 3" square with one hole of 2.5mm dia, 6 mm below the periphery, or as approved by Project-in-Charge / Project Director / Consultant. Cable designations are to be punched with letters / number punches and the tags are to be tied to cables with piano wires of approve quality & size. Tags shall be tied inside the panels beyond the glanding as well as above the glands at cable entries. Along trays tags are to be tied at all bends. On straight lengths, tags shall be provided at every 5 meters.

Cables shall be secured to cable trays with 3mm thick x 25mm wide aluminium strips/suitable GI clamp, or as approved by Project-in-Charge / Project Director / Consultant, at 1000 mm intervals and screwed by means of rust proof screws and washers, of adequate but not excessive lengths. Cable trays for horizontal runs suspended from the ceiling will be supported with mild steel straps or brackets, at 1000 mm intervals and the overall tray arrangement shall be of a rigid construction. External cabling route marker with C.I. plate marked with "DANGER 1.1 KV CABLE" with 0.6 meter long GI angle iron grouting bracket including 1:3:6 ratio cement concrete base block of minimum size 200 x 200 x 350 mm to be provided or as approved by Elect. Supply Company.

EARTHING

GENERAL

All the non-current metal parts of electrical installation shall earthed properly. All metal conduits, Distribution boards, switch boxes, outlet boxes, and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. Earthing work shall conform to Indian Standard specification IS: 3043-1966 and relevant Indian Electricity Rules 1956 amended up to date.

EARTHING CONDUCTOR

Earthing conductor shall be of GI or copper and shall be protected against mechanical injury or corrosion. Earth continuity conductor from distribution board onward upto outlet point shall be of 16SWG Copper while earth continuity conductor from Main/Sub Distribution Board up to final distribution board (lighting & power) shall be of G.I wire.

SIZING OF EARTHING CONDUCTOR.

All 6 Amp outlet points, switch boxes shall be earthed with 16 SWG copper wire and 16Amp outlet with 16 SWG copper wires. Separate earth wire shall be drawn along with each circuit.

PIPE EARTH ELECTRODE

GI pipe shall be of medium class 40mm dia and 4.5 metre in length. Galvanizing of the pipe shall conform to relevant Indian Standards. GI pipe electrode shall be cut tapered at the bottom and provided with holes of 12mm dia drilled not less than 7.5cm from each other up to 2 metres of length from bottom. The electrode shall be buried in the ground vertical with its top not less than 20cm below ground level as per detail enclosed. Earth electrode shall not be situated less than 2 meters from the building. The location of the earth electrode will be such that the soil has reasonable chance of remaining moist as far as possible. Masonry chamber of size 300 x 300 x 300mm shall be provided with water funnel arrangement a cast iron or MS frame & cover having locking arrangement at the top.

PLATE EARTH ELECTRODE

Earthing shall be provided with G.I/Cu. plate electrode of following minimum dimensions.

- i. GI Plate Electrodes: 600mm x 600mm x 6mm thick.
- ii. Cu Plate Electrodes: 600mm x 600mm x 3.15mm thick

The electrode shall be buried in ground with its faces vertical and not less than 3 meters below ground level. 25mm dia medium class GI pipe shall be provided and attached to the electrode. A funnel with mesh shall be provided on the top of this pipe for watering and earth electrode. Earth electrode the watering funnel attachment shall be housed in masonry enclosure of not less than 300 x 300 x 300mm deep. A cast iron or MS frame with cover having locking arrangement shall be provided at top of chamber. Earth electrode shall be situated not less than 2 metres from the building. Care shall be taken that the excavation for earth electrode may not affect the column footing or foundation of the building. In such cases electrode may be further away from the building.

ARTIFICIAL TREATMENT OF SOIL.

If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by addition of sodium chloride, calcium chloride, sodium carbonates copper sulphate, salt and soft coke or charcoal in suitable proportions.

RESISTANCE TO EARTH.: The resistance of earthing system shall not exceed one ohm.

H POLE STRUCTURE

Technical Parameter of 11 KV HT System

- a. Nominal Voltage (KV) : 11 KV
- b. Maximum System Voltage (KV) : 12 KV
- c. BIL (Impulse) (KV_{peak}) : 75 KV
- d. Power Frequency with stand voltage wet (KV_{rms}) : 28 KV

CEMENT CONCRETE (RCC/ PCC) POLES

Reinforced cement concrete (RCC) and pre-stressed cement concrete (PCC) poles shall conform to IS:785-1964 and IS L 1678-1978 respectively. These shall carry an earth bond in accordance with rule 90 of the Indian Electricity Rules. The dimensions shall be as per designed conforming to local requirements. Concrete poles shall be treated with suitable chemicals like silicate for the portion to be buried in ground where the subsoil water level is high and / or acidic as in coastal areas. The selection of the poles shall be done in accordance with IS : 7321-1974.

INSULATORS

Insulator fittings shall comply with IS : 2486 (Part -1) -1971 and IS 2486 (Part-2)-1989 for 11KV insulators.

PIN INSULATOR FITTINGS

The pins suitable for 11 KV pin insulators shall have stalk length of 165 mm and shank length of 145 mm and minimum failing load of 10 KN.

The pins shall be of single piece MS without joints, obtained by the process of forging.

Technical Detail of Pin Insulator (M.O.C. Porcelain)

- a. Height System Voltage : 12 KV
- b. Working Voltage : 11 KV
- c. Creepage Distance Minimum : 320 mm
- d. Visible Discharge Voltage : 9 KV
- e. Mechanical Failing Load : 10 KN

- f. Power Frequency with stand Voltage
 - i. Wet : 40 KV
 - II. Dry : 65 KV
- g. Power Frequency Flashover Voltage
 - i. Wet : 45 KV
 - ii. Dry : 70 KV
- h. Impulse withstand voltage KV _p : 75 KV
- i. Puncture Voltage : 105 KV
- ii. Net weight (Approximately) : 2.3 Kg

Stay Insulator (Guy Strain Insulator)

Technical Detail (M.O.C. Porcelain)

- a. Designation : C
- b. Creepage Distance : 57 mm
- c. Power Frequency with stand voltage
 - i. Wet : 13 KV
 - ii. Dry : 27 KV
- d. Tensile Strength : 88 KN
- e. Net Weight (Approximately) : 1.2 Kg / Unit

G.I. Stay Sets:

Stay sets shall be comprises of G.I. stay road, stay plate, stay wire of size 7/10 SWG along with the stay insulator, stay clamps etc. complete as required.

The stay wire shall comply with the specific requirement of IS:2141-1979, IS:4826-1979 and IS:6594-1974 or the latest versions thereof.

(i) Specific Technical Parameters for G.I. Stay Wire are:

- a. Size : 7/10 SWG or 7/3.15 mm
- b. Size of individual wire : 3.15 mm
- c. No. of Stands : 7 nos.
- d. Lay of Length : 12 to 18 times strand diameter
- e. Tolerance of dia of individual wire : + 2.5%
- f. Minimum breaking load of individual stand : 350 Kg
- g. Minimum breaking load of complete stay Wire set : 2331 Kg
- h. Specification to which the stay wire will conform: IS: 2141-1979 with latest version
- i. Specification for Galvizing : IS: 4826-1979 with latest version
- j. Type of Zinc coating : Heavy coating

(ii) Stay Rod:

GI stay rod shall be of 1800 mm long and 22 mm dia with an eye band of internal dia 40 mm at one end and threaded upto length of 300 mm.

11 KV LIGHTNING ARRESTER

The Lightning surge arrester shall be metal oxide, gapless type, rated 12KV, 5 KA heavy duty station class complete with insulating base, surge counter and leakage current meter. The arrester shall conform to latest issue of IS.

- Rated Voltage : 12 KV
- Nominal discharge : 5 KA
- Energy absorption : 3.6 kJ/KV (HL)
- Optional disconnector sensitivity 20A) or fault indicator (10 A)
- Vertical, at an angle or horizontal mounting .

11 KV AIR BREAK SWITCH / ISOLATOR OUTDOOR TYPE

11 KV Air break switch shall be gang operating type, quick make and break, 3 phase, outdoor mounted manual operating type.

	Rated Voltage		KV	12
		To Earth	KV	38
Withstand Voltage	On Power-Frequency 50 HZ for 1 Min.	Between Terminals	KV	45
	Impulse 1.5 /50/usec.	To Earth	KV	95
		Between Terminals	KV	110
	Rated Current		A	400
Withstand Current	Short-Time Current for 1 Sec.		KA	12.5
	Peak Current		KA	32

PIPE EARTH ELECTRODE

GI pipe shall be of medium class 40 mm dia and 4.5 meter in length. Galvanizing of the pipe shall conform to relevant Indian Standards. GI pipe electrode shall be cut tapered at the bottom and provided with holes of 12 mm dia drilled not less than 7.5 cm from each other upto 2 meter of length from bottom. The electrode shall be buried in the ground vertical with its top not less than 20 cm below ground level as per detail enclosed. Earth electrode shall not be situated less than 2 meters from the building. The location of the earth electrode will be such that the soil has reasonable chance of remaining moist as far as possible. Masonary chamber of size 300 x 300 x 300 shall be provided with water funnel arrangement a cast iron or MS frame & cover having locking arrangement at the top.

D.G. SET

Intent of Specification

This specification covers the design, manufacture, assembly, shop testing, packing, dispatch, transportation supply, erection, testing, commissioning, performance and guarantee testing of **Diesel Gen-Sets**, complete in all respects with all equipment, fitting and accessories for efficient and trouble free operation as specified here under.

Codes and Standards

The equipment furnish under this specification shall conform to the following latest standard, except where modified or supplemented by this specification:

- BS: 5514 : Specification for reciprocating internal combustion engine.
- BS: 5000 : Rotating electrical machines of particular type or for particular applications.
- IS: 1239 (Part - I&II) : Mild steel tubes and fittings.
- IS: 1651 : Stationary cells and batteries lead acid type (with tubular positive plates).
- IS:9224 : Specification of low voltage fuses, General Purpose.
- IS:4540 : Mono-crystalline semi-conductor rectifier assemblies and equipment.
- IS:5 : Colours for ready mixed paints.
- IS:4722 : Rotating electrical machines
- IS:1248 : Specification for electrical indicating instruments.
- IS:10000 : Methods of tests for internal combustion engines.
- IS:10002 : Specifications for performance requirements for constant speed compression ignition (Diesel) engine for general purposes (above 20 KW).
- IS:2147 : Degree of protection provided by enclosure for low voltage switchgear and control gear.
- IS:1600 : Code for type testing of constant speed IC engines for general purposes.
- IS:1601 : Performance of constant speed IC engines for general purposes.
- ASME Power Test Code PTC-17 : Internal combustion engines.

Engine

Diesel Engine shall be stationary, compression, ignition, totally enclosed, water cooled, stroke cycle, cold battery starting, turbo charged and after cooled heat exchanger cooled 1500 RPM in accordance to BS and IS specification complete with all accessories.

Cooling System

Cooling system shall have radiator, Thermostat & engine-built pumps, Corrosion Resister, Self-contained piping for secondary circuit, By pass thermostat.

Fuel System

Fuel System shall have PT Fuel Pump, Injectors, Fuel filters, Self-contained piping & houses, Complete piping.

Lubricating System

Lubricating system shall have Oil pump, Strainer, Lube oil cooler, Oil filter, Bypass filter, Self-contained piping, Lube oil priming pump if required.

Air Intake System

Air intake system shall have dry type filter, Air intake manifold with necessary connections, Turbocharger with after cooler.

Exhaust System

Exhaust system shall have Exhaust Manifold, Flexible piping, Residential silencer to limit the noise level and extending silencer outside the canopy.

Starting System

Starting system shall have Starter 24V with suitable ampere capacity, Charging Alternator with inbuilt regulator 24 V minimum 30 AMP DC or as per battery capacity, Connecting links between battery & alternator. The engine shall be suitable for black start.

Main and Big End Bearing

The mail and big end bearing shall be detachable shells of high grade bearing material, and shall be pre finished. The dimensions of big end bearings shall be such that the connecting rods can be withdrawn through the cylinder liners.

Coupling Arrangement

Coupling arrangement shall have Flexible coupling, Flywheel, Flywheel Housing, Coupling Guard

Instrument Panel

Instrument Panel shall have-

- Lube oil pressure gauge
- Water temperature gauge
- RMP Indicator & Hour Meter.
- Battery charger ammeter.
- Starting switch with key

Safety Control Trip

- Low Lube oil pressure
- High Water temperature
- Engine over speed.
- Lub oil temperature.

Alternator

Manufacturer : Stamford / Leroy Somer IS: 4722/BS 2613

Output : 25 KVA self-excited, self-regulated foot mounted fitted with ball and roller bearings and having PMG, droop CT for paralleling. This shall give full output of 625 KVA at 40 deg. C.

Power factor : 0.8

Rated Generating

Voltage : 415 Volts, 3 phase 4 wire systems

Voltage regulation : +/- 1.0% all load between no load to full load & power factor 0.8 to unity AVR shall be mounted in alternator.

Frequency : 50 HZ

Speed : 1500 RPM

Overload Capacity : 10% for one hour in any 12 hours of operation without exceeding temperature rise limits specified in BS: 2613 when corrected to ambient temperature at site

Class of Insulation : H and temp. Rise limited to class H

Space Heater : To be provided if required.

Winding connection : Star connection (all six leads will be brought out of stator frame).

Termination : Termination box shall be amended to connect the bus duct.

The alternator shall be self-excited, self-regulated, self-ventilated in brush less for suitable automatic voltage regulator and shall conform to BS: 2613 or equivalent standard and shall give rated output at NTP conditions. The alternator shall have space heater which shall be connected with breaker NO/NC contacts and this should be able to cut off with thermostat.

Other Accessories

Fuel Tank

Day service fuel tank shall be made of 2mm thick MS sheet of 990 litres capacity for each set with all accessories such as oil level indicator, inlet pipe connection, outlet pipe connection, trough to collect split oil, air vent pipe with air filter, manhole with cover, low level and full level float valve arrangements with all fittings interconnections between tanks. The tank shall be provided with suitable calibration scale.

Base Frame:

M.S. Fabricated adequately machined base frame complete with lifting, facilities pre-drilled foundation holes suitable for permanent installation on foundation shall also be supplied. The base frame shall be manufactured with steel and shall be stress relieved. Manufacturer shall specify what measures are taken to reduce the stresses.

Batteries

For electrical control ckt of 24V D.C. of suitable ampere hour complete with battery charger, leads and wooden base plate and shall be placed inside canopy.

Fuel system

The engine shall be capable of running on High Speed Diesel fuel oil. The fuel consumption of the engine at full, three quarters and half of its rated power output shall be indicated by the Contractor in the bid. A fuel service buffer tank, common for two DG set with 990 litres capacity shall be provided on a suitably fabricated steel platform. The tank shall be complete with level indicator marked in litres, filling inlet with removable screen, an outlet, a drain plug, an air vent and necessary piping. The fuel tank shall be painted with oil resistant paint. Service tank level switches (2 Nos. per tank) for alarm & trip shall also be provided by the bidder. All pipe joints should be brazed/welded. A hand pump for pumping the fuel into the fuel service tank together with necessary pipes or tubing shall be provided.

Silencer

Exhaust silencer shall be residential type to reduce the noise level.

Cooling

The diesel engine shall be radiator cooled type if installed on site plan and heat exchanger cooled if installed in basement.

