

NOTICE INVITING TENDER

MANAGEMENT DEVELOPMENT INSTITUTE MURSHIDABAD

Kulori, Uttar Ramna, Raghunathganj. Dist:- Murshidabad, Pin- 742235, West Bengal, India

Tender No.: MDIM/Const/2021/01 Date: 04/03/2021

Sealed tenders under two bid system (Part-I: Technical Bid and Part-II: Price Bid) are invited from eligible contractors with sound technical & financial capabilities, fulfilling the qualifying requirements stated hereunder, for the following work:

Name of Work	Renovation of existing sewerage system by revamping Rain water harvesting pits and construction of new underground sewerage disposal units and other related construction at MDI Murshidabad campus	
Estimated Project Cost	Rs. 81.89 Lacs (In addition, taxes as applicable as per the rule of the land)	
Tender Fee (Non Refundable)	Rs. 2000/- (Rupees Two thousand only) by Demand Draft/ Banker's Cheque / Pay Order	
Earnest Money Deposit (EMD)	Rs. 1,25,000/- (Rupees One Lac and Twenty Five Thousand only) by Demand Draft/ Banker's Cheque/ Pay Order/ NEFT/ RTGS	
Time of completion of work	6 (six) months	
Pre- Qualification Criteria (PQC)	Minimum Value of works contract of similar nature executed during any of the last 5 financial years	Completed One work order of minimum Rs. 65.51 Lacs OR Completed Two work orders of minimum Rs. 41.00 lacs OR Completed Three work orders of minimum Rs.25.00 lacs
	Average annual turnover of the firm during the last 3 financial years	Rs. 62.00 Lacs
Availability of tender documents	May be downloaded from the website of MDIM: www.mdim.ac.in	
Date, Time & Venue of Pre-Bid Meeting	Date: 17th March, 2021 Venue: Management Development Institute Murshidabad, Kulori, P.O.: Uttar Ramna, P.S.: Raghunathganj, Dist.: Murshidabad, West Bengal, Pin: 742235. Time: 3.00 Pm.	
Bid submission mode and place	By speed post/courier/hand delivery at Management Development Institute Murshidabad, Kulori, P.O.: Uttar Ramna, P.S.: Raghunathganj, Dist.: Murshidabad, West Bengal, Pin: 742235.	

Signature

Last date of receipt of bids	24/03/2021 till 3:00 p.m.
Opening of Technical Bids	24/03/2021 at 3:30 p.m. at Management Development Institute Murshidabad, Kulori, P.O.: Uttar Ramna, P.S.: Raghunathgunj, Dist.: Murshidabad, West Bengal, Pin: 742235
Opening of Price Bids	Will be intimated to the qualified bidders later
Exemption of EMD for MSME Bidders	The bidders will be exempted from submitting the EMD amount upon submitting and successful verification of their valid MSME Certificate. The tender is liable to get rejected if submitted without EMD amount and a valid MSME Certificate.
<u>Mandatory Requirement of Site Visit by Bidders before submitting Tender</u>	The bidders are required to mandatorily visit the site and obtain a declaration from the Engineer-in-Charge certifying their site visit, failing which their tender is liable to get rejected. The bidders are required to attach the Certificate obtained from Engineer-in-charge (MDIM) with their bids.
Contact Details of Engineer-in Charge	Mr. Anupam Karmakar Engineer-in-Charge Contact No. : +91- 8768408450
Consultant :	M/s. Creative Forum Private Limited



Scupto
(Registrar)
Registrar
MDI Murshidabad

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CHAPTER 1:

INSTRUCTIONS TO BIDDERS

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1. Sealed tenders are invited from eligible bidders in the prescribed format by Management Development Institute Murshidabad, Kulori, Uttar Ramana, Raghunathganj, District Murshidabad, West Bengal, PIN: 742235 for 'Renovation of existing sewerage system by revamping Rain water harvesting pits and construction of new underground sewerage disposal units and other related construction at MDI Murshidabad campus'.

2. Interested bidders may submit their bids as per the procedure laid down hereunder:
The biddings shall take place on two-part basis:

- Part I – TECHNICAL BID will consist of:
 - (i) Tender fee of Rs. 2000/- in the form of Demand Draft/ Banker's Cheque/ Pay Order from any Scheduled bank drawn in favour of Management Development Institute Murshidabad payable at Omarpur/ Jangipur/ Raghunathganj (Murshidabad district).
 - (ii) Earnest Money Deposit (EMD) Rs. 1,25,000/- (Rupees One Lac Twenty Five Thousand Only).
 - (iii) Filled in details of Pre-Qualification Criteria (PQC) in the prescribed format given in Annexure-I (Tender Form).
 - (iv) Documents in proof of Pre-Qualification Criteria, organization data and all related documents & credentials as per PQC of the NIT.
 - (v) Tender document duly signed on each & every page as a token of acceptance of the terms and conditions.
 - (vi) Power of attorney in the name of the person who have signed the tender (in case of Partnership firm / Company)
- Part II – PRICE BID shall be submitted as per the attached format Annexure-II (Tender Form).
- Envelope – Part I & Part II bids are to be put in two separate envelopes duly sealed and marked as Part I or Part II as the case may be, super scribing Tender No. & date on both the envelopes.
- Both Part – I and Part – II bid envelopes are to be put in one single bigger envelope duly sealed, super scribing Tender No. & date, and addressed to **The Registrar, Management Development Institute Murshidabad**, Kulori, P.O.: Uttar Ramna, P.S.: Raghunathganj, Dist.: Murshidabad, West Bengal, Pin: 742235.
- Tenders should reach to the above address by 3:00 p.m. on 24/03/2021 and Technical Bids will be opened on the same day at 3:30 p.m. Details about opening of Price Bids will be intimated to the qualified bidders later on.
- In case the requisite documents as mentioned above are not enclosed with Part I (Technical Bid), the Part-II (Price Bid) will not be opened and the bid shall be deemed to have been rejected.

3. The tender documents can be downloaded from the institute website www.mdim.ac.in. The Tender document is non-transferable.

4. Pre-Qualification Criteria:

The bidders should meet the minimum eligibility criteria as detailed in this clause to qualify for price bids. Bidders should furnish the relevant technical details in the format prescribed in Annexure-I (Tender Form)

of the tender along with the supporting documents already mentioned. The pre-qualification criteria have been enumerated below:

- (i) Average annual financial turnover of not less than **Rs. 42 Lacs** during the preceding three financial years (the tax audited reports in certificate format by Government registered CA firm are to be submitted along with the Part-I, i.e., Technical Bid of the tender).
- (ii) Experience of having successfully completed similar work during last five financial years (the proof of which is to be submitted along with the Part-I, i.e., Technical Bid of the tender), should be either of the following: -

One similar nature of completed work of value not less than **Rs.65.51 Lacs**

OR

Two similar natures of completed works of value not less than **Rs. 41.00 Lacs**

OR

Three similar natures of completed works of value not less than **Rs. 25.00 Lacs**

Similar nature of work means Civil and Sanitary & Plumbing (S & P) works in Govt. organizations/ PSUs/ in any Industrial or Institutional establishment.

- (iii) The bidders should have PAN No., GST Registration No., and all other statutory certificates and licenses required for execution of the work.

The bidders should submit proof of their pre-qualifications experience (Work orders along with completion certificate executed in the last 5 financial years), Permanent Account Number (PAN), etc. along with the Part I of the tender (Technical Bid).

No joint venture or consortium of firms will be allowed and the bidders should meet the above PQC solely.

5. Earnest Money Deposit (EMD):

The tenders must be accompanied with an Earnest Money of Rs. 1,25,000/- (Rupees One Lakh Twenty Five Thousand Only) in the form of Demand Draft/ Banker's Cheque/Pay Order from any Scheduled bank drawn in favour of Management Development Institute-Murshidabad payable at Omarpur/ Jangipur/ Raghunathgunj (Murshidabad). EMD may also be paid through NEFT/ RTGS, for which the bank details of MDIM have been provided below:

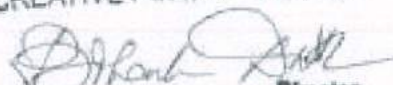
Name: Management Development Institute-Murshidabad
A/c No.: 33987582978
Bank: State Bank of India
Branch: Omarpur
IFS Code: SBIN0012355

The EMD will be forfeited in case the successful bidder withdraws his offer or fails to undertake the work after award, due to any reason whatsoever. No interest shall be paid by MDIM on the earnest money deposited by the bidder. The earnest money will be refunded to the unsuccessful bidders after finalization of the contract. EMD to the successful bidder will be refunded after the deposition of the Security Deposit

or adjusted against the Security Deposit. EMD deposited for any previous tender will not be considered for this tender. In no case shall EMD be put in Price Bid (Part-II). Tenders not accompanied with EMD (in the Technical Bid) in the prescribed form are liable to be rejected.

6. Electrical Supervisor Licence has to be submitted along with other documents.
7. The bidders will be exempted from submitting the EMD amount upon submitting and successful verification of their valid MSME Certificate. The tender is liable to get rejected if submitted without EMD amount and an invalid MSME Certificate.
8. The work as detailed in the tender shall be completed in all respect within a period of **6 (Six) months** by the successful bidder (hereinafter referred to as Contractor) from the date of issuance of written order to commence work in accordance with the tender issued by Management Development Institute (hereinafter referred to as Employer).
9. The Contractor must quote the Percentage rate (Below/At Par/Above) at which he is willing to take the work and this percentage quoted shall be applicable for the complete work. The Percentage rate quoted shall also be applicable for all the individual items listed in the Bill of Quantities in the Annexure II of the Contract document. Rates must be quoted for complete work at site inclusive of all costs, Income Tax and related incidental charges. All statutory payments, taxes & duties etc. as applicable at West Bengal on works and materials required for use in the execution of this project shall be entirely borne and payable by the Contractor and the Employer will not entertain any claim whatsoever in this respect. No price escalation is allowable during the period of contract.
10. The total amount of Security Deposit shall be 5% of the contract value of the work. No interest will be paid on the said Security Deposit. The SD will be refunded on satisfactory completion of the maintenance period (DLP) of 12 months commencing from the date of issuance of completion certificate by the Employer.
11. Tender documents duly signed on each & every page as a token of acceptance of the terms and conditions shall be submitted with the bid.
12. The tenderers are instructed to quote rate on percentage basis (At per/percentage above/percentage below) on work value (in additional taxes would be paid as applicable). All corrections in the tender should be duly attested by initials of the tenderer. Corrections, if not attested, may entail rejection of the offer. Overwriting of The rates quoted in the items rate column shall be the basis and not the amount, in case of discrepancy, in finalizing the tender.
13. It shall be clearly understood that the rate quoted in the tender are to be for complete work at site as per instructions to bidders, conditions of contract, specifications and drawings, addenda referred to therein and also for all such works as are necessary for completion of the contract.
14. The bidders shall use only the forms provided with this tender for submission of bids. The tender forms must be filled in English.
15. The successful bidder shall execute an agreement with MDIM within 15 days of issuance of LOI/ Work Order, whichever is earlier.
16. Licenses and permits for all materials under Government control shall have to be obtained by the

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Director



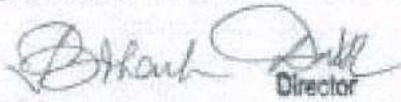
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Contractor. However, the Employer shall provide necessary help and assistance in the form of signing and forwarding necessary documents to the concerned documents subject to the condition that the requisition is made for using the same in the Employer's project.