Engine Governor

The governor shall be Electronic type suitable for class A-1. This shall control the generator frequency, and shall be suitable for operation as per the selected battery voltage (124 V DC.). The governor shall be provided with a manually adjustable over speed trip mechanism to automatically shut-off the engine or the fuel supply if the set reached 120 % of rated speed. Governor shall be capable to maintain zero speed rate or regulation and shall be AI type as per BS: 5514 in order to take care of heavy motor starting. It shall have necessary characteristics to maintain the speed substantially constant even with sudden variation in load. However, a tripping shall be provided if speed exceeds maximum permissible limit.

Turbo Charger

It shall be of a robust construction, suitable of being driven by engine exhaust having a common shaft for the turbine and blower. It shall draw air from filter of adequate capacity to suit the requirements of the engine.

Starter Battery

The battery shall conform to the requirement of IS: 1651. Starting battery sets of 24 V, heavy duty high performance approved make/quality shall be provided to enable crank & start the engine even in cold/winter morning conditions. Type/voltage/AH capacity of same on 20 hour rated discharge period shall be indicated in the offer. The battery shall be capable of performing at least (6) six normal starts without recharging.

The battery shall be provided with 2 Nos. cables, minimum 1.5m long heavy duty PVC insulated cabling with brazed tinned lug at one end and with brazed tinned brass terminal lug at battery end - for connecting batteries to cranking system - with 0.25 m long inter battery connecting cable.

The lugs shall be clearly stamped (+) or (-) and positive cable also red sleeved for easy identification.

Engine Safeguard

Safeguards shall be provided and arranged when necessary to stop the engine automatically by the following:

Energizing a solenoid coupled to the stop lever on the fuel injection pump rack.

De-energizing the "fuel on" solenoid

Energizing the "fuel - cut off" solenoid.

If any of the door opens.

The operation of the safeguard shall at the same time give individual warning of the failure by illuminating an appropriate local visual indicator and remote alarm at generator panel.

The contactors, relays and other devices necessary for signal and control, for above purposes shall be provided at Generator panel.

At the set at a easily accessible place an "EMERGENCY STOP" mushroom head stay put type P.B shall provide to stop the set in emergency mode.

The safe guard to "STOP THE SET" shall stop the set irrespective of mode selection of the set viz Auto, Manual or test for following cases, with simultaneous isolation of alternator ckt.

Emergency stop P.B's operation Over speed. Low lube oil pressure.

Sound Attenuating Acoustic Enclosure

Sound Attenuating Acoustic Enclosure should have pleasant and aesthetical looks and should be able to bring down the noise to 75 decibels when measured at a distance of 1 meter away from the set.

The DG set should be supported on a base frame in an MS Sheet enclosure with suitable ducting for air inlet and outlet. The door and enclosure should be given corrosion resistant treatment and painted to be weatherproof and long lasting. Resin bonded Glass / Mineral / Rock wool of high density with perforated MS Sheet should be provided and covered with tissue paper. Enclosures should be provided with durable locking system with doors duly gasketed with neoprene rubber.

Exhaust gases should be taken out from the DG Set by means of MS Pipe and a noise suppressor.

Proper care should be taken for engine heat rejection in order to have safe working temperature inside the enclosure by provision of fans etc, as required. The design aspect should ensure free and uninterrupted flow of suction and exhaust air in order that the temperature rise of the enclosure with respect to the ambient is less than 7°C.

Radiator hot air shall be throughout on top instead of front. The arrangement shall be made accordingly in acoustic enclosure.

Erection, Testing & Commissioning

The entire work of erection, testing and commissioning of equipment supplied under this package shall be carried out by contractor and performance and guarantee tests to be conducted at site are also included under the scope of this specification. For this purpose the contractor shall depute suitable qualified technical supervisor to site on advance intimation to the Owner along with all special testing equipment required for testing and performance and guarantee tests. The supervisor(s) shall be responsible for the installation, testing, commissioning checks and performance & guarantee tests mentioned in relevant clauses of this volume and the checks recommend by the contractor.

The successful contractor shall submit sufficiently in advance the bio-data of the supervisor giving details of his experience for Owner's approval.

The contractor shall ensure that the equipment supplied by him are installed in a neat workman like manner such that they are leveled, properly aligned and well oriented. The tolerances shall be established in Contractor's drawings and/or as stipulated by the Owner.

All special tools and tackles and spares required for erection, testing and commissioning of equipment shall be supplied by the contractor. The bid shall include a list of these special tools, tackles and spares along with their item wise prices. The total cost for these tools, tackles and spares shall be included in the bid price.

Erection, testing and commissioning manuals and procedures shall be supplied, prior to dispatch of the equipment.

The contractor shall ensure that the drawings, instruction and recommendations are correctly followed while handling, setting, testing and commissioning the equipment.

Commissioning Check Tests / Performance and Guarantee Test

In addition to the checks and test recommended by the manufacturer, the contractor shall supervise the following acceptance tests to be carried out on each test.

Load test

The engine shall be given test run for a period of at least 2 hours depending upon the actual power factor of the load and set shall be subjected to the maximum achievable load without exceeding the engine or alternator capacity.

This full load test is to be followed immediately by a 10% overload run for one hour. The performance of the engine, alternator and exciter shall be satisfactory at the end of this overload run.

At the end of the full-load run, and again at the end of the over-load run, tests for temperature rise and insulation resistance of the alternator as specified shall be taken.

Full load test can be performed at site or at manufacturer's works before dispatch and shall be monitored by the Project-in-Charge / Project Director / Architect.

Regulation Test

The automatic and manual regulation of the alternator load at half and full rated load shall be tested for a nominal volts of 240 Volts, between phase to neutral and at 0.8 p. f. to verify the requirements of voltage and frequency variation as per IS:4722.

Speed and Governing

The speed of the engine shall be verified to ensure that it conforms to the requirement of BS: 5514.

11KV/0.415KV OIL TYPE OLTC DISTRIBUTION TRANSFORMER-

GENERAL

The transformer shall be double wound core type with low loss, non-ageing, high permeability, Prime Grade, CRGO with M4 grade or better, copper wound, perfectly insulated and clamped to minimized noise and vibrations. Major civil work such as foundations, trenches, etc will be paid as per civil works. Minor civil work like cutting and making good all damages caused during installation and restoring the same to their original finish will be inclusive in the price. Transformers will be as per CPWD specifications

OLTC TYPE

Transformer shall be outdoor duty type. The transformer shall be fabricated as per IS 1180 specification amended up to date. The Transformer loss will be as per 1180 Amended up to Date.

SPECIFICATION STANDARD:-

Unless otherwise stated below, transformer & transformer oil shall conform to IS 1180 & 335 respectively.

SYSTEM OF SUPPLY:- 11KV 3 phase, 50 Hz system

NO LOAD RATIO:- 11/0.415 volts

KVA RATING:- Transformer shall be suitable for continuous rating as stated in DBR. **TYPE:-** Out door

WINDING:- The transformer shall be copper wound.

CORE:- The magnetic core shall be made up of cold rolled grain oriented low loss steel stampings.

COOLING:- Natural oil cooling by means of pressed/round tubes around transformer tank (ONAN)

FREQUENCY:- 50Hz plus minus 3%

RATED VOLTAGE:-Transformer shall operate at its rated KVA at any voltage plus minus 10% of rated voltage of that particular tap.

VECTOR GROUP:- Corresponding to the vector symbol Dyn-11

CONNECTIONS

H.V side of transformer shall be provided with suitable size cable box for 3 core XLPE cable. Indoor heat shrinkable termination kit shall be used for termination of HV Cable. MV side of transformer shall be suitable for bus duct connection/XLPE Al. Ar. Cabling arrangement.

TAPPING

ON load tap changing arrangement on HV side. The range for circuit taps, which shall be provided on H.V. side, shall be plus 5% & minus 5% in steps of 2.5%

TEMPERATURE RISE

The transformer shall conform to the requirements of temperature rise specified in IS: 1180. Continuously rated for full load, temp. rise not to exceed 50 degree C by thermometer in oil (55degree C by resistance)

INSULATION LEVELS

The insulation levels shall be in accordance with IS 2076 (Part III) 1977 . TERMINAL MARKINGS, TAPPING & CONNECTIONS

The terminal marking, tapings 21 connections shall be in accordance with IS 2026(Part1V) 1977. REQUIREMENTS WITH REGARDS TO ABILITY TO WITHSTAND SHORT CIRCUIT.

As per IS 2026 (part I) 1977

IMPEDANCE VOLTAGE

As per table 3 of IS 1180/ECBC-2017

ON LOAD TAP CHANGING SWITCH

On load tap changer with RTCC panel and AVR PARALLEL OPERATION

Transformer shall be suitable for parallel operation with similar unit of same rates. GENERAL REQUIREMENTS OF TRANSFORMERS

Transformer shall be suitable for operating at rated capacity continuously at any of the taps under ambient conditions and with the voltage and frequency variations indicated without exceeding permissible temperature rise and without any detrimental effect to any part.

Transformer shall be designed to be loaded as per IS:6600.

All windings shall have uniform insulation resistance to earth.

Disconnecting chamber shall be air filled. Suitable cable end box shall be provided for termination of cables. Gland plate for single core cables shall be non-magnetic.

Transformer shall be able to withstand electrodynamics and thermal stresses due to terminal short circuit of the secondary, assuming the primary side is being fed from an infinite bus. All leads and windings in cores shall be properly supported. Short circuits withstand and duration shall be 1 secs. As per IS: 1180.

Short circuit test results for similar transformers shall be furnished.

There shall be a marshaling box for gathering all alarm signals. All alarm shall be wired up to terminal strip provided in marshaling box. 20% spare terminals shall be provided. Armoured cable of 2.5 sqmm cu shall be provided along with suitable size glands for terminating these contacts in marshaling box.

Guides shall be provided to facilitate tanking and untanking of the core with the coil assembly. The details of anchoring of core and coils assembly of tank shall be furnished.

Radiators shall be provided on the tank to facilitate cooling. These shall be detachable type and shall be provided with isolating valves at ends, drain plugs and air release plug. Radiators of 1.2 mm thickness seamless steel tubing or pressed sheet steel.

Means for lifting and jacking of transformer shall be provided.

Class-A insulating material specified in IS:1271 shall be used. Paper insulation shall be new and free from punctures. Wood insulation, wherever used, shall be well seasoned and treated.

The mineral oil shall comply with IS: 335. 10% extra oil in seal tins/ drums shall be supplied. All valves shall be of globe type. Valve body of carbon steel and trim of 135 cr. Steel.

Oil temp. Indicator for measuring top oil temp. shall comprise 150mm dial type thermometer pocket and capillary tube jacketed with PVC sleeve. Thermo-meter shall have 2 sets of contacts, one for alarm and the other for trip, and set points can be set by hand. Contacts shall be wired up to marshalling box.

Buchholz relay shall be provided as per IS: 3637. It shall be double float type with two sets of contacts for alarm and trip with facility for testing by injection of air by hand pump and with cock for draining and venting of air. Relay shall be provided with shut off valves on conservator side as well as on tank side.

Alarm and trip contacts shall be suitable for 1A 230 AC.

A marshalling box shall be provided to accommodate all auxiliary devices except those which are to be located directly on transformer. It shall be of dust, weather and vermin proof type of sheet steel 2mm thick and shall have sufficient apace for ease of cabling. 20%extra terminals shall be provided.

All steel surfaces exposed shall be treated with suitable anti –trust, anti–corrosive paints.

Bushing insulator shall be rated for max. System voltage and shall be as per IS. Bushing shall be enclosed in terminal box and shall be detachable from outside the tank. Separate neutral bushing shall be provided for earthing the neutral. When LT cable box is provided, a neutral bushing shall be brought out for solid earthing.

Transformers shall have same percentage impedance & other characteristics with foundation plan parallel operation as per IS: 10028

FITTINGS

The following accessories and fittings shall be provided with the transformer

LIFTING LUGS: The arrangement of lifting the active part of the transformer along with the cover of the tank by means of lifting lugs without disturbing the connections. Also complete transformer lifting lugs shall be provided.

ROLLERS: The transformer to be provided with 4 Nos. rollers fitted on cross channels to facilitate the movement of transformer.

OIL CONSERVATOR: The transformer to be provided with a conservator with welded end plates. It is to be bolted to the cover and can be dismounted for purposes of transport. It has to be provided with oil gauge with marking for minimum level and an oil filling hole with a cap which can be used for filtering of oil. For draining purposes a plug is to provide. A connection pipe between the conservator and tank is to be provided, which projects inside the conservator.

AIR RELEASE VALVE: An air release valve shall be provided on top of the tank cover to facilitate of the entrapped air while filling of oil.

BREATHER: The transformer shall be provided with an indicating dehydrating silica gel breather of sufficient capacity.

DRAIN VALVE WITH PLUG: The transformer to be provided with drain valve with plug at the bottom of the tank.

DIAGRAM WITH RATING PLATE: One diagram and rating plate indicating the details of transformer connection diagram vector group tap changing diagram etc.

THERMOMETER: Dial type thermometer (150mm dia) with maximum set pointer 75 degree C electrical contacts for electrical contacts for electrical alarm at high temp.

EXPLOSION VENT: Explosion vent or pressure relief device shall be provided of sufficient size of rapid release of any pressure that may be generated within the tank and which might result in damage in the equipment. The device shall operate at a static pressure less than the hydraulic test pressure for transformer tank.

FILTER VALVE: Filter valve on the top of the tank.

BUCHOLTZ: Oil actuated relay equipment shall confirm to IS 3637-1966(amended up to date) and shall be double float type having contacts which close following oil surge or under incipient fault condition. Bucholtz relay shall have contacts for alarm /trip.

WINDING TEMPERATURE INDICATOR:

Winding temperature indicator with electrical contact for alarm/trip

OIL TEMPERATURE INDICATOR: Oil temp. Indicator with alarm & trip contacts.

MARSHALLING BOX: the transformer shall be provided with suitable size marshalling box to terminate the control cables of thermometer and bucholz relay.

CONTROL CABLING: all control cables required from Marshalling box to H.T panel board for Trip/alarm of winding temp. Indicator, oil temp indicator, bucholz relay etc. shall be provided and deemed to be included in the rate of transformer equipments.

TRANSFORMER OIL: First filling of oil.

EARTHING: Two separate earthing terminals are to be provided at the sides of the tank on both the sides for earthing.

SOAK PIT

Soak pit for oil filled transformer shall be made are per IS 10028 (Part II) 1981 with up to dated amendments. Sump shall be formed in the transformer room and shall be connected to soak pit outside the transformer room with a pipe. All the civil works required for the soak pit shall be done by the contractor and the cost shall deemed to be included in quoted rates of the transformer item.

INSTRUMENTATION MANUAL

The successful bidder shall submit three copies of manual of complete instructions for the installations, operations, maintenance and repair, circuit diagrams, foundations and trenching details shall be provided with the transformer.

SHOP DRAWINGS

The selected supplier shall prepare and furnish shop drawings for the approval by the Project-in-Charge / Project Director / Consultant before commencing fabrications/ manufacture of the equipment. Shop drawing shall be based on the requirement laid down in the specifications. The manufacture of the equipment shall be commencing only after the shop drawings have been approved in writing by the Project-in-Charge / Project Director / Consultant. Transformer shall be manufactured conforming to specification of Local supply authority.

INSPECTION

The transformer shall be inspected on arrival as per the inspection manual of the supplier

Shall be examined of any sign of damage and special attention shall be given to the following parts.

Oil tank and cooling tubes Bushes crakes or broken Oil sight glass.

INSTALLATION

The transformer shall be installed as per transformer manual of the transformer supplier and conforming to Indian standards.

The transformer is to be erected on suitable size M.S channels embedded in the cement concrete flooring including providing & fixing the channel. The transformer supplied shall be lifted by all lifting lugs for the purpose of avoiding imbalance in transit.

The transformer wheels shall be locked by suitable locking arrangement to avoid accidental movement of the transformer.

The transformer cable end boxes shall be sealed to prevent absorption of moisture.

The transformer natural earthing and body earthing shall conform to Indian Standard.

FACTORY TEST

The transformer shall be subjected to test as laid down in IS 2026 (Part I) 1977 at factory/manufacturing unit prior to dispatch of the transformer to the site.

All original test certificates shall be furnished. **TESTING AT SITE**

Prior to commissioning of the transformer the following tests shall be performed

Insulation resistance of the winding between phases and earth of Primary and Secondary side.

Winding resistance of all the winding on all tap positions shall be taken.

The supplier gives sufficient advance information about the test schedule to enable the owner to appoint his representative.

MAIN LT PANEL /OUTDOOR TYPE FEEDER PILLAR

General

Sub Distribution Board shall be metal clad totally enclosed, rigid, floor mounting, air insulated, cubicle type for use on 415 volts, 3 phase, 50 cycle system. Equipment shall be designed for operation in high ambient temperature and high humidity tropical atmospheric conditions. All outdoor type panel shall be IP – 55.

Standards

The equipment shall be designed to conform to the requirements of:

IS 8623 – Factory Built Assemblies of switchgear and control gear.

IS 4237 – General requirements for switchgear and control gear for voltages not exceeding 1000 volts.

IS 2147 – Degrees of protection provided by enclosures for low voltage switchgear and control gear.

IS 375 – Marking and arrangement of bus bars.

Individual equipment housed in the sub distribution boards shall conform to the following IS specifications:

a)	Moulded Case Circuit Breakers	-	IS: 13947-2/IEC 947-2
b)	Miniature Circuit Breaker	-	IEC - 60898
c)	Contractors	-	IEC – 947-4-1, IS 13947-4-
1			
d)	Current Transformers	-	IS: 2705
e)	Indicating Instruments (Analogue)	-	IS: 1248,
f)	Indicating Instruments (Digital)	-	IS: 13875
g)	Integrating Instruments (Analogue)	-	IS: 722, IS: 13779-1999
h)	Integrating Instruments (Digital)	-	IS: 13779- 1999, IS: 14697
i)	HRC fuse links	-	IS: 13703 / IEC 269

Submittals

Shop Drawings And Technical Data

The tenderer shall furnish relevant technical data of switchgears and associated equipment along with the offer.

The Contractor shall furnish relevant descriptive and illustrative literature on switchgears and associated equipment and the following for approval before manufacture of the panel.

- a) Complete assembly drawings of the panel showing plan, elevation and typical section views and locations of cable boxes, bus bar chamber, metering compartment and terminal blocks for external wiring connections.
- b) Typical and recommended schematic diagrams and control wiring.
- c) Foundation plan showing location of foundation channels, anchor bolts and anchors, floor plans and openings for cables etc.
- d) All drawings and data shall be in English.

Constructions

Sub Distribution boards shall be metal enclosed, indoor, floor mounted free standing and/or wall mounted type made up of the required vertical section, which when coupled together shall form continuous dead front. Sub distribution boards shall be dust and damp protected, the degree of protection being no less than IP: 54 to IS:2147. Sub distribution boards shall be

fabricated with a framed structure with rolled/folded sheet steel channel section of Sheet steel shroud and partitions shall be of minimum 2mm thickness, doors and covers shall also be of 2mm thickness. All panel doors shall be pad lockable type. All sheet steel work forming the exterior of sub distribution boards shall be smoothly finished, leveled and free from flaws. The corners to be rounded. Front and rear doors to be fitted with dust proof including neoprene gasket with fasteners designed to ensure proper compression of the gaskets. When covers are provided in place of doors, generous overlap shall be ensured between sheet steel surfaces with closely spaced fasteners to preclude the entry of dust.

Following minimum clearance to be maintained after taking into account connecting bolts, clamps etc.

i)	Between Phases	-	32mm
ii)	Between Phases and neutral	-	26mm
iii)	Between Phases and earth	-	26mm
iv)	Between Neutral & earth	-	26mm

All insulating, materials used in the construction of the equipment shall be of non-hygroscopic materials, duly treated to withstand the effect of high humidity, high temperatures, tropical ambient service conditions. SMC (Sheet Moulded Compound) supports & shrouds shall be used.

Functional units such as moulded case circuit breakers shall be arranged in multi-tier formation. The design of the sub distribution boards shall be such that each MCCB unit shall be fully compartmentalized.

Insulated barriers shall be provided with vertical section and between adjacent section to ensure prevention of accidental contact with main bus bars and vertical risers during operation, inspection or maintenance of functional units. All doors/covers providing access to live power equipment/circuits shall be provided with tool operated fastness to prevent unauthorized access. Sub distribution boards shall be so constructed that the cable alley shall be sufficient enough to accommodate all the outgoing and incoming cables.

For each cable alley, there shall be separate cable gland plate of detachable type at the bottom and/or top of the panel as required. Gland plate shall be 3 mm thick.

A base frame made out of 75mm x 40mm x 5.0mm M.S. Channel to be provided.

Metal Treatment and Finish

All metal work used in the construction of the sub distribution boards should have undergone a rigorous metal treatment process as follows:

- a) Effective cleaning by hot non alkaline degreasing solution followed by cold water rinsing to remove traces of alkaline solution
- b) Picking in dilute sulphuric acid to remove oxide scales & rust formation, if any, followed by cold water rinsing to remove traces of acidic solution.
- c) A recognized phosphating process to facilitate durable coating of the paint on the metal surfaces and also to prevent the spread of rusting in the event of the paint film being mechanically damaged. This again, shall be followed by hot water rinsing to remove traces of phosphate solution.
- d) Passivating in de-oxalite solution to retain and augment the effects of phosphating.
- e) Drying with compressed air in a dust free atmosphere.
- f) A finishing coat of powder coating of Siemens grey colour and thickness of powder coating shall not be less than 50 micron.

Bus Bars

The bus bars shall be air insulated and made of high conductivity, high strength Aluminium complying with the requirement of grade E-91E.

The bus bars shall be suitably braced with non-hygroscopic SMC supports to provide a through fault withstand capacity shall be as per actual calculation.

The neutral as well as the earth bar should be capable of withstanding the above level. Ridges shall be provided on the SMC supports to prevent tracking between adjacent bus bars. Large clearances and creep age distance shall be provided on the bus bar system to minimize the possibility of fault. The main phase bus bars shall have continues current rating throughout the length of the panel. The cross section of neutral bus bars shall be same as that of the phase bus bar for bus bars of capacity up to 250 Amp; for higher capacities, the neutral bus bar shall not be less than half (50%) the cross section of that of the phase bus bars. Connections from the main bus bars to functional circuits shall be so arranged and supported to withstand without any damage or deformation the thermal and dynamic stresses due to short circuit currents. Bus bars shall be colour coded with PVC heat shrinkable sleeves.

The sub distribution boards shall be designed that the cables are not directly terminated on the terminals of MCCB etc. but are terminated on cable termination links. Capacity of aluminium bus bars shall be considered as 1.0 Amp per sq. mm of cross section area of the bus bars.

AIR CIRCUIT BREAKER

TYPE AND CONSTRUCTION

The ACB shall confirm to the requirements of IS 13947-2 and shall be type tested & certified for compliance to standards from-CPRI. The circuit breaker shall be suitable for 415 V \pm 10%, 50 Hz supply system. Air Circuit Breakers shall be with moulded housing / sheet metal housing flush front, draw out type and shall be provided with a trip free manual operating mechanism or as indicated in drawings and bill of quantities with mechanical "ON" "OFF" "TRIP" indications.

The ACB shall be 3/ 4 pole with modular construction, draw out, manually or electrically operated version as specified. The circuit breakers shall be for continuous rating and service short Circuit Breaking capacity (Ics) shall be as specified on the single line diagram and should be equal to the Ultimate breaking capacity (Icu) and short circuit withstand values (Icw) for 1 sec.

Icu = Ics = Icw = shall be based on actual calculation.

Circuit breakers shall be designed to 'close' and 'trip' without opening the circuit breaker compartment door. The operating handle and the mechanical trip push button shall be at the front of the breakers panel. Inspection of main contacts should be possible without using any tools. The ACB shall be provided with a door interlock. i.e. door should not be open when circuit breaker is closed and breaker should not be closed when door is open.

All current carrying parts shall be silver plated and suitable arcing contacts with proper arc chutes shall be provided to protect the main contacts. The ACB shall have double insulation (Class-II) with moving and fixed contacts totally enclosed for enhanced safety and in accessibility to live parts. All electrical closing breaker shall be with electrical motor wound stored energy spring closing mechanism with mechanical indicator to provide ON/OFF status of the ACB.

The auxiliary contacts blocks shall be so located as to be accessible from the front. The auxiliary contacts in the trip circuits shall close before the main contacts have closed. All other contacts shall close simultaneously with the main contacts. The auxiliary contacts in the trip circuits shall open after the main contacts open. It should be possible to change settings on load.

Minimum 4 NO and 4 NC auxiliary contacts shall be provided on each breaker. Break time of ACB shall not be more than 70 milli second in case of short circuit.

Rated insulation voltage shall be 1000 volts AC.

CRADLE

The cradle shall be so designed and constructed as to permit smooth withdrawal and insertion of the breaker into it. The movements shall be free from jerks, easy to operate and shall be on steel balls/rollers and not on flat surfaces.

There shall be 4 distinct and separate position of the circuit breaker on the cradle.

Racking Interlock in Connected/Test/Disconnected Position.

Service Position : Main Isolating contacts and control contacts of the breaker are engaged.

Test Position : Main Isolating contacts are isolated but control contacts are still engaged.

Isolated Position : Both main isolating and control contacts are isolated.

There shall be provision for locking the breaker in any or all of the first three positions mechanically.

The following safety features shall be incorporated:

- a. Withdrawal or engagement of Circuit breaker shall not be possible unless it is in open condition.
- b. Operation of Circuit breaker shall not be possible unless it is fully in service, test or drawn out position.
- c. All modules shall be provided with safety shutters operated automatically by movement of the carriage to cover exposed live parts when the module is withdrawn.
- d. All Switchgear module front covers shall have provision for locking.
- e. Switchgear operating handles shall be provided with arrangement for locking in 'OFF' position.

PROTECTION

All breaker (ACB's) should be equipped with static release to offer accurate and versatile protection with complete flexibility and shall offer complete over current protection to the electrical system in the following four zones:

- Long time protection.
- Short time protection with intentional delay.
- Instantaneous protection.
- Ground fault protection.

SAFETY FEATURES

- (i) The safety shutter shall prevent inadvertent contact with isolating contacts when breaker is withdrawn from the Cradle.
- (ii) It shall not be possible to interchange two circuit breakers of two different thermal ratings. For Draw-out breakers, an arrangement shall be provided to prevent rating mismatch between breaker and cradle.
- (iii) There shall be provision of positive earth connection between fixed and moving portion of the ACB either thru connector plug or sliding solid earth mechanism. Farthing bolts shall be provided on the cradle or body of fixed ACB.
- (iv) The incoming panel accommodating ACB shall be provided with indicating lamps for ON-OFF positions, digital voltmeter and ammeter of size not less than 96 mm x 96 mm, selector switches, MCB for protection circuit and measuring instrument circuits.

- (v) It shall be possible to bolt the draw out frame not only in connected position but also in TEST and DISCONNECTED position to prevent dislocation due to vibration and shocks.
- (vi) Draw out breakers should not close unless in distinct Service/Test/Isolated positions.
- (vii) The insulation material used shall conform to Glow wire test as per IEC60695.
- (viii) The ACB shall provide in built electrical and mechanical anti-pumping.

TESTING

Testing of each circuit breaker shall be carried out at the works as per relevant IS Code of Practice and the original test certificate shall be furnished in triplicate. The tests shall incorporate at least the following.

- i. Impulse withstand test.
- ii. Power frequency withstand test.
- iii. Short circuit test.
- iv. Temperature - rise test under rated conditions.

MOULDED CASE CIRCUIT BREAKER

GENERAL

Moulded Case Circuit Breakers shall be incorporated in sub distribution boards wherever specified. MCCB's shall conform to IS 13947-2 and / or IEC 947-2 in all respects. MCCB's shall be suitable either for single phase AC 230 volts or three phase 415 volts.

FRAME SIZES

The MCCB's shall have the following frame sizes subject to meeting the fault level specified elsewhere.

- i) Up to 100A rating 100Amp frame.
- ii) Above 100A to 200A 200Amp frame.
- iii) Above 200A to 250A 250Amp frame.
- iv) Above 250A to 400A 400Amp frame.
- v) Above 400A to 630A 630Amp frame.

CONSTRUCTIONS

The MCCB cover and case shall be made of high strength heat treatment and flame retardant thermo-setting insulating material. Operating handle shall be of rotary type quick make/quick break, trip-free type. The operating handle for simultaneous operation and tripping of all the three phases.

Suitable fire extinguishing device shall be provided for each contact. Tripping unit shall be of thermo magnetic type up to 250 A for adjustable overload & short circuit protection and shall be microprocessor type above 250 A for adjustable overload, short circuit & earth fault protection. MCCB shall be line load reversible type. Device shall have IDMT characteristics for sustained overload, and short circuits. MCCB shall be current limiting type.

Contacts trips shall be made of suitable are resistant, silver alloy for long electrical life. Terminals shall be of liberal design with adequate clearance.

RUPTURING CAPACITY

The Moulded Case Circuit Breaker service breaking capacity (Ics) shall be based on actual calculation.

TESTING

Test certificate of the MCCB as per relevant Indian Standards (IS) shall be furnished. Pre-commissioning tests on the sub distribution boards incorporating the MCCB shall be done as per standard.

Measuring Instruments for Metering

GENERAL

Direct reading electrical instruments shall be in conforming to IS 1248. The accuracy of direct reading shall be 1.0 for voltmeter and 1.5 for ammeters. Other type of instruments direct reading shall be 1.0 for voltmeter and 1.5 for ammeters. Other type of instruments shall have accuracy of 1.5. The errors due to variations in temperature shall be limited to a minimum. The meter shall be of flush mounting type of 96mm square pattern. The meter shall be enclosed in a dust tight housing. The housing shall be of steel or phenolic mould. The design and manufacture of the meters shall ensure the prevention of fogging of instruments glass. Instruments meters shall be sealed in such a way that access to the measuring element and to the accessories with in the case shall not be possible without removal of the seal. The meters shall be provided with white dials and black scale markings.

The pointer shall be black in colour and shall have zero position adjustment device which could be operated from outside. The direction of deflection shall be from left to right.

Suitable selector switches shall be provided for all ammeters and voltmeters intended to be used on three phase supply.

The specifications herein-after laid down shall also cover all the meters, instrument and protective devices required for the electrical works. The ratings, type and quantity of meters, instruments and protective devices shall be as per the bill of quantities.