17. The Contractor shall be governed by the Indian Contracts Act, Indian Sale of Goods Act and all other relevant laws.
18. All payments due to the Contractor under the contract will be made in Indian Rupees currency.
19. MDIM does not bind itself to accept the lowest or any tender or to assign any person thereof and also reserves the right to accept whole or part of the tender.
20. Canvassing in any form in connection with the tender is strictly prohibited and the tenders submitted by the bidders who resort to canvassing in any form shall be liable to rejection.
21. The tender should remain valid for a period of 90 days from the date of tender opening.
22. The bidders are required to mandatorily visit the site and obtain a declaration from the Engineer-in-Charge (MDIM) certifying their site visit, failing which their tender is liable to get rejected. The bidders are required to attach the Certificate obtained from Engineer-in-charge (MDIM) with their bids.
23. All material to be utilized for construction (materials, machineries, etc.) has to be approved by Engineer-in-charge, MDI Murshidabad, before execution.
24. All the communications regarding the subject work shall be addressed (in written) to the Engineer-in-charge (MDI M).

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CHAPTER 2:

**GENERAL CONDITIONS OF
CONTRACT**

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1. General:

Unless otherwise stipulated, all the works are to be done by the successful bidder (hereinafter referred to as Contractor) as per general conditions and general specifications as mentioned in the NIT issued by Management Development Institute Murshidabad (hereinafter referred to as MDIM).

2. Definition of Employer and commencement of work:

Employer means Management Development Institute Murshidabad, Kulori, Uttar Ramana, Raghunathganj, District Murshidabad, West Bengal, PIN: 742235 and includes their authorized representatives to deal with any matter on their behalf. The work shall have to be taken up within fifteen days of the receipt of the work order or otherwise mentioned therein. Failure to do so will constitute a violation of the contract stipulations as regards to proportionate progress and timely completion of work and the Contractor will thereby make himself liable to pay compensation or other penal action as per stipulations of the tender.

3. Architect/PMC status and decision

3.1. Status:

The Architect/PMC appointed by MDIM, together with the Engineer-in-charge (MDI M), shall have general supervision and direction of the work. Engineer-in-charge (MDI M) shall have the authority to stop the work whenever such stoppage may be necessary to ensure proper execution of the work. The Architect/PMC together with the Engineer-in-charge (MDI M) shall be the interpreter of the conditions of the contract and judge of its performance.

3.2. Decisions:

The Architect/PMC along with certification of Engineer-in-charge (MDI M) shall, within a reasonable time (one month from bill submission date), make decisions on all claims of the Contractor and on all other matters relating to the execution and progress of the work.

The decision, opinion, direction of the Engineer-in-charge (MDI M) together with the Architect/PMC with respect to all or any of the following matters shall be final without appeal:

- (i) Variation or modification of the design
- (ii) The quality or quantity of works or the addition/ alteration/ omissions or substitution of any work
- (iii) Any discrepancy in the drawings or between the drawings and/ or specifications
- (iv) The removal and/ or re-execution of any works by the Contractor
- (v) The dismissal from the work of any person employed therein
- (vi) The opening up for inspection of any work covered up
- (vii) The amending and making good of any defect under defect liability period
- (viii) Approval of materials and workmanship
- (ix) Ask the Contractor to provide everything necessary for proper execution of the work

The Contractor shall on the report of the Engineer-in-charge (MDI M) immediately dismiss from work any person employed therein by him, who may, in the opinion of the Engineer-in-charge (MDI M) or Architect/PMC, be incompetent or misconducts himself and such person shall not be re-deployed by the Contractor at MDIM site without the permission of the Employer. Consequence of such termination will be borne by the Contractor.

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4. Terms and Conditions in extended period:

When an extension of time for completion of work is granted by the Employer for cogent reasons for which the Contractor has no control, it will be taken for granted by the working Contractor that the validity of the contract is extended automatically upto the extended period with all terms and conditions, rates etc. remaining unaltered, i.e., the tender is revalidated upto the extended period.

5. Co-operation with other agencies and damages and safety of road users:

All works are to be carried out in close co-operation with Engineer-in-charge (MDIM) and other contract or contracts that may be working in the area of work. The work should also be carried out with due regard to the convenience of the road users and occupants of the adjacent locality, if any. All arrangements and programme of work must be adjusted accordingly. All precautions must be taken to guard against chances of injury or accidents to workers, road users, occupants of the adjacent locality etc. The Contractor must see that all damages to any property which, in the opinion of the Employer/ Architect/ PMC, are due to the negligence of the Contractor are promptly rectified by the Contractor at his own cost & expenses and according to the direction and satisfaction of the Employer/ Architect/ PMC.

6. Transportation arrangement:

The Contractor shall arrange for all means of transport including railway wagons required for carriage and supply of materials and also the materials required for the construction work. MDIM may, however, at their own discretion grant necessary certificates, if required, for booking of railway wagons etc. But, in case of failure of MDIM to help the Contractor in this respect, the Contractor will have to arrange at his own initiative so that progress of work does not hamper and no claim whatever on this ground will be entertained under any circumstance. If railway facilities are not available, the Contractor will have to depend on transport of materials by road as necessary to complete the work without claiming any extra payment from MDIM in this regard. The Contractor must consider this aspect while quoting the rates.

7. Contractor's Site Office:

The Contractor shall have an office adjacent to the work as may be approved by the Employer where all directions and notices of any kind whatsoever, which the Employer/ Architect/ PMC or his representative may desire to give to the Contractor in connection with the contract, may be delivered. Any such intimation delivered at the Contractor's site office shall be deemed to have been sufficient enough to be served upon the Contractor.

8. Schedule of Rates:

The percentage rate quoted by the Contractor shall remain firm till the issue of Final Certificate and shall not be subject to escalations. Schedule of Rates shall be deemed to include and cover all cost of all materials, hire charges to tools, tackles and plants, labour, Corporation/Municipal Fees for water supply, royalty or road materials (if any), electricity charges, and other charges of Municipalities or statutory local bodies, ferry charges, toll charges, loading and unloading charges, handling chargers, overhead charges etc.

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The schedule of rates shall be deemed to include and cover the risk or all possibilities of delay and interference with the contractor's conduct of work which occur from any causes including orders of the employer in the exercise of his power and on account of extension of time granted due to various reasons and for all other possible or probable causes of delay.

For work under percentage rate basis, no alteration will be allowed in the schedule of rates by reason of works or any part of them being modified altered, extended, diminished or committed. The schedule of rates is fully inclusive of rates which have been fixed by the contractor and agreed to by the employer and cannot be altered.

9. Security Deposit:

The total amount of Security Deposit (SD) shall be 5% of the contract value of the work and this shall be deducted from the R.A. bills @ 5% of the gross bill amount. The EMD shall be adjusted in the first running bill and subsequently 5% Retention Money Deposit (RMD) shall be deducted from the bills. The EMD and RMD shall be the total SD for the contract.

All compensation or other sums of money payable by the Contractor in terms of this contract may be deducted from or paid by the sale of sufficient part of the SD or from other sums of money which may become due to the Contractor by the Employer on any account whatsoever. In the event the SD being reduced by reason of any such deduction or sale as aforesaid, the Contractor shall within 10 (ten) days thereafter make good in cash or endorse in favour of the Employer as aforesaid any sum or sums which may have been deducted from, or raised by sale of his SD or any part thereof.

The SD will be refunded on satisfactory completion of the maintenance period (DLP) of 12 months commencing from the date of issuance of completion certificate by the Employer.

No interest is payable on the SD. The SD will be liable for forfeiture wholly or in part at the sole discretion of the Employer if the Contractor fails to carry out the work or perform or observe any of the conditions of contract.

10. Performance Guarantee:

The contractor shall submit an irrevocable Performance Guarantee of 5% of the contract value in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract agreement within 30 days from the date of issue of LOI. This guarantee shall be in the form of Demand Draft of any schedule bank/ Pay Order of any schedule bank/Fixed deposit receipt/ Bank Guarantee of any scheduled bank. In case a fixed deposit receipt of any bank is furnished by the contractor as part of the Performance Guarantee and bank is unable to make payment against the said fixed deposit receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to the Employer to make good the deficit.

The PG shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case the time for completion of work gets enlarged, the contractor shall get the validity of PG extended to cover such enlarged time for completion of work. After recording the completion certificate for the work by the competent authority, the PG shall be returned to the contractor without any interest.

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11. Measurements and Billing procedure:

Following procedures shall be adopted for billing works executed by the Contractor:

All measurements shall be recorded jointly on standard measurement books by Engineer-in-charge (MDI M), PMC and Contractor's representative duly signed by all concerned people.

All RA bills shall be submitted on monthly basis in triplicate along with the checked measurement books. The Engineer-in-charge (MDI M) & PMC will check, verify and the same certify for correctness and acceptance to effect payment to the Contractor. PMC shall forward their recommendation to Engineer-in-charge (MDI M) within 7 days of receipt of bills from the contractor. The employer will arrange payment of the checked and certified bills forwarded by the PMC within 10 working days (for RA bills) from the date of receipt of certified bill from PMC & Engineer-in-charge (MDI M).

Measurement shall be recorded as per the methods of measurement as in latest edition of National Building code and every item of measurement and payment thereto have been clearly explained in concerned item/ clause for mode of measurement.

All such intermediate payments to the Contractor shall be regarded as payment by way of advance against the final payment only and not as payments for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskillful work to be removed and taken away and reconstructed and rejected. The intermediate payments should not be considered as an admission of due performance of the contract or any part thereof in any respect.

While making payment to the contractor, TDS(IT) & Labour Cess will be deducted as per prevalent rules. Further to the above water & electricity charges will be deducted as per usage.

12. Final bill:

Total overall payments in RA Bills will be limited to 95% of the value of work done and balance 5% shall form part of the final bill.

13. Claim for interest:

No claim for interest will be entertained by the Employer w.r.t. any money or balance which may be in its hands owing to a dispute between the Employer and Contractor or w.r.t. any delay on the part of the Employer in making payments.

14. Guarantees:

The Contractor shall guarantee that the materials and workmanship are the best of their respective kind for the service intended and that all items of work will be free from all inherent defects in workmanship and materials. He shall also guarantee that the works will not fail in any respect due to quality of materials, workmanship, methods of construction and workmen employed. The Contractor shall consult the Engineer-in-charge (MDI M)/ Architect/ PMC whenever in his judgment variation in the methods of construction or in the quality of material would be beneficial and necessary to fulfill the guarantee called for. Such variation will be made by the Contractor only on approval of the Engineer-in-charge (MDI M)/ Architect/ PMC. If during the period of guarantee any work or materials fails in any respect to meet the above guarantee, the Contractor shall replace such work or materials in the condition which will meet the above guarantee, immediately. The period of guarantee for the works shall be 6 (Six) months from the date of issuance of completion certificate. The contract shall remain valid till the expiry of the guarantee period.

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15. Cost of execution of work of repair etc.:

All work of repair shall be carried out by the Contractor at his own expenses if the necessity thereof shall, in the opinion of the Engineer-in-charge (MDI M)/ Architect/ PMC, be due to the use of materials or workmanship not in accordance with the provision of this contract, whether expressed or implied.

If the Contractor fails to do any such work required by the Engineer-in-charge (MDI M)/ Architect/ PMC, such work will be carried out by the Employer at the Contractor's risk and cost. The Employer (MDI M) shall be entitled to recover from the Contractor the cost thereof or may deduct the same from any money due or that may become due to the Contractor.

16. Certificate of completion of works:

On satisfactory completion of the work and handing over the site to the Employer, the Contractor will be issued with a certificate of completion of work. Before handing over the site, the contractor has to remove from the area of the premises (to be distinctly marked by the Employer/ Architect/ PMC in the site plan on which the work shall be executed) all scaffolding, surplus materials & rubbish and clean the dirt from all wood works, doors, windows or which he may have in possession for the purpose of the execution thereof. The Contractor has to demolish labour hutments/ temporary constructions, if any, and clean the area to the satisfaction of the Engineer-in-charge (MDI M)/ Architect/ PMC before handing over the site.

No completion certificate will be issued nor shall the work be considered complete until the Contractor completed the above work. If the Contractor fails to comply with the said requirements, the Employer may, at the expenses of the Contractor, get the job done and Contractor shall forthwith pay the amount of all the expenses so incurred and shall have no claim in respect of any such scaffolding or surplus materials aforesaid, except for any sum actually realized by the sale thereof.