DIGITAL AMMETERS

Digital Ammeters shall be confirmed to IS: 13875. It shall be digital type 7 segment LED display. Ammeter shall be suitable for accuracy class 1.0 and burden 0.2 VA approx. The ammeters shall be capable of carrying sustained overloads during fault conditions without damage or loss of accuracy. The meter shall be suitable for working in ambient temp 0 degree to 50 degree and 95% humidity condition.

DIGITAL VOLTMETERS

Digital Voltmeters shall be confirmed to IS: 13875. It shall be digital type 7 segment LED display. Voltmeter shall be suitable for accuracy class 1.0 and burden 0.2 VA approx. The range for 3 phase voltmeters shall be 0 to 500 volts. The meter shall be suitable for working in ambient temp 0 degree to 50 degree and 95% humidity condition. The voltmeter shall be provided with protection MCB of suitable capacity.

CURRENT TRANSFORMERS

Current transformers shall be in conformity with IS: 2705 (Part I, II & III) in all respects. All current transformers used for medium voltage applications shall be rated for 1KV. Current transformers shall have rated primary current, rated burden and class of accuracy as required. However, the rated secondary current shall be 15A unless otherwise specified. The acceptable minimum class of various applications shall be as given below.

Measuring : Class 1.0

Protection : Class 5 P10

Current transformers shall be capable of withstanding without damage, magnetic and thermal stresses due to short circuit fault on medium voltage system. Terminals of the current transformer shall be marked permanently for easy identification of poles. Separate CT shall be provided for measuring instruments and protection relays. Each C.T. shall be provided with rating plate.

Current transformers shall be mounted such that they are easily accessible for inspection, maintenance and replacement. The wiring for CT's shall be copper conductor, PVC insulated wires with proper termination lugs and wiring shall be bunched with cable straps and fixed to the panel structure in a neat manner.

Control switches

Control switches shall be of the heavy duty rotary type with escutcheon plates clearly marked to show the operating position. They shall be semi-flush mounting with only the front plate and operating handle projecting.

Indicating lamps shall be of the LED type, and with translucent lamps covers. Bulbs & lenses shall be easily replaced from the front.

Push buttons shall be on the momentary contact, push to actuate type fitted with self reset contacts & provided with integral escutcheon plates marked with its functions.

Cable Terminations

Cable entries and terminals shall be provided in the sub distribution boards to suit the number, type and size of aluminium conductor power cable and copper conductor control cable specified.

Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable gland and terminals such that cables can be easily and safely terminated. Cable glands shall be brass compression type, barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

Cable risers shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

Control Wiring

All control wirings shall be carried out with 1100V grade single core ZHFR cable conforming to IS 694/IS 8130 having stranded copper conductors of minimum 1.5 sq. mm for potential circuits and 2.5 sq. mm for current transformer circuits. Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance. Wiring shall be identified by numbering ferrules at each end. All control fuses shall be mounted in front of the panel and shall be easily accessible.

Terminal Block

Terminal blocks shall be 500 Volts grade of the stud type. Insulating barriers shall be provided between adjacent terminals. Terminal block shall have a minimum current rating of 10 Amps and shall be shrouded. Provisions shall be made for label inscriptions.

Labels

Labels shall be of anodized aluminium, with white engraving on black background. They shall be properly secured with fasteners.

Testing at Manufacturing Work

All routine tests specified in IS:8623-1977 shall be carried out and test certificates submitted to the Engineer – in – Charge.

Testing and Commissioning

Commissioning checks and tests shall be included all wiring checks and checking up of connections. Primary/secondary injection tests for the relays adjustment/setting shall be done before commissioning in addition to routine megger test. Checks and tests shall include the following:-

- a) Operation checks and lubrication of all moving parts.
- b) Interlocking function check
- c) Insulation test: When measured with 500 V megger, the insulation resistance shall not be less than 100 mega ohms.
- d) Trip tests & protection gear test.

Automatic transfer switch

General requirements

The following covers the Automatic Transfer Switch Equipment (ATSE) and its By-Pass equipment.

The ATSE shall be composed of

- two separate Load Break Switches,
- a mechanism to operate and mechanically interlock the switches,
- an actuator made of a motorized unit or a double solenoid mechanism (both momentarily energized)
- a 3 phases monitoring device and control module (MDCM) for monitoring supply circuits and for transferring the load circuit from one supply to another.

The ATSE shall be fully integrated in one device. No additional wiring other than the power connection shall be allowed to facilitate the proper functioning of the ATSE with the MDCM.

All the elements of the transfer switch equipment and control module shall be of the same manufacturer.

The ATSE shall be of the PC type.

The ATSE shall have 3 stable positions: Normal, Isolated and Emergency.

The ATSE shall be of a Disconnector type with fully visualized breaking.

The ATSE shall be able to do On Load Manual switching.

The ATSE must be proposed in 3 and 4 poles versions.

Design requirements

The transfer switch unit shall be electrically operated and mechanically held.

It shall be no power consumption while in a stable position other than the one required for the control unit.

The electrical actuator shall be a motorized unit or a double solenoid mechanism, which is momentarily energized.

The switches shall be inherently mechanically interlocked to ensure at any moment only one out of the three stable positions.

The system shall incorporate a position indicator for the 3 stable positions.

To prevent source overlapping the transfer is operated through distinct isolated positions. The sensing and logic shall be built-in microprocessor for maximum reliability and with option of serial communications feature. To facilitate flexibility of installation there shall be provision of Line/ Load reversibility.

The switching contact shall be silver plated and maintenance free in various environments. It shall be of self cleaning capability to optimize the quality of the contact during operation

The Neutral pole of ATS shall be fully rated (100% rating as that of all 4 poles).

The 4 poles shall switch simultaneously.

Standards & Codes

The ATSE shall conform to the requirements of the IEC Standard 60947-6-1 for the source transfer function and 60947-3 for Disconnection and manual on load switching.

The MDCM shall comply with the following standards:-

Emission General standard

- EN 55022 Conductor Emission
- EN 55022 Radiated Emission Immunity General standard
- EN 61000-4-2 Electrostatic Discharge (ESD)
- EN 61000-4-3 Radiated electromagnetic field
- EN 61000-4-4 Electrical fast transient (EFT)
- EN 61000-4-5 Surges
- EN 61000-4-6 Conducted radio frequency field
- EN 61000-4-8 Power frequency magnetic field
- EN 61000-4-11 Voltage dips, short interruptions and variations
- EN 61000-4-13 Harmonics and inter harmonics
- IEC 61010-1 Electromagnetic compatibility

Safety requirements & features

The ATS shall be of Disconnect or type as per IEC 947-3

It shall not be possible to mix the two supplies (Normal supply and Emergency supply) in case of any failure of the equipment. This characteristic must be guaranteed by a proper design of the mechanism.

Opening and Closing operations of the contacts must be independent from the driving mechanism. The speed of the contacts shall be independent of the speed of motor or manual operation to ensure the safety of the operator.

In case of contacts welding, the ATSE must remain in its actual position, in Manual or Automatic operation, according to IEC 60947-3. Neither the manual nor the automatic operation can lead to a failure of the mechanism or of the interlocking. The mechanical indicator shall show the actual position in contact welded situation.

The ATSE shall have a Manual and Automatic mode: the swap between both modes shall be possible only with a key or selector on the front face. Manual operation shall be prohibited in automatic and Automatic operation shall be inhibited in Manual mode.

The ATSE shall have a built-in provision for padlocking in the Isolation position for the safety of the operators. A provision for a padlocking in Normal or Emergency positions shall also be provided.

Automatic commands shall be inhibited when the product is padlocked

The padlocking shall be possible only in Manual position.

The ATSE shall be able to accommodate up to three padlocks at the same time. A handle for manual operation shall be provided for emergency transfer purposes. The handle shall be located on the ATSE itself to ensure a safe and quick operation during power outages. The handle shall be easily removable for automatic operation.

Manual transfer shall be possible on load, without any upstream disconnection, with respect to the safety of the operator. This feature is essential in case of emergency and panic.

It shall be possible to block the re-transfer process via programming. When selected, retransferring to the Main source must be validated locally or remotely via keypad or external contact.

The replacement of the motor operated actuator shall be possible under live condition with respect to the operator safety (isolation distances, easy access to the fixing elements).

Operations

The ATSE shall be supplied by any present source. It shall allow the ATSE to be controlled in the 3 positions with only one source present.

The ATSE shall have high short time current withstand capability (Icw 1 second in accordance to IEC 60947-3).

Manual retransfer function can be inhibited and must be possible either locally or from remote.

The ATSE shall have the possibility to be electrically controlled in any of the 3 positions by mean of dry contacts. It overrides the automatic sequence. Once back in Auto mode, the ATSE shall come back to the proper position.

Automatic operation via the MDCM

The monitoring device and control module (MDCM) must be integrated within the ATSE.

Electrical Control of the product position must be possible and controlled locally or remotely. Any automatic command must be inhibited during control operation (takeover).

Parameters sensing & setting

The MDCM shall include 3 phases sensing for monitoring of voltage and frequency to detect the presence and loss of the power supply for activation of the automatic transfer. The settings are as following:

PARAMETER	SOURCES	THRESHOLD	HYSTERESIS
Under voltage	Mains and Backup, 3 phases	80 to 98%	81 to 99%
Over voltage	Mains and Backup, 3 phases	102 to 120%	101 to 119%
Under frequency	Mains and Backup	80 to 99%	80.5 to 99.5%
Over frequency	Mains and Backup	101 to 120 %	100.5 to 119.5%
			100.6

Voltage settings shall be field adjustable in 1% increments either locally with the display and keypad, or remotely through serial communication. Frequency settings shall be adjustable in 0.1% increments either locally with the display and keypad, or remotely through serial communication. All settings shall be adjustable directly from the front face, opening of the MDCM is strictly forbidden for obvious reasons of safety and possible damages. The MDCM shall have a phase sequence detection to ensure the proper voltage vectors sequence on both power supplies. The MDCM shall have programming for selection of network type 4NBL/41NBL/42NBL/3NBL/2NBL/2BL/1BL and capability to monitor the minimum and maximum voltages and frequencies threshold and hysteresis. The MDCM shall allow the setting of the sources priority. The MDCM shall be equipped with the activation of manual re-transfer mode. The MDCM must be equipped with a permutation counter to enable to record the life span of the ATSE represented by the number of transfer operations. Resetting of this counter shall be conditioned by 4 digits numerical password with 2 levels of security. Interface with the MDCM The MDCM must be easily configurable via a HMI dialogue interface complete with a 2 levels security 4 digits numerical Password for programming access right. The MDCM shall be equipped with local visualization of three phase currents, powers (P, Q, S), frequency and power factor through 3 current transformers measurement from the 2 sources. Source status shall be clearly visible on the front of the unit for both normal & emergency, stated in a clear schematics diagram. The controller shall provide digital readout of voltage on all 3 phases, frequency and phase rotation. Inputs/outputs, communication.

The MDCM shall be able to provide up to four Inputs (Programmable NO or NC) and four Outputs (NO Type) for interfacing with control system. The inputs and outputs functions shall be versatile (no unique function), the assignment being done by the HMI or the communication. The MDCM can be equipped with an option to enable communication via RS485 module MODBUS protocol with a transmission speed up to 38400 bps. The link shall be capable of reading the voltages, timers and inputs values, setting all parameters values and inputs/outputs functions.

Timers settings

An adjustable timer of 0 to 60 seconds shall be provided to detect the priority network failure, to override any transient outages of the normal supply. (Main Failure Timer, MFT). A timer of 0 to 60 seconds shall be provided to validate the stability of emergency network before transfer, once the Generator Set supply is available. (Delay To Transfer, DTT). While transferring to emergency, a possibility to stay in position 0 shall be provided from 0 to 20 seconds (0 Main Failure timer, 0MF). An adjustable timer of 0 to 30 minutes shall be provided to detect priority network return to normal, to override any false availability of the normal supply. (Main Return Timer, MRT). While transferring back to primary source, a possibility to stay in position 0 shall be provided from 0 to 20 seconds (0 Main Return timer, 0MR). An adjustable timer of 0 to 30 minutes shall be provided to allow the generator cooling down after load retransfer from standby source to Mains source (Cool Down Timer, CDT). The controller shall provide the ability to prevent retransfer to Mains from happening, except if the user validates manually the retransfer. (Manual Re-Transfer).

Maintenance & testing

The MDCM shall provide the possibility to run a test ON load and OFF load. It shall be possible to actuate these sequences from the front face HMI or via the Modbus link. Maintenance of the electrical parts (Controller or Motorization unit) shall be possible without disconnection of the power conductors. It shall be possible to change any actuator unit based on a motor technology in less than 10 minutes without disconnection of the power conductors. During this operation, it shall still be possible to operate manually the switch with the MDCM and motorization removed.

Both Local and Remote control of test sequences shall be possible on the Switch.

Inspection at factory

The inspection / testing of all the ATS / STS shall be done at manufacturer works before dispatch by Project-in-Charge / Project Director / Consultant.

Factory testing and certification

The complete ATSE shall be factory tested to ensure proper operation of the individual components together and correct overall sequence of operations. The test must also ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements. The manufacturer shall be certified ISO 9001 : 2003 International Quality Standard and the manufacturer shall have third party certification verifying its quality assurance in design / development, production, installation and servicing in accordance with ISO 9001.

Training

The manufacturer / supplier shall ensure the training for Operating staff in the local national language, by means of fully configured Training kits to impart hands-on training to simulate various parameters and for trouble shooting exercise.

POWER FACTOR CORRECTION SYSTEM

1 SCOPE

Design, assembly / fabrication, installation, testing and commissioning of 3 phase, 440 V, 50 Hz TP&N APFC system (Auto + manual option) with MDXL type capacitors, microprocessor based controller and detuned filter. The unit shall improve the monthly average power factor and mitigate harmonic distortion on the LV bus.

2 ENCLOSURE

The panel shall be indoor type, free standing, and floor mounting with IP42 degree of protection. It shall be completely made of CRCA sheet steel. The enclosure shall have sturdy support structure with angle supports as necessary and shall be finished with powder coating in the approved colour shade/s to match the colour of the other panels. The thickness of powder coating should be minimum 60-80 microns.

Suitable provisions shall be made in the panel for proper heat dissipation. Air aspiration louvers for heat dissipation shall be provided as a necessary.

The front portion shall house the switchgear and the rear portion shall house capacitors and series reactors. The enclosure is to be suitably sized to accommodate all the components, providing necessary air clearance between live and non-live parts, providing necessary working clearance.

3 APFC RELAY / CONTROLLER

Microprocessor based APFC relay (Intelligent VAR controller) shall sense the PF in the system and automatically switch ON / OFF the capacitor unit or stage to achieve the preset target PF. The controller shall have the following features:

- Digital settings of parameters like PF, Switching time delay, Step limit etc.
- Indication of PF, preset parameters.
- Indication and elimination of defect capacitor steps.
- No-volt release.
- Protective shut down in case of harmonic overload.
- Indication for Failure to achieve the target PF, Harmonic overloading, Step failure etc.

4 CAPACITORS

- The capacitor shall comply with the following standards (and their latest amendments) : IS 13340-1993, IS 13341-1992, IEC 60831-1+2
- General specifications: 3 phase, delta connected, 50 Hz.
- Voltage: Must be designed to withstand system over voltage, increased voltage due to series reactor and harmonics.

- Capacitor type: Super heavy duty with double side metallized capacitor tissue paper. Oil impregnated and self-healing type with bi-axially oriented polypropylene film shall be fitted with pressure sensitive disconnect or in each individual capacitor cell.
- Over voltage +10% (12h / 24h), + 15% (30m / 24h), + 20% (5m), +30% (1m) as per Clause 6.1 of IS 13340-1993.
- Over current : $2.5 \times I_n$
- Peak Inrush current withstand : $350 \times I_n$
- Total watt-losses including discharge resistors: $\leq 0.45 \text{ W / k V Ar.}$
- Temperature category: -25 deg.C to 70 deg.C.
- Capacitor shall be self-heating type and oil impregnated for longer life. The impregnate shall be non-PCB, biodegradable type, must be properly treated and de-gasified, so as not to have any degeneration properties and shall be non-oxidizing.
- The design shall be modular for simple mechanical assembly, no extra accessories/ metal parts to be required. Unit must be free standing with an IP 41 protection level.

4.1 Capacitor Construction

Capacitor Unit

Each step in the APFC panel shall comprise of single unit or group of units connected in parallel to form a bank. Each capacitor unit / module shall be provided with Pressure Sensitive Disconnect or for safe disconnection. Each capacitor unit shall comprise of number of single-phase elements connected Delta configuration. All capacitor unit shall be provided with discharge resistors, which shall discharge the capacitors to less than 50 V within 1 minutes.

Capacitor Elements

Each element shall be wound from continuous reels of high quality polypropylene film combined with dual side metallized paper in the dielectric structure to form a cylindrical winding. Elements shall be vacuum dried, impregnated under high vacuum with non PCB oil.

5 SERIES REACTOR

Application

LV Harmonic Filters shall be used with harmonic filter duty power capacitors to mitigate harmonics, improve power factor and avoid electrical resonance in LV electrical networks.

Construction, Testing & Protection

The low voltage filter reactor shall be series type having a three phase, iron core construction suitable for indoor use (IP 00). The reactor shall be air cooled and the layout shall be in accordance with IEC 60076.

The complete unit shall be impregnated under vacuum and over-pressure in impregnation resin and shall be suitable for temperature Class H (T60/H) operation.

The reactor shall be tested using a separate source voltage test of 3.0kV (coil to core) for 1 minute as per IEC 60076/3.

The permitted tolerance of inductance shall be + 3% of rated inductance value.

Reactor tuning factor shall be 7% and the current rating of the reactor shall include the effects of harmonics and other possible over-currents.

The limit of linearity of inductance of the filter reactor shall be as follows $1.2 \bullet \sum I_{\eta}$ with $L = 0.95 L_N$

The reactor shall be fitted with a temperature sensitive micro-switch in the centre coil (normally open) for connection to trip circuits in case of high operating temperatures.

6 SWITCHGEAR & PROTECTION

Incomer switchgear shall be TP&N breaker appropriate rating. Suitable contactor for each step shall be used and must be capable of capacitor switching duty at each step for short circuit protection.

Bus bars shall be suitably colour coded and must be mounted on appropriate insulator supports.

Power cables used shall have superior mechanical, electrical and thermal properties, and shall have the capability to continuously operate at very high temperatures up to 125 deg.C.

Internal wiring between main bus-bars, breaker, contactor and capacitors shall be made with 1100 V grade, PVC insulated, copper conductor cable of appropriate size, by using suitable copper crimping terminal ends etc.

Suitable bus links for input supply cable termination shall be provided.

7 CONTROL CIRCUIT & GENERAL PROTECTION

The control circuit shall be duly protected by using suitable rating MCB.

An emergency stop push button shall be provided to trip the entire system (22.5 mm dia, mushroom type, press to stop and turn to reset).

Wiring of the control circuit shall be done by using 1.5 sq.mm, 1100 V grade, PVC insulated, multi-stranded copper control wire.

Inspection terminal strip, number ferruling, labeling etc. shall be provided.

440 V caution board on the panel shall be provided.

INTERNAL ELECTRIFICATION WORK.

Distribution Boards

General

- a) Distribution Board shall be double door type with extended loose wire box & M.S. Junction Box at the top and suitable for flush installation. All distribution boards shall be of three phases (415 Volts) or single phase (240 Volts) type with incoming isolator or MCB and/or RCCB as in Bill of Quantities. Distribution boards shall contain plug in type miniature circuit breaker mounted on bus bars. Miniature circuit breakers shall be quick make & quick break type with trip free mechanism. MCB shall have thermal & magnetic short circuit protection. MCB shall conform with IS 8828-1978 & IS 8828 - 1996. Bus bars shall be of electrolytic copper. Neutral bus bars shall be provided with the same number of terminals as there are single ways on the board, in addition to the terminals for incoming mains. An earth bar of similar size as the neutral bar shall also be provided. Separate neutral & earth bus bar link to be provided for each phase. Phase barrier shall be fitted and all live parts shall be screened from the front. Ample clearance shall be provided between all live metal and the earth case and adequate space for all incoming and outgoing cables. All distribution board enclosures shall have an etched zinc base stove painted followed by synthetic stove enamel, colour light gray. A circuit identification card in clear plastic cover shall be provided for each distribution board. IK (Mechanical Stress) rating of distribution board enclosure shall not be less than IK -07/ 08 / 09.
- b) Distribution Board with single phase outgoings requirement shall be Horizontal type. Distribution Board with three phase outgoings requirement shall be Vertical/ Horizontal type. Distribution Board installed in indoor dry locations shall conform to IP-42. Distribution Board installed in outdoor & wet locations shall conform to IP- 65.
- c) Miniature Circuit Breakers for lighting circuits shall be of "B" series whereas the circuits feeding discharge lamps (HPMV or HPSV) halogen lamps, all power outlet points, equipment/ machinery shall be of "C/D" series (Motor circuit) types. All miniature circuit breakers shall be of not less than 10KA rated rupturing capacity. All miniature circuit breaker terminals shall have safety shutter.
- d) Distribution board shall be provided with isolator or MCB and/or earth leakage circuit breaker. Earth leakage circuit breaker shall be current operated type and of 30mA sensitivity unless otherwise stated. RCCB shall be mounted within distribution board box for single phase distribution board while in three phase distribution board RCCB shall be either mounted within distribution board box or in a separate MS box below distribution board. Width and depth of RCCB box shall be same as that of distribution board box and of same finish. Height of RCCB box shall be sufficient to accommodate RCCB & termination of incoming & outgoing wires. Distribution board box, isolator, MCB'S used shall be of one/same manufacturer. Standard size manufactured by approved manufacturer shall be used. In case size required is not standard size of manufacturer, in that case next standard size distribution board box shall be used with incoming & outgoing MCB. Additional cutout/space for outgoing MCB shall be plugged with blank plates. No extra cost shall be paid for using bigger/higher size distribution board box and blank plates.

Conduit and Wiring System

M.S. Conduit

All conduit pipes shall be of approved gauge (not less than 16 SWG for conduits of sizes up to 32mm diameter and not less than 14 SWG for conduit of size above 32mm diameter) solid drawn or reamed by welding finished with stove enameled surface. All conduit accessories shall be of threaded type and under no circumstances pin grip type accessories shall be used. The maximum number of PVC insulated 650/1100 volts grade copper conductor cable that can be drawn in conduit of various sizes shall be as per IS code. No steel conduit less than 20mm in diameter shall be used unless otherwise stated.

Conduit Joints

Conduit pipes shall be joined by means of threaded couplers, and threaded accessories only. In long distance straight run of conduits, inspection type couplers at reasonable intervals shall be provided or running threads with couplers and jam nuts shall be provided. In the later case the bare threaded portion shall be treated with anti-corrosive preservative. Threads on conduit pipes in all cases shall be between 13mm to 19mm long sufficient to accommodate pipes to full threaded portion of couplers or accessories. Cut ends of conduit pipe shall have no sharp edges nor any burrs left to avoid damage to the insulation of conductor while pulling them through such pipes.

Wherever conduit passes a building expansion joint, galvanized flexible metallic conduit shall be provided for connecting rigid M.S. Conduit in either slab.

Protection against Condensation

The layout of conduit should be such that any condensation or sweating inside the conduit is drained out. Suitable precaution should also be taken to prevent entry of insects inside the conduit.

Protection of Conduit against Rust

The outer surface of conduit including all bends, unions, tees, junction boxes etc forming part of conduit system shall be adequately protected against rust when such system is exposed to weather by being painted with two coats of oxide paint applied before they are fixed. In all cases, no bare threaded portion of conduit pipe shall be allowed. Unless such bare thread portion of conduit is treated with anticorrosive preservative or covered with approved plastic compound.

Painting of Conduit and Accessories

After installation, all accessible surface of conduit pipes, fittings, switch and regulator boxes etc. shall be painted with two coats of approved enameled paint or aluminium paint as required to match the finish of surrounding wall, trusses etc.

Fixing of conduits

Surface Conduit

Conduit pipes shall be fixed by heavy gauge saddles, secured to suitable wood plugs or other approved plugs with screws in an approved manner at an interval of not more than one meter but on either side of the couplers or bends or similar fittings, saddles shall be fixed at a distance of 30cm from the centre of such fittings. The saddles should not be less than 24 gauges for conduits up to 25mm dia and not less than 20 gauge for larger diameter conduits. The corresponding widths shall be 19mm & 25mm. Where conduit pipes are to be laid along the trusses, steel joint etc. the same shall be secured by means of special clamps made of MS. Whereas it is not possible to drill holes in the trusses members suitable clamps with bolts and nuts shall be used. All fixing arrangement like saddles, special purpose clamps, nuts, bolts etc. shall be deemed to be included in quoted rates of conduit.

For 25mm diameter conduit width of clip shall be 19mm and of 20 SWG. For conduit of 32mm and above, width of clip shall be 25mm and of 18 SWG.

Where conduit pipes are to be laid above false ceiling, either conduit pipes shall be clamp to false ceiling frame work or suspended with suitable supports from the soffit of slab. For conduit pipe run along with wall, the conduit pipe shall be clamped to wall above false ceiling in uniform pattern with special clamps if required to be approved by the Project-in-Charge / Project Director / Project Director at site.

Recess / Concealed Conduit

The chase in the wall shall be neatly made and of ample dimensions to permit the conduit to be fixed in the manner desired. In the case of building under construction, conduit shall be buried in the wall before plastering and shall be finished neatly after erection of conduit. In case of exposed brick/rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work. Entire work of chasing the wall, fixing the conduit in chases, and during the conduit in mortar before plastering shall form part of point wiring work. (For chase cutting-chase cutting machine shall be used and no manual cutting shall be allowed).

The conduit pipe shall be fixed by means of stapples or by means of saddles not more than 60cm apart or by any other approved means of fixing. Fixing of standard bends and elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with the long radius which shall permit easy drawing in of conductors. All threaded joint of conduit pipe shall treat with some approved preservative compound to secure protection against rust. Suitable inspection boxes to the barest minimum requirements shall be provided to permit periodical inspection and to facilitate replacement of wires, if necessary. These shall be mounted flush with the wall. Suitable ventilating holes shall be provided in the inspection box covers. Wherever the length of conduit run is more than 10 metres, then circular junction box shall be provided to facilitate pulling of wires. The chicken wire mesh shall be provided by civil agency.

Outlet Boxes

Switch/outlet boxes shall be made of metal on all sides except on the front. Boxes shall be G.I. Up to 10cmx20cm size Box shall have wall thickness of 18 SWG and above 10cmx20cm shall have 16 SWG. The metallic boxes shall be painted with anticorrosive paint before erection. Clear depth of the box shall not be less than 50mm all fitting shall be fitted in flush pattern. Switch/outlet boxes shall be suitable to house modular type light and power accessories. Earthing stud to be provided for connection of earthing wire in side of box at near any corner.

Fan Box

Fan Box shall be made out of 14-gauge M.S. sheet in hexagonal shape. The dia of box shall be 150 mm and depth of box shall be 80 mm. A M.S. covers plate size 160 mm x 160mm x 16 gauges to be provided in the back of fan box. 12 mm dia M.S.Rod to be provided for fan hanging arrangement in the box. A 28 mm dia knockout To be made in all six hexagonal vertical part for conduit entry in the box. The box shall be painted with 2 coat of primer. A 180 mm dia, 2 mm thick hylem sheet Cover to be provided. (The sample to be approved before procurement / execution by Project-in-Charge / Project Director / Consultant.

Light & power accessories**General**

All light & power accessories shall be of modular range of plate switch type and shall be of one manufacturer (brand) and type.

Light Switches Modular Type

All switches for control of light shall be of 6/10 Amp unless otherwise stated. All switches shall be modular range of plate switch type. The switches shall be rocker mechanism type with silver contact. All switches shall be of white finish or as sample approved by Project-in-Charge / Project Director / Consultant.

6/16 Amp Switch Socket Outlet Modular Type

Switch socket outlet shall be of 3 pin 6Amp outlet shall have safety shutters. The switch shall be of rocker mechanism type with silver contact. Socket outlet shall be shutter type and of modular range of plate type and having white finish or as approved by Project-in-Charge / Project Director / Consultant.

Wiring

All FRLS insulated copper conductor multi-stranded wires shall conform to relevant IS codes. Cable conductor size and material shall be as required.

All internal wiring shall be carried out with FRLS insulated wires of 1100 volts grade. The circuit wiring for points shall be carried out in looping in system and no joint shall be allowed in the length of the conductors. Circuit wiring shall be laid in separate conduit originating from distribution board to switch board for light/fan. A light/fan switch board may have more than one circuit but shall have to be of same phase. Looping circuit wiring shall be drawn in same conduit as for point wiring. Each circuit shall have a separate neutral wire. Neutral looping shall be carried out from point to point or in light/fan switch boards. A separate earth wire shall be provided along with circuit wiring for each circuit. For point wiring red or yellow or blue colour wire shall be used for phase and black colour wire for neutral. Circuit wiring shall be carried out with red, yellow or blue colour FRLS insulated wire for RYB phase wire respectively and black colour FRLS insulated wire for the neutral wires. FRLS insulated green colour wire shall be used as earth continuity conductor and shall be drawn along with other wires. No wire shall be drawn into any conduit until all work of any nature, that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire.

Before the wires are drawn into the conduit, the conduits shall be thoroughly cleaned of moisture, dust and dirt. Drawing & jointing of copper conductor wires & cables shall be as per CPWD specifications.

All the wire & cables shall be copper up to 16 sq.mm and above 16 sq.mm shall be aluminum except UPS cables. For UPS Incoming & outgoing, only copper cable/ wire shall be used.

Nominal Cross-sectional Area of conductor in Sq. mm	20mm		25mm		32mm		38mm		51mm		64mm	
	S	B	S	B	S	B	S	B	S	B	S	B
1.50	5	4	10	8	18	12	-	-	-	-	-	-
2.50	5	3	8	6	12	10	-	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12	8
25	-	-	-	-	3	2	5	3	8	6	9	7
35	-	-	-	-	-		3	2	6	5	8	6
50	-	-	-	-	-	-	-	-	5	3	6	5
70	-	-	-	-	-	-	-	-	4	3	5	4

Joints

All joints shall be made at main switches, distribution board socket and switch boxes only. No joint shall be made in conduits & junction boxes. Conductors shall be continuous from outlet to outlet.

Sub Mains

Sub-main wiring shall be carried out with FRLS Insulated Copper multi-stranded wires/cables.