17. Defects Liability Period and Refund of Security Deposit:

The Contractor shall provide warranty of 12 (Twelve) months for the works executed under the scope of the contract. The Contractor shall be responsible to make good and remedy at his own expense any defects in the works executed under the contract which may develop or may be noticed before the expiry of 12 months from the certified date of completion, i.e., Defects Liability Period, and intimation of which has been sent to the Contractor within 7 days of the observance of the defects.

The Security Deposit shall be refunded to the Contractor on the expiry of twelve months warranty period after the issuance of certificate of completion of work.

However, the Security Deposit in the aforesaid manner may be released after the completion of the work on deposition of equal amount of Bank Guarantee in favour of MDIM in the prescribed format.

18. Direction regarding drawings and design:

- a) After signing the contract, the Contractor will be given free of charge 3 prints of the contract drawings. The Contractor shall make at his own expense any additional copies he requires. One copy of the drawing furnished to the Contractor as aforesaid shall be kept by the Contractor at the site and the same shall, at all reasonable times, be available for inspection and use by the Engineer-in-charge (MDI M)/ Architect/ PMC.
- b) Such further drawings and instructions including revisions as the Engineer-in-charge (MDI M)/ Architect/ PMC may furnish to the Contractor shall form part of this contract.
- c) Figured dimension shall be followed in preference to scaled and detailed drawings or general layout drawings. The Contractor shall verify all dimensions in the site before any work is commenced and

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obtain instruction of the Engineer-in-charge (MDI M)/ Architect/ PMC in case of any discrepancy.

- d) The Engineer-in-charge (MDI M)/ Architect/ PMC shall have power and authority to supply to the Contractor from time to time during the progress of work such further drawings and instructions as may be necessary for the purpose of proper and adequate execution and maintenance of work. The Contractor shall carry out and be bound by the same.
- e) As built drawings or completion drawings showing all corrections, adjustments etc. shall be furnished by the contractor in 6 copies and one transparent for record purpose of the employer.

19. Insurance:

The Contractor, before commencing the execution of work, without limiting his obligation and responsibilities, shall insure the works at his own cost and keep them insured till the completion of the contract against all acts of God inclusive of fire, theft, riots, floods etc. with a nationalized insurance agency in the joint names of the Employer and the Contractor (name of the former being placed first in the policy). Such policy shall cover the property of the Employer for assessing the claim and in connection with his Contractor or of any sub-Contractor or employee. The Contractor shall deposit the policy and receipt for the premium within 21 days from the date of commencement of the execution of the work or unless otherwise instructed by the Employer. In case the Contractor fails to obtain the insurance, the Employer may obtain the same, the cost of which shall be deducted from the bills of the Contractor.

In case of claim under the policy, the Contractor, as soon as the claim is settled, shall proceed with due diligence for the completion of the work. The Contractor, in case of rebuilding or reinstatement after accident, shall be entitled to such extension of time for completion as the Employer deems fit.

20. Authorized Representative of Contractor:

The Contractor shall not assign the work or sublet any portion of the work. The Contractor may, however, appoint an authorized representative in respect of one or more of the following purpose only.

- a) General day to day management of work.
- b) To attend measurements when taken by MDIM Officers and sign the records of such measurements in token of acceptance by the Contractor.

The selection of the authorized representative(s) shall be subject to the prior approval of the Employer and the Contractor shall in writing seek such approval of the Employer giving therein the name of work, Tender No., the Name, Address and the specimen signature of the representative he wants to appoint and the specific purposes as specified here-in- above, which the representative will be authorized for. Even after first approval, the Employer may issue at any subsequent date, revised directions about such authorized representative and the Contractor shall be bound to abide by such directions. The Employer shall not be bound to assign any reason for his revised directions. Any notice correspondence etc. issued to the authorized representative or left at his address, will be deemed to have been issued to the Contractor.

21. Power of Attorney:

The Provision of the power of attorney, if any, must be subject to the approval of the MDIM. Otherwise MDIM shall not be bound to take cognizance of such power of attorney.

22. Extension of time:

For cogent reasons over which the Contractor will have no control and which will retard the progress, extension of time for the period lost will be granted on receipt of application from the Contractor before the expiry date of contract. No claim whatsoever for idle labour, additional establishment, enhanced cost of materials and labour and hire charges of tools and plants etc. would be entertained under any circumstances.

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The Contractor should consider the above factor while quoting his rate.

23. Force Majeure

23.1 Conditions for Force Majeure

In the event of either party being rendered unable by force majeure to perform any obligations required to be performed by them under the Contract the relative obligations of the party effected by such force majeure shall upon modification to the other party be suspended for the period during which force majeure even lasts. The cost and loss sustained by the either party shall be borne by the respective parties.

The term "Force Majeure" as employed herein shall mean acts of God, earthquake, war (declared or undeclared), revolts, riots, fires, floods, rebellions, explosions, hurricane, sabotage, civil commotions and acts and relations of respective Government of the two parties, mainly the Employer the Contractor.

Upon the occurrence of such cause(s) and upon its termination, the party alleging that it has been rendered unable as aforesaid thereby, shall notify the other party in writing immediately but not latest than 72 hours of alleged beginning and ending thereof, giving full particular and satisfactory evidence in support of its claim.

Time for performance of the relative obligation suspended by the force majeure shall then stand extended by their period for which such cause last.

23.2 Outbreak of war

If during the currency of the Contract there shall be an outbreak of war whether declared or not, in that part of world which whether financially or otherwise materially effect the execution of the work the Contract shall unless and until to Contract is terminated under the provisions in these clause continue to use his best endeavour to complete the execution of the work, provided always that the employer shall be entitled at any time after such outbreak of war to terminate the contract by given notice in writing to the contract and upon such notice being the contract shall, save as to the rights of the parties under this clause and to the operation of the clauses entitled settlement of dispute and arbitration hereof, Disputed and Arbitration hereof, be terminated but without prejudice to the right of either party in respect of any antecedent breach thereof.

24. Liquidated Damages

If the contractor fails to complete the works and clear the site on or before the contract or extended date(s) period(s) of completion, he shall, without prejudice to any other right or remedy of the employer on account of such breach, pay as compensation an amount to 0.5% of tender amount for delay of every week provided always that the entire amount of compensation to be paid under the provisions of the clause shall not exceed 5% of the tendered cost of the work as in tender.

25. Contractor's sub-ordinate staff and their conduct

The contractor, on or after award of the work shall name and depute a qualified engineer(Civil) having sufficient experience in carrying out work of similar nature, to whom the equipment, materials, if any, shall be issued and instructions for works given. The contract shall also provide to the satisfaction of Employer/PMC sufficient and qualified staff to superintend the execution of the work. Whenever in the opinion of the Engineer-in-charge (MDI M)/PMC additional properly qualified supervisory staff is considered necessary, they shall be employed by the contractor without additional charge on accounts thereof.

If and whenever any of the contractor's sub-ordinate staff shall in the opinion of Engineer-in-charge (MDI M)/PMC be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance or their duties of that in the opinion of the Engineer-in-charge (MDI M) or PMC, it is undesirable for administrative or any other reason for such person or persons to be employed in the works, the Contractor,

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is so directed by the employer, shall at once remove such person or persons from employment thereon. Any persons or persons so removed from the works shall not again be employed in connection with the works without the written permission of the Employer. Any person as removed from the work shall be immediately replaced at the expense of the Contractor by a qualified and competent substitute.

26. Contractor's Godown:

The Contractor must provide suitable godowns for cement and other materials at the site of work. The cement godown is to be sufficient in capacity and it must be water tight with either an elevated floor with proper ventilation arrangement underneath the floor or if solid raised flooring is made, cement is to be stored on bamboo or timber dunnage to the satisfaction of the Engineer-in-charge (MDI M)/ Architect/ PMC. No separate payment will be made for these godowns or for the store yard. Any cement, which is found at the time of use to have been damaged, shall be rejected and must immediately be removed from the site by the Contractor as per direction of the Engineer-in-charge (MDI M)/ Architect/ PMC.

27. Use of MDIM's Land:

Before using any space in MDIM's land for any purpose whatsoever, approval of the Employer will be required. MDIM's land, if available and if applied for, may be spared for the purpose on usual charges as fixed by the Competent Authority. The Contractor shall make his own arrangements for storage of tools, tackles, plant, equipments; materials etc. of adequate capacity and shall clear and remove on completion of work any shed, huts etc. which he might have been erected on MDIM's land. If after such use, the Contractor fails to clear the land, MDIM will arrange to remove those installation and adequate recovery will be made from the dues of the Contractor.

28. Clearing of Materials:

Before starting any work, work site, where necessary, must be properly dressed after cutting clearing all varieties of jungles, shrubs, bamboo clusters or any undesirable vegetation from the alignment or site of works. On completion of work, all temporary structures or obstructions including pipes in underground work, if any, must also be removed. All scars of construction shall be obliterated and the whole site shall be left in a clear and neat manner to the satisfaction of the Employer/ Architect/ PMC. Total length (in case of road project) shall be demarcated by proper chain aging along with fixing 200m post as per direction of Employer/ Architect/ PMC on both side of the alignment and Bench Marking at desired locations as per direction of Employer/ Architect/ PMC. No separate payment shall be made for all these works, the cost thereof being deemed to have been included in the rates of various items of works quoted by the Contractor in the price bid.

29. Sundry Materials:

The Contractor must erect temporary pillars, master pillars etc. as may be required in suitable places as directed by the Engineer-in-charge (MDI M)/ Architect/ PMC at his own cost before starting and during the work by which the MDIM staff will check levels, layout different works and fix up alignment and the Contractor shall have to maintain and protect the same till completion of the work. All machineries and equipments like Level Machine, Staff, Theodolite etc. and other sundry material like, pegs, strings, nails flakes instruments etc. and also skilled labour required for setting out the levels for laying out different structures and alignment shall also be supplied by the Contractor as per direction of Employer/ Architect/ PMC at his own cost without any extra claim towards MDIM.

30. Supplementary / Additional items of Work:

Notwithstanding the provisions made in the related clauses of the NIT, any item of the work which can be

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legitimately be considered as not stipulated in the price estimate but has become necessary as a reasonable contingent item during actual execution of work will have to be done by the Contractor, if so directed by the Engineer-in-charge (MDI M)/ Architect/ PMC and the rates will be fixed in the manner as stated below:-

- (a) Rate of supplementary items shall be analyzed from the rates of the allied items of work appearing in the Schedule of Rates of Central Public Works Department (CPWD). Rates applicable at the time of issue of NIT shall prevail.
- (b) If the rates of the supplementary items cannot be computed even after applications of clauses stated above, the same shall be determined by analysis from market rates of material, labour and carriage cost prevailing at the time of execution of such items of work. Profit and overhead charges (both together) at 10% (ten percent) only will be allowed; the contractual percentage will not be applicable.

It may be noted that cases of supplementary items of claim shall not be entertained unless supported by written order from the Engineer-in-Charge (MDI M).

31. Approval of Sample:

Samples of all materials to be supplied by the Contractor and to be used in the work shall have to be approved by the Engineer-in-charge (MDI M) and checking of quality of such materials shall be done by the Engineer-in-charge (MDI M) prior to utilization in the work.

32. Water and energy:

The Contractor shall have to arrange on his own cost, required energy for operation of equipments and machineries, for operating of pumping set, illuminating work site, office etc. that may be necessary in different stages of execution of work. No facility of any sort will be provided for utilization of MDIM's sources of energy existing at site of work. Arrangement for obtaining water for the work should also be made by the Contractor at his own cost. All cost for getting energy, water and all other utility services for any purpose whatsoever will have to be borne by the Contractor for which no claim will be entertained. All materials, tools and plants and all labour (skilled and unskilled) including their housing, water supply, sanitation, light, procurement of food for Contractors' staff and crews, medical aids etc. are to be arranged by the Contractor at his own cost. The cost for transportation of labour, materials and all other incidental items as required for work shall also have to be borne by the Contractor without any extra claim from MDIM. Energy and water, if provided by MDIM, shall be on chargeable basis.