Sub-main cable where called for shall be of the rated capacity and approved make. Every sub-main shall be drawn into an independent adequate size conduit. Adequate size draw boxes shall be provided at convenient locations to facilitate easy drawings of the sub-main cables. Cost of junction box/drawn box is deemed to be included in the rates of sub-main wiring. An independent FRLS insulated copper earth wire of proper rating shall be provided for every sub-main. Single phase sub-main shall have single earth wire whereas three phase sub-main shall be provided with two earth wire.

Where sub-mains cables are connected to the switchgear, sufficient extra lengths of sub-main and mains cable shall be provided to facilitate easy connections and maintenance. For termination of cables crimping type cable socket/ lugs shall be provided. Same colour code as for circuit wiring shall be followed.

Load Balancing

Balancing of circuits in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

Mode of measurement

The following measurement code shall apply to the contract.

Power cables

All power cables/control cables shall be measured on linear basis in meters.

LIST OF MATERIALS HAVING ISI / BIS CERTIFICATION MARKING

<u>Srl No</u>	<u>Name of Materials</u>	<u>Relevant IS</u>
1.	<u>CONCRETE</u>	
	(a) Integral cement water proofing compound	2645
	(b) Ply wood for concrete shuttering work	4990
2.	<u>JOINERY</u>	
	(a) Wooden flush door shutters, solid core type	2202(Part-1)
	(b) Particle board and hard board face panel	2202(Part- II)
3	<u>BUILDERS HARD WARE</u>	
	(a) Steel Butt hinges	1341
	(b) Non-Ferrous metal butt hinges	205
	(c) Ferrous tower bolts	204 (Part-I)
	(d) Non-Ferrous tower bolts	208
	(f) Parliament hinges	362
	(g) Hydraulically operated door closers	3564
	(h) Continuous piano hinges	3818
	(j) Non-Ferrous metal sliding door bolts	2681
	(k) Tee and strap hinges	206
	(l) Mild steel sliding door bolts	281
4.	<u>STEEL & IRON WORK</u>	
	(a) Steel doors, windows, and ventilators.	1038

5. ROOF COVERING

(a) Bitumen felts for water proofing and damp proofing	1322
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6. CELLING AND LINING

(a) Ply wood for general purpose	303
(b) Block boards	1659
(c) Veneered particle board	3097
(d) Marine plywood	710
(e) Fiber hard board	1658
(f) Wood particleboard	3087

7. FLOORING

(a) White Portland cement	8042
(b) Cement concrete flooring tiles.	1257

8. WATER SUPPLY PLUMBING DRAINS AND SANITARY APPLIANCES

(a) Concrete pipes with or without reinforcement	458
(b) Salt glazed stone ware pipes and fittings	651
(c) Flushing cisterns for water closets and urinals Valve less symphonic type	774
(d) Cast copper alloy screw down bib tap and stop valves	781
(e) Galvanised mild steel tubes	1239 (part-I)
(f) Galvanised mild steel tube fittings	1239 (part-II)
(e) Sand cast iron, spigot and socket soil, waste and ventilating pipes &fittings	3989
(f) Ball valves (horizontal plunger type) including floats for water supply purposes	1703
(j) Cast iron manhole covers and frames	1726(Part I to VII)
(k) AC pressure pipes	1592
(l) Automatic flushing cisterns for urinals	2336

Contd.../-

APPENDIX 'A' Contd..../-.

Srl No	Name of Materials	Relevant IS
(m)	Vitreous china ware appliances	
i)	Wash down water closet	2556 (part-II)
ii)	Squatting pans	2556 (part III)
iii)	WashBasin	2556 (part IV)
iv)	Laboratory sinks	2556 (Part V)
v)	Urinals bowl type	2556 Part VI)
vi)	Half round channels	2556 (Part VII)
vii)	Syphonic wash down water closets	2556 (Part VIII)
	Foot rests	2556 (Part X)
(n)	Plastic WC seat covers	2546
(o)	Vertically cast iron pressure pipes for water gas and sewage	1537
(p)	Pillar taps for water supply purposes	1795
(q)	Centrifugally cast pipes for water, gas and sewage	1536
(r)	Centrifugally cast (spun) iron spigot & socket soil, waste and ventilating pipes, fittings and accessories.	3989
(s)	Rubber sealing rings for gas mains, water mains and sewers	5382
(t)	Cast iron fittings for pressure pipe for water, gas and sewage	1538 (Part I to XXIII)

9. ELECTRICAL WORKS

(a)	Ceiling roses	371
(b)	Tumbler switches	3854
(c)	Socket outlet 3-pin plug & socket	1293
(d)	Switch, fuses (Main & Switch)	4064(Part 1&II)
(e)	Rigid non-metallic conduit	9537 (part III)
(e)	Single core cable polythene insulated and PVC sheathed cable.	1596
(g)	Rigid steel conduits	9537 (part-II)

(h)	Starter for tube light	2215
(j)	Fluorescent lamps	2418 (part I)
(k)	Aluminium Conductor for overhead	398 (part I & II)
(l)	Switch gears	2208
(m)	HRC fuse links upto 650 volts	9224 (part-I)
(n)	Porcelain insulators for overhead power lines	731
(o)	MCB	8828

Note: All fittings & fixtures for buildings including hardware and all other items enumerated in this Appendix sanitary fittings & electrical fittings etc shall be ISI marked. In case any fittings/fixtures of ISI marked is not manufactured then the fittings & fixtures conforming to relevant IS may be incorporated as approved by the GE. The contract provision shall be deemed to be amended accordingly & unit rate of buildings under Sch 'A' section 1 & other sections of Sch'A' shall be deemed to be inclusive for the same & no extra payment on this account shall be admissible.

Signature of contractor

for Accepting Officer

Dated: _____

Appendix ' B '**LIST OF PRODUCTS WHICH ARE GENERALLY SUPERIOR TO BIS / ISI CERTIFIED
PRODUCTS TO BE INCORPORATED IN WORKS**

1.	Asbestos Cement Sheets	-	IS-459
2.	Asbestos Cement Building Pipes & pipe fittings	-	IS-1626 (Part 1)
3.	Distempers washable and dry	-	IS-427 & IS-428
4.	Paints	-	IS- 2932
5.	Cast copper alloy fancy bib taps and stop valves	-	IS- 8931
6.	Cement paint	-	IS- 5410
7.	Cast copper alloy fancy pillar taps	-	IS-8934

Signature of contractor

for Accepting Officer

Dated: _____

RECOVERY CHARGES FOR TESTING OF MATERIALS

Appendix 'C'

Legend :- A-Site Lab, B- & C-National Test House/ SEMT/ Govt approved lab/Engg College

Srl No	Materials	Test	Method of Testing	Frequencies of Test	Level of Test	Rate in Rs	Remarks
1	2	3	4	5	6	7	8
1	Bricks			As per IS 5454 as given under:	Permissible % of defective Bricks		Check for visual and dimensional characteristic shall also be allowed out as per IS-5454
				Lot Size	Sample Size	0	
				1001 to 10000	5	0	
				10001 to 35000	10	1	
				35001 to 50000	15		
	(i) Compressive Strength		IS-3495 (Part-II)			A	330
	(ii) Water Absorption		IS-3495 (Part-II)			A	330
	(iii) Efflorescence		-do- (Part-I)			A	330
2	Coarse Aggregate	(i) Sieve Analysis	IS-2386 (Part-I)	One Test for every 15 cum of Aggregate or part thereof.		A	660
		(ii) Flakiness Indices	-do-	One Test for every 15 cum of Aggregate or part thereof.		A	250
		(iii) Estimation of deleterious materials	-do-	One Test for every 100 cum of Aggregate or part thereof.		A	600
		(iv) Organic Impurities	-do-	One Test per source of supply.		C	275
		(v) Moisture Content	IS-2386 (Part-II)	Regularly as required.		A	330
		(vi) Specific Gravity	-do- (Part-III)	One Test per source of supply.		B	330

Contd..

RECOVERY CHARGES FOR TESTING OF MATERIALSAppendix 'C'

1	2	3	4	5	6	7	8
3	Fine Aggregate	(i) Sieve Analysis	(IS-2386) (Part-I)	(I) One Test for every 15m ³ of EA or part when brought to site.	A	660	
		(ii) Test for clay silt impurities	-do-	(I) One Test for every 15m ³ of EA or part when brought to site.	A	500	
		(iii) Specific Gravity	-do-	One for each source of supply	B	330	
		(iv) Moisture Content	-do- (Part-III)	Regularly as required subject to 2 tests/day when being used.	A	330	
		(v) Test for Organic Impurities	-do- (Part-II)	One test for each source of supply.	C	275	
4	Cement	(i) Setting Time	IS-4031 (Latest Edition)	Once for each Consignment	B	500	
		(ii) Soundness	IS-4031 (Latest Edition)	Once for each Consignment	C	550	
		(iii) Compressive Strength	IS-4031 (Latest Edition)	Once for each Consignment	B	550	
		(iv) Fineness	IS-4031 (Latest Edition)	Once for each Consignment	C	275	
5	Structural Concrete	(i) Slump Test or Compacting Factor Test of Vee Bee Time	IS-1199	The minimum frequency of sampling of concrete of each grade shall be as under:			(i) Random sampling shall be carried out to cover all mixing units
				<u>Qty of Concrete in the work of Samples</u>	<u>No</u>	A	300
				(M3)			
				1-5			
				1			
				6-15		A	300
				2			(ii) Refer IS-456-2000, Clause 14 for frequency of sample
				16-30			
				3			
				31-50			
				4			
				51 and above 4+1 for each additional 50 cubic metre or part thereof.	A	300	

RECOVERY CHARGES FOR TESTING OF MATERIALSAppendix 'C'

1	2	3	4	5	6	7	8
		(ii) Compressive Strength	IS-516		A	900	
6	(a) PCC Block for walling (Hollow block)	(i) Compressive Strength	IS-2185 (Appx 'B')	8 Block out of total of 14	A	900	Sample: 18 Blocks from consignment of every 5000 blocks or part thereof.
		(ii) Water Absorption	-do-	3 –do-	B	330	
		(iii) Density	-do- (Appx 'A')	3 –do-	B	330	
	(b) PCC Solid Blocks for walling	(i) Compressive Strength	IS-2185 (Appx 'A')	12 Block out of total of 18	A	900	Sample: 18 Blocks from consignment of every 100000 blocks or part thereof.
		(ii) Water Absorption	-do-	3 –do	A	330	These blocks to be checked for dimension and weight.
		(iii) Density	-do-	3 –do-	B	330	
7	Cement flooring tiles/terrazzo tiles	(i) Water Absorption	IS-1237 1980 (Appx 'D')	6 tiles out of total of 18	B	330	
		(ii) Wet transverse strength	-do- (Appx 'E')	6 tiles out of total of 18	B	660	
		(iii) Resistance to wear	do (Appx 'F')	6 tiles out of total of 18	C	1000	Sample 18 tiles from each source of supply selected at random
8	Burnt clay roofing tiles (Hand made) as per IS-2690 (Part-II)	(i) Water Absorption	IS-3495 (Part-II)	6 tiles out of total of 18	B	216	Sample: 12 tiles from each source of supply selected at random.
	Length – 150 mm to 250 mm						
	Width – 100 mm to 200 mm						
	Thickness – 35 mm to 50 mm						
		(ii) Compressive Strength	-do-	6 tiles out of total of 18	A	180	Selected at random

RECOVERY CHARGES FOR TESTING OF MATERIALSAppendix 'C'

1	2	3	4	5	6	7	8
9	Mangalore pattern roofing tiles	(i) Water Absorption	IS-654 (Appx 'A')	16 tiles out of total 32	B	180	Sample: 32 tiles from each consignment of every 3000 tiles or part thereof. These tiles shall be checked for dimension & weight.
		(ii) Breaking load	IS-654 (Appx 'C')				
10	Timber	(i) Specific Gravity and weight	IS-1708- 1960	Minimum 3 samples from a lot of 4 cubic meters or 250 pieces of seasoned timber.	B	120	
		(ii) Moisture content	IS-1708- 1960		A	120	
11	Water for construction purpose	(i) Test for acidity	IS-456 & 3025	Once the stage of approval	B	500	Also refer Clause 4.8 of IS-456 & its subsequent sub clauses regarding suitability of water
		(ii) Test for alkalinity	IS-456 & 3025		B	500	
		(iii) Test for Solid contents.	IS-456 & 3025		C	500	
12	Welding of Steel work	Visual Inspection Test	IS-818-1970, Clause 7.1	100 % by visual inspection	A	360	Specialised tests their method and frequency to be decided on consideration of their importance by the Accepting Officer
13	Timber panelled and glazed door (wooden shutters) (Including factory made shutters).			Frequency of sampling from each lot shall be as under:			
				<u>Lot Size</u>	<u>Sample Size</u>		
				20 to 50	05		
				51 to 100	08		
				101 to 150	13		
				151 to 300	20		
				301 to 500	32		
				501 to 1000	50		
				1001 and above	80		

Contd..

RECOVERY CHARGES FOR TESTING OF MATERIALSAppendix 'C'

1	2	3	4	5	6	7	8
		(a) Dimensions, sizes, workmanship and finish	IS-1003-1977 (Part-I)		A	180	
		(b) Strength test		From each lot 5 % of the factory made shutters shall be tested for strength test.	Manufacturer		
		(i) Slamming	IS-1303-1990				
		(ii) Impact Indication	-do-				
		(iii) Shock resistance	-do-				
		(iv) Edge loading	-do-				
14	Ply Wood	(a) Moisture Contents	IS-1734 (Part-VI)	6 Test pieces from each of the board selected.	B	240	
		(b) Water resistance	IS-1734 (Part-I)	As per Table-I shall be subjected to tests.	C	240	
15	Work particles board (Medium density) IS-3087-1988	(a) Density	IS-2380-1977	Three test specimen each sample (size-150mmx75mm)	A	60	Sampling shall be as per IS-7838 1978 (Table-I)
		(b) Moisture content	-do-	-do-	With Moisture Meter A & B	60	
		(c) Water absorption	-do- (Part 16)	-do- (size-300mmx300mm)	A	60	
		(d) Swelling to surface absorption	-do- (Part 17)	~-do- (size-125mmx100mm)	A	60	
		(e) Swelling in water	-do-	-do- (size 200mmx100mm)	A	60	
		(f) Modulus of rupture	-do- (Part 4)	Three test specimen as per IS-2380-1977	B	90	
		(g) Screw withdrawal strength	-do- (Part 14)	~-do- as per IS-2380	C	120	

Signature of the Contractor

Dated: _____

for Accepting Officer

APPENDIX 'D'**PARTICULAR SPECIFICATION****LIST OF APPROVED BRANDS / MAKES / MANUFACTURERS FOR
CIVIL WORK**

S.No.	Description of Material	Agencies/Brands / Makes / Manufacturers
1.	Anti Termite Treatment (Executing Agency)	: M/s Pest Control Services, Dehradun : M/s Pest Control Services, Delhi : M/s Pest Control (India) Pvt Ltd. : M/s Pest Eradicators (India), New Delhi : M/s Pest Control Services of India, New Delhi
2.	Anti Termite Treatment (Chemical Manufacturer)	: M/s D-Nocil, Mumbai : M/s Amvac Ltd., Delhi
3.	Synthetic Enamel Paints & Primer	: Berger Paint : Asian Paint
4.	Acrylic Distemper First Quality & Emulsion Paint	: Berger Paint : Asian Paint
5.	Cement Base Paint	: Asian paint, : Durocem (Berger Paints)
6.	Texture Exterior Anti- Fungal Weather Proof Emulsion	: Asian Paint : Berger Paint
7.	Cement Primer Wood Primer Pink Red Oxide Steel Primer	: Berger Paint : Asian Paint
8.	Wooden Door Frame	: Shri Jayna Doors InPlot-Devtries : M/s Godrej And Boyce : Shri Jainwood InPlot-Devtries : M/s GM Woodwork
9.	Flush Door Shutters/Skin Moulded Door Shutters	: M/s Jainwood InPlot-Devtries : M/s Kutty Flush Doors (Brand -Kutty) : M/s Godrej & Boyce Manufacturing Co. Ltd., : M/s GM Woodwork
10.	Anodized Aluminium Hardware	: Classic : Nulite : Crown
11.	Aluminium Sections	: Hindalco : Jindal
12.	Laminates	: Century : Merino : Duro : Greenlam
13.	Adhesive for wood work	: Fevicol (Pidilite) : Amicol
14.	Plywood / Block board	: Merino : Green Ply : Duro
15.	Hydraulic Door closer	: Door King

		Godrej
16.	Swing Type Door hinges	: : Heryika : Yane
17.	Glazing/ Glass for windows	: : Modiguard : Atul : Saint Gobain
18.	Sealants	: : GE : Dowcorning : Pidilite
19.	Steel Manufacturers	: : M/s Steel Authority of India Ltd. (SAIL) : M/s Tata Iron & Steel Co. Ltd. (TISCO) : M/s Rastriya Ispat Nigam Ltd. (RINL) : M/s Jindal Steel & power Ltd. (JSPL)
20.	Cement Suppliers	: : M/s Cement Corp of India : M/s ACC Ltd. : M/s Ultratech Ltd. : M/s Jaypee Associates : M/s Birla Corporation Ltd. : M/s Shree Cement
21.	Chemical / Water Proofing Compound	: : M/S Cico Technology Ltd. : M/S Pidlite InPlot-Devtries Ltd. : M/S Fosroc : M/S Choksey Chemicals : Dr. Fixit
22.	White Cement & Wall Care Putty	: : Birla White : JK White
23.	Door Handles with Latch/Latch and Lock (all Mongery)	: : Dorset : Godrej
24.	Ceramic Tiles / Glazed Tiles	: : Kajaria : Somany
25.	Vitrified Tiles	: : Kajaria : Somany
26.	Water Bars (RCC Tanks)	: : Deepjyoti : Padmini : Fixopen
27.	Kerbstone, Tiles For Pavement/ Foot Path/ Path Way & Inter Locking Tiles/ Paver Blocks.	: : Nitco Tiles, : Somany : Surya Kiran
28.	GI & MS Pipes	: : Jindal- Hisar : Tata : Prakash Surya
29.	PVC Water Tanks (HDPE) Tripple Layer	: : Sintex : Supreme
30.	Stone Ware Glazed Pipes & Gully Traps (ISI Marked)	: : Perfect : Anand
31.	Mirror/ Glass	: : Modi Float : Saint Gobain

32.	Ready Mix Concrete (RMC)	: M/s Reciprocal-Infra Structures pvt Ltd. M/s G.S. Express Pvt Ltd M/s Ultra Tech Concrete M/s L&T Lafarge M/s RMC India M/s Ambalika Construction M/s Gordrej & Buyce MSG Crop Ltd. M/s Scow Ready Mix M/s Birla Shakti Concrete
33.	Admixture / Plasticizers	: Fosroc Chemicals (India) Ltd. Dr. Fixit BASF SIKA
34.	Stainless Steel Hardware/ Screws	: Dorset Godrej Crown
35.	Exterior Texture Paint	: Asian Ultratech Berger
36.	Water proofing Membrane	: M/s Texa India Ltd. M/s. IWL india Ltd. M/s. Pidilite InPlot-Devtries. M/s CICO M/s Acro
37.	Concrete Additives	: M/s. Pidilite InPlot-Devtries. M/s CICO M/s FOSROC
38.	Dash/ Anchor Fasteners	: Hilti Fischer
39.	GI/SS Wire Mesh	: Tiger M/s Metal and Wiremesh (Jayna) M/s Shine Wiremesh (Adarsh)
40.	False Ceiling	: Unifloor Armstrong
41.	Polycarbonate sheet	: GE Plastics Polygal Sunlite Danfass
42.	Expansion joint Filler HD100	: Supreme Kampan Polymers
43.	Honey Comb HDPE Grass pavers for Parking & Fire Tender Path	: M/s Ovilite InPlot-Devtries M/s Affinity Associates Tuffrak KGM Exports

44.	Natural Veneer	: : Green ply : Durian : Century Ply :
45.	Non Metallic Hardner Compound	: : Fosroc : STP : CICO :
46.	Floor Spring	: : Hardwyn : Omega : Everite : Dorma :

Appendix-D**LIST OF APPROVED MAKES / BRANDS / MANUFACTURERS
FOR INTERNAL PLUMBING**

S.No.	Description of Material	Brands / Makes / Manufacturers
1.	SANITARY WARE	HINDWARE / PARRYWARE
2.	KITCHEN SS SINK	NEEL KANTH / JAYNA/NIRALI
3.	C. P. FITTINGS/ACCESSORIES	JAGUAR/ MARC(ORIENTAL) WITH MAINTENANCE WARRANTY AND GUARANTEE
4.	MIRROR	MODI FLOAT / SAINT GOBAIN / ASAHI INDIA
5.	G.I. PIPES/ MS PIPES	JINDAL HISSAR / PRAKASH SURYA/ TATA
6.	MS PIPES FITTINGS	KM / ZOLOTO M / R-BRAND/ UNIK/ NVR/DRP/VEESON/JAINSON
7.	SOLAR HOT WATER SYSTEM	SOLAHART / SOLO EDWARD / TATA BP SOLAR/RACOLD
8.	VALVES :	
	(A) GM / FORGED BRASS VALVE	ZOLOTO / SANT / LEADER/DRP/VEESON/ LEHRY
	(B) SLUICE / NON RETURN VALVES / PRV	KIRLOSKAR / ZOLOTO / SANT/DRP/VEESON/ LEHRY
	(C) BUTTERFLY VALVE	KS B / ZOLOTO / SANT/DRP/VEESON/ LEHRY
	(D) CHECK VALVE	ZOLOTO / SANT / KIRLOSKAR//DRP/VEESON/ LEHRY
	(E) AIR RELEASE VALVE	KIRLOSKAR / ZOLOTO / SANT //DRP/VEESON/ LEHRY
9.	SOLENOID VALVE/MOTORIZED VALVE/PRV	HONEYWELL / SIEMENS / DANFORS/LEHRY/WATTS
10.	CAST IRON PIPES & FITTINGS	HIF / SKF / NECO / SRIF
11.	SFRC MANHOLE COVERS & FRAMES	NECO / KAJECO/ KK MANHOLE
12.	CAST IRON SPUN PIPE CLASS LA	NECO / ELECTRO STEEL / KESHORAM
13.	Y STRAINER	EMERALD / ZOLOTO / SANT
14.	FLOOR DRAIN FIXTURE, RAIN WATER OUTLETS AND CHANNEL GRATINGS	CHILLY / CAMRY
15.	STAINLESS STEEL GRATING	CHILLY / CAMRY/ JAIN BROTHERS & SANITATION
16.	STONEWARE PIPES, GULLY TRAPS	PERFECT / ANAND
17.	LEVEL CONTROLLER AND INDICATOR	ACTIVE CONTROLS OR EQUIVALENT
18.	SFRC MANHOLE COVERS AND FRAMES	TUF-TECH (INDIA) PVT. LTD. / KK MANHOLES
19.	INSULATION FOR HOT WATER PIPES	K-FLEX / ARMAFLEX
20.	UPVC PIPES AND FITTINGS	SUPREME/ PRINCE ULTRAFIT/ FINOLEX/ASHIRVAD
21.	DI PIPES	ELECTROSTEEL/ JINDAL
22.	CPVC PIPES	PRINCE SMARTFIT/ ASTRAL/ ASHIRVAD FLOWGUARD/ VECTUS/ LUBRIZOL

A.	SANITARY WARE - (HINDWARE)	CAT NO.
1	VITREOUS CHINA EWC FLOOR MOUNTED WITH TRAP AND CISTERN, SLOW FALLING SEAT COVER	S- 20085 / 21053
2	WALL HUNG EWC WITH CISTERN AND SLOW FALLING SEAT COVER	20058/ 21028
3	EWC FLOOR MOUNTED (POPULAR) WITH CISTERN (SLEEK PLUS) AND SEAT COVER	20044(P-18)
4	WHB SIZE - 560X410 MM OVER COUNTER WITH ALL FITTINGS (IN ALL TOILET EXCEPT MASTER TOILET)	10017
5	WHB SIZE -620 X 520MM TABLE TOP WITH ALL FITTINGS (IN MASTER BEDROOM TOILET)	91058
6	URINAL FLAT BACK LARGE	60002
B.	CP FITTINGS - JAQUAR (FLORENTINE/CONTINENTAL) WITH MAINTENANCE WARANTY AND GUANTEE.	CAT NO.
1	CONCEALED STOP COCK	083 (CONTINENTAL)
2	PILLAR TAP/COCK	FLR 5015(FLORENTINE)
3	ANGLE VALVE/ANGULAR STOP COCK	FLR 5053 N (FLORENTINE)
4	OVER HEAD SHOWER 100 MM DIA ROUND SHAPE SINGLE FLOW WITH RUBIT CLEANING SYSTEM.	OHS -1989 (FLORENTINE)
5	WALL MIXER FOR PROVISION OF OVER HEAD SHOWER	5273 UPR(FLORENTINE)
6	SINGLE LEVER SINK MIXER WITH SWINGING SPOUT (WALL MOUNDED MODEL)	5163 (FLORENTINE)
7	SINK BASIN MIXER WITH SWIVEL SPOUT TABLE TOP MOUNTED	FLR 5309 NB(FLORENTINE)
8	CENTRAL HOLE BASIN MIXER W/O POP UP WASTE SYSTEM	FLR-5001B (FLORENTINE)
9	BOTTLE TRAP	(FLORENTINE) ALD-769 (L 250 /300 X190)
10	TOWEL ROD /RAIL	AQN 7711 (FLORENTINE)
11	TOILET PAPER HOLDER	ACN 1151 N (FLORENTINE)
12	SOAP DISH	1131N (FLORENTINE)
13	TOWEL RING	AEC-1121BN (FLORENTINE)
NOTE: REFER PARTICULAR SPECIFICATION FOR ITEM NOT SHOWN ON DRAWINGS		

Appendix -DLIST OF APPROVED MAKES / BRANDS / MANUFACTURERS FOR
INTERNAL ELECTRICAL

S No.	DESCRIPTION OF ITEMS	MAKES
1	HIGH TENSION ALUMINIUM CONDUCTOR XLPE INSULATED ARMOURED CABLES	CABLE CORPORATION OF INDIA / UNIVERSAL/ ASAIN CABLE
2	CONDUIT ERW (ISI MARKED)	AKG/POLYPACK
3	MICROPROCESSOR BASED CONTACTORS & OVERLOAD RELAYS/APFC/PROTECTIONS/RELAYS	L&T/SIEMENS/ SCHNEIDER/ABB/AREVA
4	CTS & PTS	AE/KAPPA/L&T
5	SF UNITS	L&T/SIEMENS/GE
6	CABLE TRAYS	SLOTCO/PILCO/CTM ENGG /RICO STEEL
7	PUSH BUTTON & INDICATING LIGHT	L&T /SIEMENS/HAVELLS/GE
8	LT PANELS & LT BOARDS, METER BOARDS	CONQUERENT/ ADVANCE CONTROL/ /ADLEC/CONTROLWELL SWITCHGEAR/AUTOMATIC CONTROLS DIAMOND/SPC/MAK ENGG (WITH VALID CPRI CERTIFICATES)
9	BATTERY	EXIDE/AMRON/OKAYA
10	BATTERY CHARGER	AMARAJA/STATCON/VOLCAN
11	PVC CONDUIT & ACCESSORIES ISI	AKG/D-PLASTO/OPTIMA/SUPREME
12	PVC INSULATED STRANDED COPPER CONDUCTOR CABLE ZERO HALOGEN FRLS	POLYCAP/INDOASIAN/FINOLEX/ANCHOR

13	MODULAR SWITCH, SOCKET, STEPPED FAN REGULATOR, COVER & GRID PLATE ELECTROPLATED BOX, TV, TELEPHONE & LAN SOCKET & OTHER ACCESSORIES	LEGRAND(ARTEOR SERIES)/ ANCHOR (WOOD)/MK BLENZ
14	EARTH LEAKAGE CIRCUIT BREAKER (ELCB)	ABB/LEGRAND/SCHNEIDER
15	MCBS,ELCB,RCCB/RCBO, MCB DBS & ACCESSORIES	LEGRAND/L&T/SCHNEIDER/INDOASIAN
16	COVER PLATES FOR JUNCTION BOXES & FAN HOOK BOX	EGG WHITE HYLEM SHEET 3MM THICK
17	CALL BELL	CHYME TYPE/ANCHOR
18	SCREW & WASHERS	BRASS
19	TV, TELEPHONE CABLE	FINOLEX / DELTON / ANCHOR
20	COAXIAL CABLE	DELTON/SKYTONE/NATIONAL/BONTON
21	LIGHT FIXTURES/LAMPS	BAJAJ/ WIPRO / PHILIPS
22	LIGHTNING ARRESTOR/PROTECTION	OBLUM/ELPRO/KAPPA/LANCO /JMV/ALFRED KIM (CONVENTIONAL TYPE)
23	EARTHING	DUVAL MESSIEN/ERIC/ALTEC
24	MS CONDUIT (ISI MARKED)	TATA/ JINDAL-HISSAR/SURYA
25	LIFTS	OTIS/SCHINDLER/KONE/JOHNSON/THYSE NKRUPP
26	AIR CIRCUIT BREAKER	SCHNEIDER/L&T/ABB/SIEMENS
27	TERMINALS/CONNECTORS	ELMEX/ WAGO
28	PVC INSULATED COPPER WIRE	FINOLEX/INDOASIAN/RR CABLE/HAVELLS
29	ELECTRONIC TARRIF ENERGY METER	SECURE/L&T/SOCOME/ENERCON
30	AUTOMATIC TRANSFER SWITCH	GE/ASCO/L&T/HPL
31	ACCL	HAVELLS/SCHINDLER/SAFE POWER