33. Drawings:

All works shall be carried out in conformity with the drawings supplied by MDIM. The Contractor shall have to carry out all the works according to MDIM's General Arrangement Drawing and Detail Working Drawings to be supplied by MDIM from time to time.

34. Serviceable Materials:

The responsibility for stacking the serviceable materials (as per decision of the Engineer-in-charge (MDI M)/ Architect/ PMC) obtained during dismantling of existing structures/roads and handing over the same to the Employer lies with the Contractor and nothing will be paid on this account. In case of any loss or damage of serviceable materials prior to handing over the same to the Employer, full value will be recovered from the Contractor's bill at rates to be assessed by the Engineer-in-charge (MDI M)/ Architect/ PMC.

35. Unserviceable Materials:

The Contractor shall remove all unserviceable materials, obtained during execution at place as directed. The Contractor shall dress up and clear the work site after completion of work as per direction of the Engineer-in-charge (MDI M)/ Architect/ PMC. No extra payment will be made on this account.

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36. Contractor's risk for loss or damage:

All risk on account of railway or road carriage or carriage by boat including loss or damage of vehicles, boats, barges, materials or labour, if any, will have to be borne by the Contractor without any extra claim towards MDIM.

37. Idle labour and additional cost:

Whatever may be the reason no claim on idle labour, enhancement of labour rate additional establishment cost, cost of Toll and hire charges of tools and plants, railway freight etc. would be entertained under any circumstances.

38. Charges and fees payable by Contractor:

- a) The Contractor shall pay all fees required to be given or paid by any statute or any regulation or by-law of any local or other statutory authority which may be applicable to the works and shall keep MDIM immune against all penalties and liabilities of every kinds for breach of such statute, regulation or law.
- b) The Contractor shall save, harmless and indemnify MDIM from and against all claims, demands, suit and proceedings for or an account of infringement of any patent rights, design, trade mark or name of other protected right in respect of any constructional plant, machine, work, materials, thing or process used for or in connection with works or temporary works or any of them.

39. Tools and Plants:

All Tools and Plants required for the work will have to be supplied by the Contractor at his own cost. All cost of fuel and stores for proper running of the Tools and Plants must be borne by the Contractor.

40. Realization of MDIM's claims:

Any sum of money due and payable to the Contractor (including security deposit returnable to him) under this contract may be appropriated by MDIM and set off against any claim of MDIM for the payment of sum of money arising out of this contract or under any other contract made by the Contractor with MDIM.

41. Safety, Security and Protection of the Environment:

The Contractor, throughout the execution and completion of the Works and the remedying of any defects therein:

- 41.1. shall take full responsibility of the safety of the workers to be deployed by him for the work during the period of the contract. The Contractor has to provide Personal Protective Equipments (PPEs) to the workers like helmets, safety shoes, safety belts etc. as per requirement of the work at his own cost.
- 41.2. provide and maintain at his own cost all lights, guards, fencing, warning signs and arrange for adequate security, when and where necessary or required by the Employer/ Architect/ PMC for the protection of the Works or for the safety, security and convenience of the public or others,
- 41.3. 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 others resulting from pollution, noise or other causes arising as a consequence of his methods of operation,
- 41.4. ensure that all lights provided by the Contractor shall be screened so as not to interfere with any signal light of MDIM or with any traffic or signal lights of any local or other authority.

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42. Commencement of work:

The work must be taken up within the date as stipulated in the work order and completed in all respects within the period specified in Notice Inviting Tender. In the event of failure on the part of Contractor to comply with the provisions of this clause the contract shall be terminated upon a notice to be issued by MDIM to that effect. In such case, MDIM shall have the right to award whole or part of the work to any other agency at the risk and cost of the Contractor.

43. Setting out of the work:

The Contractor shall be responsible for the true and perfect setting out of the work and for the correctness of the position, levels, dimensions and alignments of all parts of work. If any rectification or adjustment becomes necessary the Contractor shall have to do the same at his own cost according to the direction of the Engineer-in-charge (MDI M). During progress of works, if any, error appears or arises in respect of position, level, dimensions or alignment of any part of the work, the Contractor shall, at his own cost, rectify such defects to the satisfaction of the Engineer-in-charge (MDI M). Any setting out that may be done or checked by either of them shall not in any way relieve the Contractor from their responsibility for correctness and rectification thereof.

44. Precautions during works:

The Contractor shall carefully execute the work without disturbing or damaging underground or overhead service utilities viz. Electricity, Telephones, Gas, Water pipes, Sewers etc. In case disturbances of service utilities is found unavoidable, the matter should immediately be brought to the notice of the Employer/ Architect/ PMC and necessary precautionary measures as would be directed by the Employer/ Architect/ PMC shall be carried out at the cost and expenses of the Contractor. If the service utilities are damaged or disturbed in any way by the Contractor during execution of the work, the cost of rectification or restoration of damages as would be fixed by the Employer/ Architect/ PMC will be recovered from the Contractor.

45. Testing of qualities of materials and workmanship:

All materials and workmanship shall be in accordance with the specifications laid down in the contract and also as per relevant IS codes and the Engineer-in-charge (MDI M)/ Architect/ PMC reserves the right to test, examine and measure the materials/workmanship direct at the place of manufacture, fabrication or at the site of works or any suitable place. The Contractor shall provide such assistance, instrument, machine, labour and materials as the Engineer-in-charge (MDI M) PMC may require for examining, measuring and testing the works and quality, weight or quantity of materials used and shall supply samples for testing as may be selected and required by the Engineer-in-charge (MDI M) without any extra cost.

Besides this, he will carry out tests from outside Laboratory and submit the test reports as per instructions of Engineer-in-charge (MDI M). The cost of all such tests shall be borne by MDI M.

46. Site Order Book:

The Contractor shall maintain a Site Order Book at the site of the works wherein the instructions of the Engineer-in-charge (MDI M) & PMC may be recorded. The Site Order Book shall be the property of the Engineer-in-charge (MDI M) and the instructions recorded therein shall be deemed to have the same force and effect as if they had been given to the Contractor himself. The Contractor or his authorized representative on the site must sign the book as token of having perused the order given therein.

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47. Timely completion of work:

All the supply and the work must have to be completed in all respect within the time specified in Notice Inviting Tender from the date of commencement as mentioned in work order. Time for completion as specified in the tender shall be deemed to be the essence of the contract.

48. Procurement of materials:

All materials required to complete execution of the work shall be supplied by the Contractor after procurement from authorised and approved source.

49. Rejection of materials:

All materials brought to the site must be approved by the Engineer-in-charge (MDI M). Rejected materials must be removed by the Contractor from the site within 24 hours of the issue of order to that effect. In case of non-compliance of such order, the Engineer-in-charge (MDI M) shall have the authority to cause such removal at the cost and expense of the Contractor and the Contractor shall not be entitled to claim for any loss or damage on that account.

50. Implied elements of work in items:

Except of such items as are included in the BOQ and approximate quantities, no separate charges shall be paid for traffic control measures, shoring, shuttering, dewatering, curing etc. and the rates of respective items of works are to be deemed as inclusive of the same.

51. Damaged / Unused Materials:

Any damaged / unused materials lying at Contractor's custody, which is found at the time of use to have been damaged and / or remaining unused, shall be rejected and / or removed immediately from the site by the Contractor or disposed off as directed by Employer/ Architect/ PMC at the cost and expense of the Contractor and the Contractor shall have no claim for compensation on account of any such materials so damaged / remaining unused as aforesaid.

52. Issue of Employer's Materials:

Employer's materials will not be issued under any circumstances.

53. Foreclosure:

In case of foreclosure or abandonment of the works by MDIM, the Contractor will be eligible to be paid for the finished work and reimbursement of expenses actually incurred but not for any losses.

54. Delay due to modification of drawing and design:

The Contractor shall not be entitled for any compensation for any loss due to delay arising out of modification of the drawing, addition and/or alterations of specifications.

55. Income Tax and other statutory payments will be deducted from each bill of the Contractor as per applicable rates and rules in force.

56. The whole work will have to be executed as per the drawings provided by the Employer with the tender documents.

57. GST would be paid to the contractor on billed value and at the time of reimbursement.

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58. Safety code:

Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions.

In respect of all labour directly or indirectly employed in the work for the performance of contractor's part of these agreement, the contractor shall at his own expenses arrange for all the safety provisions as per safety codes of CPWD, Indian Standard Institution, the Electricity Act, the Mines Act and such other acts as applicable.

The contractor shall observe and abide by all fire and safety regulations of the employer. Before starting construction work Contractor shall consult with Engineer-in-charge (MDI M) & PMC and must make good to the satisfaction of the employer any loss or damage due to fire to any portion of the work done or to the done under the contract or to any of the employer's existing property.

The contractor shall maintain First Aid facilities for its employees.

Scaffolding : Suitable scaffoldings should be provided for workmen for all works that cannot safely be done from the ground level or from solid construction except such short period work as can be done safely from ladders. When a ladder is used it should be made strong by providing firm props and supports from underneath as well as from the sides to stop oscillation, sagging or anything that may cause accident or danger to the workmen to work smoothly and fearlessly and if the ladder is used for carrying materials as well, suitable foot holds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1 in 4 (1-horizontal and 4- vertical).

Scaffolding or staging more than 4 meters above the ground or ground floor, swing suspended from an overhead support or erected with stationery support shall have a guard rail properly attached, bolted braced and otherwise retarded atleast 1-meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swing from the building or structure.

Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform of the gangway or the stairway is more than 4 meters above ground level or floor level, they should be closely boarded, should have adequate width and should be suitable fastened as described above.

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

Safe-means of access shall be provided to working platform and other working places; every ladder shall be securely fixed. No portable single ladder shall be over 9 meters in length while the width between side rails in rung ladder shall in no case be less than 30 cms for ladder upto and including 3 meters in length. For longer ladder this width should be increased at least 5 mm for each additional foot length. Uniform steps spacing shall not exceeding 30 cms. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of work shall be so stacked or placed to cause danger or in convenience to any person of public. The contract shall also provide all necessary fencing and lights to protect the workers and staff from accidents, and shall be bound to bear the expenses of differences of very suit, action, or other proceedings of law that may be brought by any person for injury sustained owing to neglect of the above precautions and pay any damages and cost which may be awarded any such suits or action or proceedings to any such persons or which may with the consent of the contractor be paid to compromise any claim by any such person.

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The contractor has to provide fire extinguishers, fire buckets and drums at worksite as recommended by employer engineer/PMC. They will have to ensure all precautionary measures and exercise utmost care in handling the inflammable gas cylinders/ Inflammable liquid/ paints etc. Temporary combustible structures will not be built near or around the work site.

59. Arbitration:

If any dispute, difference or question arises any time between the parties as to the construction of the agreement or concerning anything relating to the terms of the contract or regarding the rights, liabilities and duties of the parties, the same shall be referred for arbitration to a Sole Arbitrator after giving at least 15 days notice to the other party clearly setting out the items of dispute. The Sole Arbitrator shall be appointed by the Employer who shall be presently unconnected with the organization of the Employer or the Contractor. If the person so appointed is unable or unwilling to act or refuses his appointment or vacates his office due to any reason whatsoever, another person shall be appointed as aforesaid.

The arbitration shall be governed by the Arbitration and Conciliation Act, 1996, as in force and as amended from time to time. The award of the Arbitrator shall be final and binding on the parties. It is hereby agreed that for all disputes referred to the Arbitrator, separate awards shall be given by the Arbitrator in respect of each dispute in accordance with the terms of reference and the award shall be a reasoned award. It is hereby also agreed that the Arbitrator shall not have powers to order any interim measures whatsoever during the course of arbitration.

The fees, if any, of the Arbitrator shall initially be paid in equal proportion by each of the parties. The cost of the reference and of the award including the fees, if any, of the Arbitrator shall be directed to be finally borne and paid by such party or parties to the dispute in such manner or proportion as may be directed by the Arbitrator as the case may be in the award.

It is specifically agreed by the Employer and Contractor that the works required to be carried out under the tender shall not be stopped or discontinued or delayed by reasons of any matter, question or dispute having been referred for arbitration, but shall be carried on and completed with due diligence and speed so as to be completed and handed over to the Employer within the agreed period and the Employer shall pay for the works so done as per the running bills submitted by the Contractor.

60. Termination / parallel contract:

The Contractor shall comply with the provisions of the contract with due care and diligence, execute and maintain the work and provide labour including supervision of all works, structural plans and other things whether temporary or permanent in nature required for such execution and maintenance in so far as the necessity of providing these is specified or is reasonable inferred from the contract. The Contractor shall take full responsibility for the adequacy, suitability and safety at site of all the works methods.

In case the Contractor fails to discharge any of the contractual obligations, the Employer on recommendation (in written) of Engineer-in-charge (MDI M) shall have the exclusive right to terminate the contract by giving 7 days notice and award whole or part of the work to any other agency at the risk and cost of the Contractor. SD and all other payments due to the Contractor will be forfeited in such case.

61. Jurisdiction of court:

All disputes pertaining to this NIT shall be subject to the jurisdiction of Jangipur Court only.

62. In no case, late and delayed offers will be considered. The Employer shall not be responsible for any postal delay. Similarly, e-mail quotations or conditional offers will be considered.

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CHAPTER 3:

**SCHEDULE OF REQUIREMENTS
(BOQ)**

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**SCHEDULE OF ITEMS FOR RENOVATION OF EXISTING SEWERAGE SYSTEM BY
REVAMPING RAIN WATER HARVESTING PITS AND CONSTRUCTION OF NEW
UNDERGROUND SEWERAGE DISPOSAL UNITS AND OTHER RELATED CONSTRUCTION
AT MDI MURSHIDABAD CAMPUS**

SL.NO.	DESCRIPTION	UNIT	TOTAL QUANTITY
1	Jungle Cutting Works		
	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared.	Sq.M.	290
2	Dismantling Works		
	Dismantling brick work in cement mortar manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. The demolition works also include dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking as per the directions of Engineer-in-Charge	Sq.M.	105
3	EARTH WORKS		
	Earth work in excavation of foundation trenches or drains, in all sorts of soil (including mixed soil but excluding laterite or sandstone) including removing, spreading or stacking the spoils within a lead of 75 m. as directed. The item includes necessary trimming the sides of trenches, levelling, dressing and ramming the bottom, bailing out water as required complete.		
	Depth of excavation for additional depth beyond 1,500 mm. and upto 3,000 mm. but not requiring shoring.	Cu.M.	302
4	Gravel Stone Filling		
	Filling in foundation or plinth by Gravel Stone in layers not exceeding 300 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of Gravel Stone. (payment to be made on measurement of finished quantity)	Cu.M.	19
5	Stone Dust Filling		
	Filling in foundation or plinth by STONE DUST in layers not exceeding 300 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of STONE DUST. (payment to be made on measurement of finished quantity)	Cu.M.	19
6	Brick Flat Soling		
	Single Brick Flat Soling of picked jhama bricks including ramming and dressing bed to proper level and filling joints with local sand.	Sq.M.	65
7	Plain Cement Concrete		

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	Ordinary Cement concrete (mix 1:2:4) with graded stone chips (20 mm nominal size) excluding shuttering and reinforcement, if any, in ground floor as per relevant IS codes.		
	Pakur Variety	Cu.M.	26
8	Concrete Works for Reinforced Cement Concrete		
	Providing and laying in position mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured as per mix design of specified grade for reinforced cement concrete work, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS:9103 to accelerate / retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in - charge. Note :- Cement content considered in this item is @ 330kg/cum. Excess/less cement used as per design mix is payable/recoverable separately.	Cu.M.	182
9	Form Work for Reinforced Cement Concrete		
	Centering and shuttering including strutting, propping etc. and removal of form		
	Columns, Pillars, Piers, Abutments, Posts and Struts, Beams and Staircases	Sq.M.	499
10	Steel Work for Reinforced Cement Concrete		
	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.		
	Thermo-Mechanically Treated bars.	Tonnes	27
11	Dewatering		
	Pumping out water caused by springs, tidal or river seepage, broken, water mains or drains and the like.	Kilo Liters	350
10	Plaster Work		
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar including rounding off or chamfering corners as directed and raking out joints including throating, nosing and drip course, scaffolding/staging where necessary (Ground floor). [Excluding cost of chipping over concrete surface] With 1:4 cement mortar, 20 mm thick plaster.	Sq.M.	402
11	Neat cement		
	Neat cement punning about 1.5mm thick in wall, dado, window sill, floor etc.	Sq.M.	402
12	Paver Block		

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	50 mm thick interlocking designer concrete paver block M- 30 grade for non-traffic zone, buiding premises, garden, parks, domestic drive as per IS: 15658- 2006. Coloured Decorative	Sq.M.	80
13	G.I. Pipes		
	Supplying, fitting and fixing Medium Class G.I. pipes with all necessary accessories, specials viz. socket, bend, tee, union, cross, elbo, nipple, longscrow, reducing socket, reducing tee, short piece etc. fitted with holder bats clamps, including cutting pipes, making threads, fitting, fixing etc. complete in all respect including cost of all necessary fittings as required, jointing materials and two coats of painting with approved paint in any position above ground.		
	80 mm	Metre	1400
14	Butterfly Valve		
	Providing, fixing, testing and commissioning of suitable insertion between flanges as per BS-10 Table D/E wafer type spring loaded, Nitrile rubber lining seat, 5G iron disc, AISI-410 SS STEM and C.I. body Butterfly valve PN 1.0 Hand lever operated for Sewerage water application , conforming to IS : 13095. Body Test Pressure: 2.4 Mpa and Seat Test Pressure: 1.6 Mpa.		
	80 mm.	Each	6
15	Non Return Valve		
	Providing and fixing cast iron dual plate wafer type non-return valve with flange ends with pressure rating of PN-1.0 of approved quality as per IS: 5312		
	80 mm dia.	Each	6
16	Submersible Pump		
	Supply, installation, testing and commissioning KIRLOSKAR / KSB / XYLEM make open well Submersible type non-clogging Pump motor set for sewage water transfer of required drive (Motor HP), having discharge capacity and pumping head as described below with all electrical accessories viz. main switch and starter, auto on/off system with float arm (with fixed or flexible arm), over load protection relay, power cable and control cable from main switch and starter with auto on-off with dry running protection to respective motors, earthing having required M.S. galvanised supporting stay/ clamp etc. complete operational.		
	(I) A set of two nos Sump pumps (Non-clogging type) having discharge capacity of each pump approx. 10 cum/hr at 20 m. pumping head Suction from Septic tank, delivery to centralise storage tank. Including MCC and allied works.	Each	6
17	Grease Trap		
	Supply and Installation of Grease Trap	Each	2
18	Septic Tank		
	Clean up of Septic tank	Each	4
19	Rain Water Harvesting Tank		
	Clean up harvesting storage tank	Each	4

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CHAPTER 4:
TECHNICAL SPECIFICATIONS
AND ALLIED DETAILS

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GENERAL PARTICULARS AND REQUIREMENTS

1.0 General

- 1.1 The Conditions of Contract, schedule of quantities and the drawings shall be read in conjunctions with this specification and matters referred to shown or described in any of the former are not necessarily repeated in the latter.

The work under this contract shall be carried out in accordance with general conditions of contract, special conditions of contract, specifications drawings, schedule of quantities forming part of this contract and the latest Indian standard specifications and codes of practice referred to in this specifications.

- 1.2 Discrepancy between drawings & specifications and schedule of quantities.

- 1.2.1 In the event of any discrepancy between this specification and the latest Indian standard specifications/codes of practice the provisions in this specifications shall take precedence over the other specifications.

- 1.2.2 In case of any discrepancy between specifications, schedule of quantities and contract drawings or such other drawings as may be issued during progress of works, the matter shall be referred to the engineer in charge for clarification and decision. The contractor shall execute the work in accordance with the decision the Engineer in charge. And under no circumstance whatsoever, the contractor shall carry out the works on the basis of his own interpretation and understanding of the apparent discrepancy. It will however be deemed that the contractor has quoted on the basis of the description of the B.O.Q including preamble.

- 1.2.3 Protection to work from weather

The contractor shall cover up and protect all the works from weather and shall suspend all the wet operations

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during a weather which, in the opinion of the engineer in charge will be to the work.

1.2.4 Dimension in drawings

Figured dimensions are to be follows in all cases and in no case shall they be sealed , large scale details take precedence over shall scale drawings . In general , drawings shall indicate dimensions, positions and type of constructions, the specifications shall indicate the quality , standard and methodology of work and the schedule of quantities shall indicate the estimated approximate quantities and brief description of item.

1.2.5 Method of Measurement

Unless otherwise described in the preamble to the schedule of quantities, the method of measurement shall be as described in Method of measurement " of building and civil engineering works IS 1200 (part - I to XVV) latest edition of bureau of Indian standards.

1.3 Materials

All materials/fitting/equipments supplied and incorporated in the work shall comply with the requirements for relevant Indian standards (latest applicable standards) and also shall meet approval of Engineer in charge.

1.3.1 The Contractor shall produce samples of all materials / fittings of sizes/number as required by the engineer in charge before incorporation of these materials/ fittings in the work prior approval of the engineer in charge. The approved sample shall remain in custody of engineer in charge till expire of defect liability period and returned thereafter. Samples of consumables, tiles, sand aggregate will however, not be returned. Bulk procurement of materials shall not be commenced until the samples are duly approved in writing. The materials/fittings to be provided by the contractor shall conform to or shall be superior to the samples approved.

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Contract price

The contract price quoted by the contractor shall be deemed to include for any details of construction which are obviously and fairly intended and which are incidental to the item but may not have been clearly shown and or specified.

1.4 Notice of operation

No important operation shall be commenced nor shall work outside the usual working hours be carried out without the consent in writing of the engineer in charge or without full and complete notice.

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1.6

Sequence of works

The sequence in which the works are to be carried out shall be to the approval of the engineer in charge and shall be such as to suit the detailed method of construction adopted by the contractor. The works shall also be carried out so as to enable the other contractors to work concurrently for early completion of the works.

1.7 Setting out the work

1.7.1 The contractor shall set out and measure up all the works in accordance with the contract documents and for this purpose he shall appoint technical and other category staff and also provide for all necessary assistants needed.

The Contractor shall be entirely responsible for the accurate and perfect setting out of all works, whether such setting out be executed by his own staff or not, and notwithstanding that the engineer in charge may furnish bench marks and set out or give the necessary directions for setting out the work, the contractor must satisfy himself as to the accuracy of these and shall, at his own cost rectify and make good any and all defects which may arise from errors in the lines and levels, and no inaccuracy in the setting out and in the construction of the works shall be founded on by the contractor as a reason for any claim against the owner by the corporation.

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1.8 Responsibility for carrying out works

1.8.1 The responsibility for carrying out the works and the methods to be adopted under this contract shall rest solely with the contractor subject always to the approval by the engineer in charge of the contractor's proposals. Such approvals shall not, however relieve the contractor in any way of his responsibility for the proper execution of works in accordance with the contract.

1.9 Construction equipment, works, building materials etc.

1.9.1 The Contractor's attention is specially directed to the fact that the requirements of the specification are general and applicable to all the works.