32	AMMETER,VOLT METER & OTHER	AE/HPL/SOCOME/L&T/ENERCON
33	BRASS COMPRESSION GLANDS	COMET / GRIPWELL / POWER ENGG
34	CABLE COPPER LUGS	DOWELLS /ACTION / COMET
35	CAPACITORS	L&T / SIEMENS /EPCOS
36	HT/LT TERMINATIONS	RAYCHEM /DENSON/ 3M BIRLA/M SEAL
37	GO SWITCHES	JAIPURIA/ISOTECH/BHEL/VERSATEC
38	DROP OUT SWITCHES/INSULATOR SETS/HT,LT INSULATORS	JAIPURIA/L&T/BHEL
39	TAPE INSULATION	3M/STEELGRIP/ANCHOR
40	HRC SWITCHES AND FUSES	L&T / SIEMENS / ABB/SCHNEIDER
41	LT 1100 VOLT GRADE ALUMINIUM / COPPER CONDUCTOR XLPE INSULATED ARMOURED / UNARMOURED CABLES ISI MARKED	HAVELLS/ UNIVERSAL/CABLE CORPORATION OF INDIA/FINOLEX/RR CABLE
42	AVIATION OBSTRUCTION LIGHT	BAJAJ/NOVA/PHILIPS
43	CIRCUIT BREAKER (MCCB/MPCB)	SCHNEIDER/ L&T/SIEMENS/ABB
44	SELECTOR SWITCHES	SIEMENS/,KAYCEE/L&T-SALZER
45	RMUS	SCHNEIDER/L&T/ABB/SIEMENS
46	CEILING/EXHAUST FAN	CROMPTON/ALMONARD/BAJAJ KHAITAN/POLAR/BAJAJ
47	AIR CONDITIONERS/SPLIT ACS	CARRIER/HITACHI/BLUESTAR/NATIONAL/L LOYD
48	HI WALL UNITS	TRANE/DAIKIN/HITACHI/CARRIER
49	DUCTING GI SHEET	TATA/JINDAL
50	FACTORY FABRICATED DUCT & FLANGES	ROLASTAR/DUCTOFAB/DYNAMIC ENGINEERS

51	AXIAL FLOW FAN/PROPELLER	HUMIDIN/AIRFLOW/KRUGER/COMFRIE/NICOTRA/KHAITAN
52	UPS	NUMERIC/APC/GE/SECOMAC/NEXUS
53	STREET/GARDEN LIGHT POLES	NATIONAL TUBING/BAJAJ/BBP/ADVANCE STEEL
54	RISING MAIN/BUSDUCT	SCHNEIDER/L&T/GE/EAE/EATON/C&S/NAXSO
55	UNITIZED SUBSTATION (USS)	SCHNEIDER/SIEMENS/ABB/L&T/GE
56	POWER TRANSFORMERS 22/.433,33/.433	AREVA/CROMPTON GREAVES / KIRLOSKAR/ VOLTAMP (AS PER USS MANUFACTURER/LOCAL ELECTRIC SUPPLY)
57	11/22/33KV VCB PANELS	ABB/SCHNEIDER/SIEMENS/L&T/AREVA/CROMPTON AS PER LOCAL ELECTRIC SUPPLY
58	DG SETS	ENGINE- CUMMINS/KIRLOSKAR/CATERPILLAR/ASHOK LEYLAND ALTERNATOR- STAMFORD/CROMPTON

Appendix-DLIST OF APPROVED MAKES / BRANDS / MANUFACTURERSEXTERNAL WATER SUPPLY AND EXTERNAL FIRE FIGHTING

S.No.	Description of Material	Brands / Makes / Manufacturers
1.	ELECTRIC MOTORS	ABB /L&T/ SIEMENS / CROMPTON/KIRLOSKAR
2.	ELECTRIC DRIVEN PUMPING SETS	KIRLOSKAR / CROMPTON/GROUNDFOS
3.	G.I. PIPES / MS PIPES	JINDAL HISSAR / TATA / PRAKASH SURYA
4.	STARTER	L&T,ABB,SIEMENS,
5.	CI PIPES	KESORAM/ELECTROSTEEL
6.	SOLENOID VALVE	HONEY WELL,SIEMENS,DANFORS
7.	Y STRAINER	ZOLOTO/SANT/LEADER//DRP/VEESON
8.	SLUICE VALVE/NRV/PRV	KIRLOSKAR/KALPANA/LEADER/ZOLOT O/SANT/WATTS/LEHRY
9.	BUTTER FLY VALVE	KIRLOSKAR/KALPANA/LEADER/ZOLOT O/SANT/WATTS/LEHRY
10.	AIR RELEASE VALVE	KIRLOSKAR/KALPANA/LEADER/ZOLOT O/SANT/WATTS/LEHRY
11.	GI FITTINGS	KM/ZOLOTO M/LEADER
12.	GATE VALVE	KIRLOSKAR/KALPANA/LEADER/ZOLOT O/SANT/WATTS/LEHRY
13.	HOSE DRUM	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
14.	FIRE HYDRANT VALVES	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
15.	RRL HOSE PIPE	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
16.	20 MM DID RUBBER HOSE REEL	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
17.	PRESSURE SWITCHES	INDFOSS/SWITZER
18.	PRESSURE GUAGE	RISHAB/BRC/HD
19.	FIREMEN AXE	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
20.	BRANCH PIPES AND NOZZLES	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
21.	FIRE EXTINGUISHER	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
22.	VIBRATION ELIMINATOR	KANWAL/DUNLOP/ARROW/RELEY

		CORP
23.	HYDRO-PNEUMATIC SYSTEM	GRAND FORSS,DP HOLLAND, EBARA, KSB
24.	SMOKE AND HEAT DETECTOR=	ECIL/GODREJ/APOLLO/PHILIPS/EDWARD
25.	RESPONSE INDICATOR	IVC/FIRE HUT/GODREJ
26.	ELECTRONIC HOOTER	IVC/FIRE HUT/GODREJ
27.	MANUAL CALL BOX	IVC/ECIL/FIREHUT/GODREJ
28.	MS PIPES	PRAKASH SURYA/ TATA/ JINDAL HISSAR
29.	SPRINKLERS	VIKING/ TYCO
30.	LEVEL INDICATORS	MINILAC/ PUMPTOOL
31.	POWER CABLES	ASIAN(RPG)/ UNIVERSAL/CCI
32.	SINGLE HEAD VALVE	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ

APPENDIX-D**LIST OF APPROVED MAKES FOR INTERNAL FIRE FIGHTING WORKS**

1	PIPE	TATA /JINDAL/PRAKASH
2	SINGLE HEADED HYDRANT VALVE ,3/4-WAYFB INLET , BRANCH PIPE & SHUTOFF NOZZLE	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
3	20 MM DIA RUBBER PIPE FOR HOSE REEL	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
4	STARTERS , SWITCHES	L&T / SIEMENS / HAVELLS
5	PRESSURE SWITCH/TRANSMITTER	INDFOSS / SWITZER
6	PUMP	KS B / KIRLOSKER / /M&P / GRUNDFOSS
7	PRESSURE GUAGE	H GURU / FIEBIG
8	MOTOR	ABB / SIEMENS / KIRLOSKER
9	PUMP	KIRLOSKER
10	PAINT	ASIAN / NEROLAC /ICI / GOODLAS
11	FASTNER	HILTI / BOSH
12	4MM THICK UNDERGROUND PIPE COAT	IWL / GOATEK
13	RRL HOSE	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
14	RUBBER GASKET	CIC / VARUNA
15	ENGINE	CUMMIN'S / CATTERPILLER / KOEL
16	HOSE DRUM	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
17	MECHANICAL SEAL	DURAMETALLIC / BURGMANN
18	STRAINER	EMRALD / KIRLOSKER
19	CONTROL VALVE	CENTRAL / HD / GRINELL / TYCO
20	PIPE SUPPORT	CHILLY / HILTI
21	FLOW SWITCH	SYSTEM SENSOR / POTTER
22	PIPE FITTING	UNIK / VS
23	SLUICE ,BUTTERFLY ,NON-RETURN VALVE	KIRLOSKER / ZOLLOTO/LEHRY
24	ANTI-VIBRATION MOUNTINGS	DUNLOP / RESISTOFLEX
25	LEVEL INDICATOR	MINILAC / PUMPTOOL
26	POWER CABLE	CCI / NATIONAL /HAVELL,S / SKYTINE / NICCO / BEC / AKG
27	CONDUIT	BEC / AKG
28	SWITCHES ,MCB , MCCB ,CONTACTOR, OVER LOAD RELAY	L&T / SIEMEN'S /GE POWER / ABB
29	CT ,PT	AE / KAPPA

30	CABLE TRAY	SLOTCO / PILCO / INDIANA / VENUS
31	FUSE LINK	L&T / SIEMEN'S /GE POWER
32	LAMP (LED TYPE) , PUSH BUTTON	L&T / SIEMEN'S /GE POWER / BCH
33	SELECTOR SWITCH	KEYCEE / SALZER
34	OVER LOAD RELAY WITH BUILT IN SINGLE PHASE PREVENTOR	TELEMECHANIQUE / ABB / L&T
35	FIRE EXTINGUISHER	NEWAGE SURENDRANAGAR/GUNNEBO/EXFLAME/GODREJ
36	SPRINKLERS	VIKING/TYCO

LIST OF APPROVED MAKES / BRANDS / MANUFACTURERS FORFIRE ALARM & FIRE DETECTION

S.NO.	DESCRIPTION OF MATERIAL	BRANDS / MAKES / MANUFACTURERS
1.	SMOKE DETECTORS	ECIL / APOLLO / PHILIPS / EDWARD
2.	HEAT DETECTOR	ECIL / APOLLO / PHILIPS / EDWARD
3.	RESPONSE INDICATOR	SAFEZONE/IVC / FIRE HUT
4.	ELECTRONIC HOOTER	IVC / PHILLIPS / FIRE HUT
5.	MANUAL CALL BOX	IVC / ECIL / FIRE HUT
6.	MAIN CONTROL & INDICATING PANEL	IVC / ECIL / FIRE HUT/APOLLO
7.	PIPES	JINDAL (HISSAR)
8.	M.S. CONDUIT	ISI MARKED AND OF MAKES AKG / BEC & DOUBLE SS/ (WALL THICKNESS 1.6 MM)

Appendix 'D'**LIST OF MAKES OF SEWAGE TREATMENT PLANT EQUIPMMENTS**

S.NO.	ITEM	MAKES
1	SUBMERSIBLE PUMPS	WILO/SHIMGE/KIRLOSKAR
2	HORIZONTAL CENTRIFUGAL PUMPS	WILO/SHIMGE / KIRLOSKAR
3	SCREW PUMPS	ROTOMAC /CHANDRA HELICAL / ROTO
4	AIR BLOWERS	BETA / EVEREST
5	FILTERS	FABRICATED
6	BAR SCREEN	WASTECH
7	PIPING	JINDAL, HISSAR / TATA
8	CABLES	GLOSTER / HAVELLS/KEI.
9	ELECTRICAL PANEL	APPLICATION
10	SWITCHGEAR	SCHNEIDER / SIEMENS / L&T
11	MOTORS	ABB / SIEMENS
12	BUTTERFLY VALVES & NRVS	SKS / CRI
13	FILTER PRESS	PHARMATECH/SACHIN
14	UV SYSTEM	ALFA
15	PH METER	ASTER
16	WATER METER	KRANTI
17	WELDING RODS	ADORE
18	TUBE SETTLER MEDIA	PHARMATECH/COOL DECK
19	MBBR MEDIA	KURARY INDIA
20	AIR DIFFUSERS	XYLEM / RHEAU/ SULZER
21	BALL VALVES	AIP TIMME
22	PRESSURE GAUGES	H-GURU
23	VARIABLE PORE MICRO FILTRATION	GLOBAL ENFILTEC/WASTECH
24	CHLORINE DOSING SYSTEM	E-DOSE / ASIA LMI
25	APPROVED STP VENDORS	BRIZANSIA,UEM,ION EXCHANGE

APPENDIX 'E'**CERTIFICATE**

1. It is certified that the architectural design and structural design as provided and furnished to the client for the buildings included in the scope of work of this agreement as covered in the design development report have been prepared after considering all Codal provisions of Indian Standards (of BIS) and National Building Code as amended till date of design, on the matters and issues of structural safety.
2. We further certify that these designs are structurally safe including safety considerations from natural hazards of the accepted level and that all local factors including those based on soil conditions have been duly incorporated and accounted for in the design of buildings/ structures.
3. It is further certified that the structural drawings are based on structural design calculations and that the design/ specification included in drawings are in accordance with the current Govt. Policy, IS specifications, Technical Instructions of Engineer-in-Chief's Branch (issued from time to time), National Building Code and sound engineering practice including earthquake resistant design for a specified design life of buildings/structures as 50 years.

**Signature of Contractor /Authorised
Representative**

**CONSTRUCTION OF PROPOSED PLOTTED DEVELOPMENT WORK AT
KALINDIPURAM, PRAYAGRAJ (UP) FOR ARMY WELFARE HOUSING
ORGANISATION, NEW DELHI**
CA NO: AWHO/PRAYAGRAJ/PLOT - DEV/03/2024

LIST OF DRAWINGS

SI No	DESCRIPTION / DRAWING TITLE	DRAWING NO / SHEET NO	DATE	
			ORIGINAL	REVISED
1	2	3	4	5
	LAYOUT PLAN			
1	LAYOUT PLAN	AWHO/WD/AR/-01	R0 09-07-2024	
2	ELECTRICAL LAYOUT	AWHO/WD/EL/-01	R6 22-07-2024	
3	ELECTRICAL SLD	AWHO/WD/EL/-02	R6 22-07-2024	
4	WATER SUPPLY LAYOUT	AWHO/WD/WSL/-01	R5 2-07-2024	
5.	STORM WATER LAYOUT	AWHO/WD/SWL/-02	R5 2-07-2024	
6	SEWERAGE LAYOUT	AWHO/WD/SL/-03	R5 2-07-2024	
7	ROAD WORK	AWHO/WD/RD/-01	R0 9-07-2024	
8	LANDSCAPE PLAN	AWHO/WD/AR/-05	R0 20-07-2024	
	UGT			
9	UNDER GROUND WATER TANK DETAIL	AWHO/WD/UGT/-01	R0 9.12.2023	
10	FOUNDATION, COLUMN, BEAMS & SLABS PLAN & DETAILS	SDC-1091/2023-2024/01	R0 20-07-2024	
11	SCHEDULE OF REINFORCEMENT OF BEAMS & SLABS	SDC-1091/2023-2024/02	R0 20-07-2024	
	Guard Room			
12	GUARD ROOM AND MAIN ENTRANCE GATE DETAIL	AWHO/WD/AR/-02	R0 08.05.2024	

13	GUARD ROOM - ELECTRICAL PLAN	AWHO/WD/EL/-03	R0 08.05.2024	
14	FOUNDATION, BEAM & SLAB PLAN FOR GUARD ROOM	SDC-1037/G/2023-2024/01	R0 27-03-2024	
15	SCHEDULE OF REINFORCEMENT OF BEAMS FOR GUARD ROOM	SDC-1037/G/2023-2024/02	R0 27-03-2024	
16	SCHEDULE OF REINFORCEMENT OF SLABS FOR GUARD ROOM	SDC-1037/G/2023-2024/03	R0 27-03-2024	
17	GARBAGE COLLECTION CENTER 1 DETAIL	AWHO/WD/AR/-03	R0 09.12.2023	
18	GARBAGE COLLECTION CENTER 1 -ELECTRICAL PLAN	AWHO/WD/EL/-02	R0 04.07.2024	
19	FOUNDATION, BEAM & SLAB PLAN FOR GARBAGE COLLECTION CENTER	SDC-1037/2023-2024/01	R0 27-03-2024	
20	SCHEDULE OF REINFORCEMENT OF BEAMS FOR GARBAGE COLLECTION CENTER	SDC-1037/2023-2024/02	R0 27-03-2024	
21	SCHEDULE OF REINFORCEMENT OF SLABS FOR GARBAGE COLLECTION CENTER	SDC-1037/2023-2024/03	R0 27-03-2024	

Note : - Working drawings shall be provided by the Architect / Consultant through the Project Director, if any required during the execution of the work.