1.9.2 In addition, the following general requirements given in sub pars 1.9.2 (i) to 1.9.2 (iii) shall also be held to apply to every part of works where applicable

(i) Use of plant, materials etc for safe construction

All the labour, constructional plant, machinery, tools, instruments, tackle and equipment temporary offices, workmen's sanitary and welfare arrangement and other buildings, temporary structures, works, services and operations materials, stores and things of whatever description necessary to construct, complete and maintain the whole of the works, temporary or permanent, or to fulfill the requirements specified in the contract shall be provided and used by the contractor, and the constructional plant, equipment, materials, temporary building, works, services etc. shall be of a type, capacity power or quantity, strength, design and construction and erected in such position or used or executed at such times and in such manner as are specified in the contract and as re most efficient and suitable for the proper and safe execution of the work to be under taken under this contract.

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(ii) Utilities to be provided by contractor

The contractor shall make his own arrangements and except where otherwise indicated shall at all points where they are required such supplies of water, fuel, light and power as he may require for all the operations under the contract, and shall also provide and use all the necessary appliances, works, services and other things necessary to distribute the supplies to the various parts of the works.

(iii) Furnishing information to engineer in charge

The Contractor shall when required by the Engineer in charge furnish all information as to quality, weight, constituent substances, dimensions, levels, strength and description of the materials and works and give the Engineer -in charge such other particulars as may be required.

1.10 Names of manufacturers and copies of orders

Before ordering any material of any description of the permanent works the contractor shall submit for the approval of the Engineer in charge, the names of the makers and suppliers proposed and any other detail required by the engineer in charge and shall afterwards send to the Engineer in charge, copies in quadruplicate, of the orders given by the contractor for the materials. All materials shall be suitable for local climatic conditions.

1.11 Manufacturers' name sizes catalogue numbers and / or samples of all materials shall be submitted for approval.

1.12. Proprietary Materials

1.12.1 Proprietary materials to be used in the works and shall when brought to site be not inspected by the engineer in charge.

The contractor shall, on demand, produce to the Engineer in charge original Receipts/vouchers /invoices in respect of the Supplies.

Supplies



1.13 Test Certificates

1.13.1 All manufacturer's certificates of test proof, sheets, mill sheets, etc. showing that the materials have been tested in accordance with the requirements of the appropriate Indian standard, other relevant standard specification or this specification, are to be supplied free of charges, on request to the engineer in charge.

1.14 Storage of Materials

1.14.1 All materials used in the permanent works shall be stored on racks supports, in bins under cover etc. as appropriate to prevent deterioration or damage from any cause whatsoever to the entire satisfaction of the engineer in charge and as amplified in the succeeding clauses.

1.15 Records and usage of materials

1.15.1 The contractor shall maintain a detailed record of all materials received on the site or in his stores or storage and working areas in the vicinity of the site and shall make such records available to the engineer in charge. At such times as the latter may reasonably require.

1.16 Forming holes & making good

1.16.1 All holes shall be left or provided in concrete including reinforced cement concrete, brick work and in any other situations as required for or directed by the engineer in charge and shall be made good, in the same mortar mix as specified for that portion of the work. No extra payment on this account will be made to the contractor.

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1.17 Keeping site clean

1.17.1 The contractor shall at all time keep the site free from all surplus materials, rubbish and offensive matter which shall be disposed of in a manner to be approved by the Engineer in charge.

1.18 Safety precautions

The contractor shall take all necessary safety precautions to prevent the possibility of accidents which may be caused mechanically electrically or otherwise during the course of the works. The works shall include the provision and fixing of detachable guards of approved design to cover all moving machine parts wherever they may be located and whether they are intended to be permanent or temporary and in such manner as to comply with the appropriate statutory requirements it shall also include such step down transformers as at be used for portable electrical tools.

1.19 Maintenance of Finishes

The contractor shall cover up and protect the various works and portions thereof from all damage due to unconsidered or rough treatment, dust grit or damage in other ways. All bright parts of fittings shall be covered with transparent polyethylene sheeting and shall be cleaned and polished before being handed over wherever is required.

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GENERAL SCOPE

1. These specifications establish and define the material and constructional requirements for CIVIL and STRUCTURAL WORKS.
2. Method of measurements are indicated in these specifications, where not so specified, latest revision of IS:1200 shall be applicable.
3. Providing and operating necessary measuring and testing devices and materials including all consumables are included in the scope of work. No separate measurement or payment for testing the work shall be made but rates quoted for various items shall be deemed to include the cost of such tests which are required to ensure achievement of specified quality.
4. All materials shall be of standard quality, manufactured by renowned concerns conforming to Indian Standards or equivalent and shall have IS mark as far as possible unless otherwise approved by the Engineer-in-Charge. The contractor shall get all materials approved by the Engineer-in-Charge prior to procurement and use. The contractor shall furnish manufacturer's certificates for the materials supplied by him when asked for. Further to that he shall get the materials tested from an approved test house if asked for by the Engineer-in-Charge. The cost for all the tests and test certificates shall be borne by the Contractor. No separate payment shall be made for the testing. The Engineer-in-Charge shall have the right to determine whether all or any of the materials are suitable. Any materials procured or brought to site and not conforming to specifications and satisfaction of the Engineer-in-Charge shall be rejected and the contractor shall have to remove the same immediately from site at his own expense and without any claim for compensation due to such rejection.
5. Wherever referred to in this tender document, only the latest revision which shall be in force till the completion work, of specifications, codes of practice and other publications of Bureau of Indian Standards shall be applicable.

Stamps



- 6.0 Wherever the Contractor executes civil and structural works Involving buildings, equipment foundations, supporting structures pipe racks, etc., the following works are deemed to have been included in the quoted rates for various works.
- 6.1 Marking of centre lines of foundations.
- 6.2 Marking of top levels of foundations, floors etc. and establishment of reference lines, bench marks on various floors, platforms etc.
- 6.3 Preparations of "as built" scheme of structural foundations, equipment foundations etc. Indicating designed and achieved levels, centre lines and dimensions of pockets, position and level of anchor bolt etc.
- 7.0 The provisions of schedule of rates, specifications and drawings shall be read in conjunction with each other and in case of conflict amongst them, the clarification shall be obtained from the Engineer-in-Charge whose decision shall be final and binding. However, the following procedure may generally be followed.
- 7.1 Description of items in schedule of rates shall be followed when provisions therein are different from those in specifications.
- 7.2 Where the description of item does not call for some specific requirement but the same is given in specifications, the specifications shall be followed in addition to the requirement given in description of item.
- 7.3 Where drawings call for requirements different from or additional to those given in item description and specifications, the decision of the Engineer-in-Charge shall be obtained as to what shall be followed.

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EARTH WORK

1.0 SCOPE

This specification deals with earthwork in excavation and filling.

2.0 CLASSIFICATION_OF_SOIL

2.1 Soft/Loose Soil

Generally any soil which yields to the ordinary application of pick and shovel or to pharach, rake or other ordinary digging implement; such as vegetable or organic soil, turf, gravel, sand, silt, loam, clay, peat etc.

2.2 Hard/Dense Soil

Generally any soil which requires the close application of pick, or jumper or scarified to loosen such as stiff clay, gravel and cobble stone.

2.3 Soft/Disintegrated rock

Rock or boulder which may be quarried or split with crowbar. This will also include literate and hard conglomerate.

2.4 Hard_Rock(Requiring_Blasting)

Any rock or boulder for the excavation of which blasting is required.

2.5 Hard_rock(Requiring_Controlled_Blasting)

Due to any reason, if general blasting is prohibited, then for excavating these rocks, controlled blasting as approved by the Engineer-in-Charge shall be used.

2.6 Hard Rock(Blasting Prohibited)

Hard rock requiring blasting as described under 2.4 but where blasting is prohibited for any reason and excavation has to be carried out by chiseling, wedging or any other agreed method.

3.0 BACKFILLING MATERIAL

3.1 Backfilling material shall be as approved by the Engineer-in-Charge.

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3.2 Back filling of excavations in trenches, foundations and Elsewhere shall consists of one of the following materials as the Engineer-in-Charge may direct in each location.

(i) Soil

(ii) Selected earth from heaps or brought from borrow areas.

(iii) Stone/gravel

(iv) Sand

(v) Lean

concrete

3.3 The material shall be free from rubbish, roots, hard lumps and any other foreign organic material.

4. SETTING OUT

4.1 The Contractor shall be responsible for the true and proper setting out of the work in relation to original points, Lines and levels of reference and for the correctness of the levels, dimensions and alignment of all parts of the work and for the provision of all necessary instruments, appliances and labour in connection therewith. If at any time during progress of the work any error appears or arises in the position of level, dimension, or alignment of part of the

work, the Contractor at his own expense shall rectify such errors to the satisfaction of the Engineer-in-Charge. The checking of any line or level by the Engineer-in-Charge shall not in any way relieve the Contractor of his responsibilities.

4.2 The Contractor shall lay out one or more permanent bench marks in some central place before the start of the work, from which all important levels for the excavations will be set. The Contractor shall provide all labour and materials for setting at his own cost.

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These permanent bench marks shall consist of masonry pillars with top neatly plastered and leveled as per the directions of the Engineer-in-Charge. Bench marks shall be well connected with triangular grid system or any other bench mark approved by the Engineer-in-Charge.

5.0 EARTHWORK_IN_EXCAVATION

5.1 Excavation shall be carried out in any material met on the site to the lines, levels and contours shown on the detailed drawings and the Contractor shall remove all excavated materials to soil heaps on site or transport for use in filling on the site or stack them for reuse as directed.

5.2 Excavated material shall not be deposited within 1.5M from the top edge of the excavation.

5.3 The sides of the excavation may be cut sloping or shored and strutted to hold the face of earth as per site requirements and as directed by the Engineer-in-Charge.

The Contractor shall remove all vegetation, shrubs etc. encountered during excavation.

5.4 Foundation pits/trenches shall not be excavated to the full depth unless construction is imminent. The last fifteen (15) cm depth of the excavation shall not be removed until concreting work is imminent. The full depth may at the discretion of the Engineer-in-Charge be excavated and the bed covered with a seventy five (75) mm (minimum) thick (or as indicated on drawing) layer of lean concrete 1:5:10 mix (1 cement:5 Coarse sand:10 Crushed Stone Aggregates) or as specified in schedule of rates, after watering if required, and consolidating the bed.

Exempt



- 5.5 The Contractor shall provide suitable drainage arrangement to prevent surface water from any source entering the foundation pits at his own cost.
- 5.6 If the bottom of any excavation has been left exposed by the Contractor and in the opinion of the Engineer-in-Charge, that has become badly affected by the atmosphere or by water, then the Contractor shall remove such portions of the deteriorated material as the Engineer-in-Charge may direct and shall make good with lean concrete 1:4:8 mix (1 Cement: 4 Coarse Sand : 8 Crushed Stone Aggregate). All expenses for such additional concrete and excavation shall be borne by the Contractor. The cement used for making good the above shall be taken into account for reconciliation purposes only.
- 5.7 Where excavation is made in excess of the depth required, the Contractor shall, at his own expenses, fill up to required level with lean concrete 1:5:10 mix (1 Cement: 5 Coarse Sand: 10 Crushed Stone Aggregates) or as decided by Engineer-in-Charge.
- 5.8 The Contractor shall make all arrangements for dewatering the accumulated water from any source including subsoil water in the excavated pits/trenches and keeping the surface dry for subsequent works at his own cost.
- 5.9 Lowering of water table by well point pumping shall be paid separately.
- 5.10 The Contractor shall make necessary arrangements for lighting, fencing and other suitable measures for protection against risk of accidents due to open excavation at his own expense.
- 5.11 Where the excavation is to be carried out below the foundation level of an adjacent structure, the precautions to

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be taken such as under pinning, shoring and strutting etc. shall be determined by the Engineer in Charge. No excavation shall be done unless such precautionary measures are carried out as per directions of the Engineer in Charge. The payment for such precautionary measures shall, however, be made separately unless the rate for such measures are specifically included in the rates for items of excavation.

- 5.12 Loose or soft bed ground encountered in excavation at the required depth shall on the Engineer' in Charge instructions be excavated to a firm bed and difference made up to the required level with lean concrete 1:5:10 mix (1 Cement :5 Coarse Sand : 10 Crushed Stone Aggregates) or as decided by the Engineer in Charge.
- 5.13 In those cases where during excavation side slips occur for reasons not attributable to the Contractor (e.g. side slips which take place on their own but not due to surcharge of earth kept near the edge of excavation and cracking of excavation top strata due to clay drying out leading to collapse of excavation sides), the Engineer in Charge shall admit payment at his discretion.
- 5.14 Any obstacle encountered during excavation shall be reported immediately to the Engineer in Charge and shall be dealt with as instructed by him. Removal of buried pipes or cables shall not be done without prior permission of the Engineer in Charge and the Contractor shall provide all measures to protect the same. Cost of such protective measures are deemed to be included in the rates for various items of excavation.
- 5.15 The Contractor shall not undertake any concreting in foundation until the excavation pit/trench is approved by the Engineer in Charge.

Dumps



5.16 The specification for earth work shall also apply to excavation in rock in general. The excavation in rock shall be done such that extra excavation beyond the required width and depths as shown in drawing is not made. If any extra excavation particularly in depth is made by the contractor during the excavation operation, the Contractor shall make up such extra excavations with concrete 1:5:10 mix (1 Cement : 5 Coarse Sand : 10 Crushed Stones Aggregates) to the required levels and shape at no extra cost to the Owner.

5.17 Payment:

5.17.1 Payment for earth work in excavation shall be made on cubic meter (M³) basis on the measurement of volume of pit / trench of excavation with working space as per IS:1200 and slopes/stepping as permitted by the Engineer in Charge. The rate shall include cost of all the operations of blasting with explosives & accessories, making of all arrangements for dewatering the accumulated water from any source in the excavated pit or trench, removal and disposal of surplus excavated soil within a lead of 100M from construction areas. The rate shall also include setting out and line out work Required for the excavation.

6.0 BACK_FILLING_AROUND_FOUNDATIONS_AND_PLINTH

6.1 Back filling around completed foundations, structures, trenches and in plinth shall be done to the lines and levels shown on the drawings including any trimming of the surfaces, as may be necessary. This shall be done with selected and approved earth from excavation or otherwise with materials described under clause 3.2 as directed by the Engineer in Charge. Where sufficient suitable material is not available from the excavation, the Engineer in Charge may direct to import suitable earth from other sources. The filling shall be done in layers of thickness not exceeding 15 cm with watering, rolling and ramming by manual methods/ mechanical compactors to specified grade and level to obtain 90% laboratory maximum dry density or as specified in schedule of rates.

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6.2 The Contractor shall not commence filling in and around any work until it has been permitted by the Engineer in Charge.

6.3 Payment

Payment for backfilling with earth shall be based on volume in cubic meters (M³) of consolidated fill. This volume shall be derived from the difference between the volume of excavation and structure or trenches as the case may be. The rate shall include cost of extracting suitable approved earth from available excavated soil from spoil heaps within a lead of 100M, placing, watering, rolling, ramming compacting in layers, trimming and dressing finished surface and disposal of surplus materials up to a lead of 100m. However backfilling done with materials other than earth shall be paid separately under relevant items.

7.0 TRANSPORTATION OF SURPLUS EARTH

7.1 Surplus earth and soil from excavation shall be removed from construction area to the area demarcated by the Engineer in Charge.

7.2 Payment

7.2.1 Payment shall be made only for the lead beyond initial 100 M from construction area. Rate shall include re-excavation, loading, transportation, dumping, stacking or spreading (as

per directions of the Engineer in Charge) the surplus earth and the soil in the area demarcated by the Engineer in Charge. Payment shall be made on cubic meter

(M³) basis on the difference of measurements of the

volumes of the excavated pits and the measurement of the back filling. Quantity generated due to voids in back filled volume of earth shall also be removed by the Contractor at no extra cost and this disposal of earth shall not be measured and paid under any item.

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7.2.2 In exceptional circumstances the Engineer in Charge may direct the Contractor to remove surplus earth, concrete debris or any other waste material from site to the areas disposal on the basis of truck measurement. In such cases volume of material shall be calculated on the basis of truck volume reduced by 30% for voids in case of soft/hard soils and 50% for soft/hard rock. All other provisions of disposal such as spreading, leveling, grading shall apply in this case also.

8.0 SAND_FILLING_IN_PLINTH/FOUNDATIONS

8.1 Sand supplied by the Contractor for filling shall be medium hard, strong, clean, free from dust, organic and deleterious matter and approved by the Engineer in Charge.

8.2 Filling shall be carried out in layers not exceeding 15 cms and shall be compacted mechanically or by saturation to specified grade and level and to obtain 90% laboratory maximum dry density or as specified in schedule of rates.

8.3 Compaction by flooding may be accepted at the discretion of the Engineer in Charge provided the required compaction is achieved.

8.4 The Contractor shall not commence filling and around any work until it has been permitted by the Engineer in Charge.

8.5 Payment

Payments shall be made on cubic meter (M3) basis of the finished compact volume. The rate shall include cost of sand for any compacted thickness, wastage if any, all handling, transport for all leads, tamping, watering, flooding, dressing etc. Any brick work required for pending shall be paid separately under relevant item.

Signature



1.1 BRICK WORK

1.1.1 QUALITY

1.1.2 Bricks

Bricks shall be of 1st class quality and conform to the latest Indian standard specification no. 1077-57. Bricks shall be whole, sound well burnt, free from cracks to ring when struck and not to crack or break when soaked in water, regular in shape and uniform in size. They shall be of the best of description. class designation obtainable in the market, and of the best quality and colour, and in every respect to be approved by the Engineer - in-charge unless otherwise specified. They shall be of F.P.S bricks of sizes 22.5 x 11.1 x 7.0 cm No. bricks to absorb water more than one fifth of their own weight when dry for use in load bearing walls, for bricks used in panel walls, the water absorption shall not exceed one fourth of their dry weight. Bricks to be thoroughly cleaned, well wetted or soaked in fresh water before being used on the work and no broken bricks to be used except as closures. Specified brick quality shall be sampled as per IS: 5454-1978 and tested as per IS: 3495-1976. The bricks shall meet the criteria as per IS: 1077 -1976 when tested as mentioned herein.

1.1.1.3 Brick bats

Brick bats shall be obtained from well burnt bricks.

1.1.1.4 Classification

The common burnt clay bricks shall be classified on the basis of their minimum comprehensive strength as given in the table below:

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CLASSIFICATION OF BRICKS

Class designation	Average compressive strength Kg/square cm) Not less than	Not more than
75	75	100
50	50	75
45	45	60
35	35	50

1.1.1.5 Sampling:

For carrying out compressive strength, water absorption efflorescence and dimensional tests, the samples of the bricks shall be taken at random according to the size of the lot as specified in this document and samples thus taken shall be stored in a dry place until the tests are made.

1.4.2 SOAKING OF BRICKS:

Bricks required for masonry in cement mortar shall be thoroughly soaked in clean water before use for at least six hours and until air bubbles cease to come out. The soaked bricks shall be kept on wooden planks or bricks platform to avoid earth being smeared on them. Bricks required for masonry with mud or flat lime mortars shall not be soaked.

1.4.3 MORTAR:

All brickwork shall be laid with specified mortar to be prepared in specified proportion described in the relevant items of schedule of Quantities. It shall

Be of cement and coarse sand and shall be made in small quantities so as to be used up within 30 minutes. Then it shall be mixed to a sufficiently thick consistency as required by the Engineer-in-Charge. No left over mortar shall be used. The proportion to be used shall be as specified in the relevant items.

1.4.4 LAYING

1.4.4.1 General

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Brickwork shall be carried out as per IS 2212. Brick work shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except when needed to complete the bond. Each course shall be perfectly straight horizontally and transverse. The walls be taken up truly plumb. If battered, the batter is to be truly maintained. The plumb of the brick work in vertical walls shall be checked up at every one meter interval.

Bricks shall be laid with frogs upward. While laying, bricks shall be the roughly bedded and flushed in mortar and tapped into position with a wooden wallet and the superfluous mortar removed.

1.4.4.2 Raking back of walls at angle:

Walls of all structures shall be carried up regularly in all cases, leveling no part, one meter lower than another. If this cannot be adhered to, the brick work shall be raked back at an angle not more than 45 degree so as to maintain a uniform and effectual bond but raking back should not start within 60 centimeter of a corner.

1.4.4.3 Buttresses, counter forts, etc.

In all cases returns, buttresses, counterfeits etc. are to be built up course-by-course carefully bound into the main walls.

1.4.4.4 Junction of walls

At all angles forming the junction of any two walls, the brick shall, at each alternate course, be carried into each of the respective walls so as to thoroughly unit the work. The brickwork shall not be raised more than courses per day.

1.4.5 JOINTS:

Joints shall be restricted to 1.0 cm for brickwork with bricks of any class designation (unless any wider vertical joints upto 10 mm is necessary to give the required thickness of the wall). All bed joints shall be normal to that pressure upon them i.e horizontal in vertical walls, radial in arches and at right angles to the face in battered retaining walls. The vertically joints in alternate course shall come directly one over the other and shall be truly vertical. Care shall be taken that all joints are fully filled with mortar (proportion as specified in bill of Quantities) well flushed up and in case where struck as the work proceeds. The

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joints in faces, which are to be plastered or pointed, shall be squarely raked out to a depth of 12mm while the mortar is still green. The raked joint shall be well brushed to remove loose particles. After the work, the faces of the brickwork shall be cleaned with wire brush so as to remove any splash of mortar during the course of raising the brickwork. Before jointing the brick work with new brick work, old brick surface shall be raked brushed, cleaned and soaked with water.

1.4.6 FIXTURES TO BE PROVIDED:

All iron fixtures, pipes, conduits, drains, sleeve, bolts, holdfasts of doors and windows and other inserts of services and all other trades of works etc. which are required to be built in walls, shall be embedded in cement mortar 1:3 (1 cement : 3 sand or in cement concrete 1:3:6 (1 cement : 3 sand :6 coarse aggregate) as per requirement to suit site conditions in their correct position as the work proceeds.

1.4.7 BRICK COPING AND CUT CORNERS:

The top courses of all plinth, parapet, steps and top wall below RCC shall be laid with brick on edge, unless specified otherwise. Care shall be taken that the bricks forming the top courses and ends of walls are properly radiated and keyed in to position.

1.4.8 PROTECTION AND CURING:

Green work shall be protected from rain by suitable covering. The work shall also be suitably protected from damage, mortar dropping. Brick work as it progresses shall be kept thoroughly well watered on all faces for at least 10 days after completion. Proper watering cans with nozzles must be used for this purpose. The top of brickwork shall be left flooded at the close of the day by forming fillet of mortar 40 mm high round the edges of top courses and filled with water.

1.4.9 SCAFFOLDING:

Double scaffolding sufficiently safe and strong so as to withstand all loads likely to come upon it and having two sets of vertical supports shall be provided. Where two sets of supports are not possible the inner end of the horizontal scaffolding pole shall rest in hole provided in the header course only. Only one header for each pole shall be left out. Such holes however shall be filled up immediately after removal of scaffolding properly.

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1.5 Masonry work with Autoclaved Aerated Concrete Block (AAC Block):

AAC Blocks should conform with IS 2185 (part3) - 1984. This standard (Part 3) covers the requirements of autoclaved cellular - (aerated) concrete blocks having density up to 1000 kg, m³.

- Steam curing of concrete Products, sandlime bricks, asbestos cement products, hydrous calcium silicate insulation Products, or cement in an autoclave at maximum ambient temperatures generally between 170° and 215°C.
- The total area occupied by a block on its Bedding face, including areas of the cavities and end recesses.
- AAC block is a concrete masonry unit, any one of the external dimensions of which is greater than the corresponding dimension of a brick as specified in IS: 3952-1978 and of such side & mass as to permit it to be handled by one man, Furthermore, to avoid confusion with slab and panels, the height of the block shall not exceed either its length or six times its width.

Physical requirement:

- General: All units shall be sound & free of cracks or other defects which interfere with the proper placing of unit or impair the strength or performance of the construction. Minor chipping resulting from the customary methods of handling during delivery, shall not be deemed grounds for rejection.
- Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall be free of chips, cracks, or other imperfections, except that if not more than 5 percent of a consignment contains slight cracks or small chipping not larger than 25 mm, this shall not be deemed grounds for rejection.
- Dimensions: A concrete masonry unit, any one of the external dimensions of which is greater than the corresponding dimension of a brick as specified in IS : 3352-1978 ,and of such size and mass as to permit it to be handled by one man. Furthermore, to avoid confusion with slabs and Panels, the height of the block shall not exceed either its length or six times its width. The overall dimensions of the units when measured as given

Concrete block shall be referred to by its nominal dimensions. The term 'nominal' means that the dimension includes the thickness of the mortar joint. Actual dimensions shall be 10 mm short of the nominal dimensions (or 6 mm short in special cases where finer jointing is specified).

Length 400,500 or 600 mm

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Height 200,250 or 300 mm
 Width 100,150,200 or 250 mm

In addition block shall be manufactured in half heights of 200, 250 or 300 mm to corresponds to full length.

The vertical dimension of the exposed face of a block, excluding any tongue or other device designed to provide mechanical keying.

The horizontal dimension of the exposed face of a block, excluding any tongue or other device designed to provide mechanical keying.

The external dimension of a block at the bedding plane, measured at right angles to the length and height of the block.

- Block density: The density calculated by dividing the mass of a block by the overall volume, including holes or cavities and end recesses. The block density shall conform to the requirements specified in IS : 6441(Part 1)- 1972.
- Compressive Strength: The minimum compressive strength, being the average of twelve units, shall be as prescribed in IS : 6441(Part 5)-1972.
- Thermal Conductivity: The thermal conductivity shall not exceed the values specified in accordance with IS:3346-1980
- Drying shrinkage: The difference between the length of specimen which has been immersed in water and then subsequently dried to constant length, all under specified conditions; expressed as a percentage of the dry length of the specimen. The drying shrinkage shall be not more than 0.05 percent for Grade I blocks & 0.01 percent for Grade 2 blocks when tested in accordance with IS : 6441 (Part 2)- 1992

PHYSICAL PROPERTIES OF AAC BLOCK

Sl. No.	Density in ovedry condition	Compressive strength		Thermal Conductivity in AirDry Condition
		Grade 1	Grade 2	
(1)	(2) Kg/m ²	(3) N/mm ²	(4) N/mm ²	(5) W/m.k
i	451 to 550	2.0	1.5	0.21
ii	551 to 650	4.0	3.0	0.24
iii	651 to 750	5.0	4.0	0.30
iv	751 to 850	6.0	5.0	0.37
v	851 to 1000	7.0	6.0	0.42

TESTS:

Block Density: The block density shall be determined in the manner described.

Sample



Compressive strength: The compressive strength shall be determined in accordance with.

Thermal Conductivity: The thermal conductivity shall be determined in accordance with.

Drying Shrinkage: The drying shrinkage shall be determined in the manner described.

CRITERIA FOR CONFORMITY:

The number of blocks with dimensions outside the tolerance limit & or with visual defects, among those inspected, shall not be more than two

For density, the mean value shall be within the range specified in table above. The test result shall be grouped into groups of 4 and individual values of ranges shall be determined and the average range R calculated from these values and shall satisfy the following condition:

For thermal conductivity, the mean value shall be equal to or less than the value specified in table above.

For drying shrinkage, all the test specimens shall satisfy the requirements of the test. If one or more specimens fail to satisfy the requirements, remaining 3 blocks shall be subjected to these tests. All these blocks shall satisfy the requirements.

MANUFACTURER'S CERTIFICATE:

The manufacturer shall satisfy himself that the masonry units conform to the requirements of this specification & if requested, shall supply a certificate to this effect to the purchaser or his representative.

Accepted



PLAIN AND REINFORCED CEMENT CONCRETE

1.0 SCOPE

This specification establishes the materials, mixing, placing, curing etc. of all types of cast in situ and precast concrete used in foundations, underground and over ground structures, floors etc. Any special requirements as shown or noted the drawings shall govern over the provisions of this specification.

1.1 Apart from this specification, construction of plain and reinforced concrete works shall be in accordance with the Indian Standard Code practice for "Plain and Reinforced Concrete" IS:456 and other relevant codes mentioned therein.

1.2 In case of conflict between the clauses mentioned in this specification and those in the Indian Standards, this specification shall govern.

2.0 GRADES OF CONCRETE

Unless otherwise specified on drawings or called for in the schedule of rates, the grades of concrete shall generally be as per Table 1.

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TABLE - 1

Grade	Specified Characteristic
Designation	Compressive Strength of 15cm. cube at 28 days [N/mm ²]
M15	15
M20	20
M25	25
M30	30
M35	35
M40	40

The characteristic strength is defined as the strength of material below not more than five (5) percent of the test results are expected to fall.

3.0 TYPE OF CONCRETE MIX

3.1 The concrete shall be either nominal mix concrete or design mix concrete as defined in IS:456. Unless otherwise specified or given in schedule of rates, all lean and structural concrete shall be nominal mix and design mix types respectively.

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3.2 Nominal Mix Concrete

This concrete shall be made (without preliminary tests) by adopting nominal concrete mix with proportions of materials as specified in Table 1A. All the relevant requirements for this type of concrete as given in IS:456 shall apply.

TABLE - 1A

PROPORTIONS FOR NOMINAL MIX CONCRETE

of per 50 cement	Grade of concrete	Total quantity of dry aggregates by mass per 50 kg of cement, to be taken as the sum of the individual masses of fine and coarse aggregates (max)	Proportion of fine aggregate to coarse aggregate (by weight)	Quantity water kg of (max.)
Liters				Kgs
	M 5	800	Generally 1:2 but	60
	M 7.5	625	subject to an upper	45
	M 10	480	limit of 1:1 1/2	34
	M 15	350	and lower limit of	32
	M 20	250	1:2 1/2	30

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Note: The proportions of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger. Graded coarse aggregates shall be used.

3.3 Design Mix Concrete

The mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than appropriate values given in Table - 1.

4.0 PROPORTIONING

Proportioning, as used in this specification, shall mean the process of determining the proportions of the various ingredients to be used to produce concrete of the required strength, workability, durability and other properties.

The Engineer-in-Charge shall verify the strength of the concrete mix, before giving his sanction of its use. However, this does not absolve the Contractor of his responsibility as regards achieving the prescribed strength of the mix. If during the execution of the work, cube tests show lower strengths than required, the Engineer-in-Charge shall order fresh trial mixes to be made by the Contractor. No claim to alter the rates of concrete work shall be entertained due to such changes in mix variations. Any variation in cement consumption shall be taken into consideration for material reconciliation. Preliminary mix designs shall be established well ahead of start of work.

4.1 Maximum Density

Suitable proportions of sand and the different sizes of coarse aggregates for each grade of concrete shall be selected to give as nearly as practicable the maximum density. This shall be determined by mathematical

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means, laboratory tests, field trials and suitable changes in aggregate gradation.

4.2 Water Cement Ratio

Once a mix, including its water cement ratio, has been determined and specified for use by the Engineer in Charge, that water/cement ratio shall be maintained. The Contractor shall determine the water content of the aggregates frequently as the work progresses, and the amount of mixing water shall be adjusted so as to maintain the specified water cement ratio.

4.3 Consistency

The concrete shall have a consistency such that it shall be workable in the required position and when properly vibrated it flows around reinforcing steel, all embedded fixtures etc.

4.4 Workability

4.4.1 The concrete mix proportion so should be such that the concrete is of adequate workability for the placing condition and can be properly compacted with the means available.

4.4.2 The suggested ranges of values of workability of concrete measured in accordance with IS:1199 are indicated in Table 2.

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TABLE-2

Placing Conditions	Degree of Workability	Values of Workability
Concreting of shallow sections with vibration	Very low	20-10 seconds, vee-bee time
		or 0.75-0.80, compacting factor
Concreting of lightly reinforced sections with vibration	Low	10-5 seconds, vee-bee time
		or 0.80-0.85, compacting factor
Concreting of lightly reinforced sections without vibration, or heavily reinforced sections with vibration	Medium	5-2 seconds, vee-bee time
		or 0.85-0.92, compacting factor
		or 25-75 mm, slump for 20 mm* aggregate
Concreting of heavily reinforced sections without vibration	High	Above 0.92, compacting factor
		or 75-125 mm, slump for 20 mm* aggregate.

*For smaller aggregate the values will be lower.

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5.0 BATCHING

In proportioning concrete, the quantity of both cement and aggregate should be determined by weight. Where the weight of cement is determined on the basis of weight of cement per bag, a reasonable number of bags should be weighed periodically to check the net weight. Where the cement is weighed on the site and not in bags it should be weighed separately from the aggregates. Water should be either measured by volume in calibrated tanks or weighed. Any solid admixtures that may be added, may be measured by weight; liquid and paste admixtures by volume or weight. Batching plant, where used, shall conform to IS:4925. All measuring equipment shall be maintained in a clean serviceable condition, and their accuracy periodically checked.

- 5.1 Except where it can be shown to the satisfaction of the Engineer in Charge that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions when required, different sizes being stacked in separate stock piles. The grading of coarse and fine aggregate shall be checked frequently, the frequency for a given job being determined by the Engineer in Charge to ensure that the specified grading is maintained.
- 5.2 Under special circumstances, change from weight batching to volume batching may be permitted by Engineer in Charge on specific request from the Contractor.
- 5.3 The amount of the added water shall be adjusted to compensate for any observed variations in the moisture contents in both fine and coarse aggregates. For the determination of moisture content in the aggregates, IS:2386 (part-III) may be referred to. To allow for the variation in weight of aggregates due to

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variation in their moisture content, suitable adjustments in the weights of aggregate shall also be made. In the absence of exact data, only in the case of nominal mixes, the amount of surface water may be estimated from the values given in Table 3 below:-

TABLE-3

SURFACE WATER CARRIED BY AGGREGATE

Aggregate	Approximate quantity of surface water	
	Percentage by Weight	Liter/M ³
120 Very Wet Sand		7.5
80 Moderately Wet Sand		5.0
40 Moist Sand		2.5
40 Moist Gravel or Crushed Rock	1.25 - 2.5	20 -

5.4 No substitutions in materials used on the work or alterations in the established proportions, except as permitted in 5.3 shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

6.0 CONCRETE MIXING

6.1 The mixing of concrete shall be strictly carried out in an

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approved type of mechanical concrete mixer. The mixing shall be continued until there is a uniform distribution of the material and the mass is uniform in colour and consistency. If there is segregation, after unloading from the mixer, the concrete shall be remixed.

6.2 Mixer

6.2.1 Mixers shall comply with IS:1791 and shall be maintained in satisfactory operating condition. Mixer drum shall be kept free of hardened concrete and blades shall be replaced when worn down more than ten percent (10%) of their depth. Should any mixer at any time produce unsatisfactory results, leak mortar or cause waste of materials, its use shall be promptly discontinued until it is repaired.

6.2.2 Mixing Time

Mixing time shall be as indicated in the following table. Excessive mixing requiring additions of water shall not be permitted. Time shall start when all solid materials are poured in the revolving mixer drum, provided that all of the mixing water shall be introduced before one fourth of the mixing time has elapsed. The Engineer-in-Charge may, however, direct a change in the mixing time, if he considers such a change necessary.

Capacity of Mixer	Minimum Mixing Time
2 Cu.M or less	1-1/2 Minutes.
3 Cu.M	2-1/2 Minutes.
5 Cu.M	3 Minutes.

All records and charts for the batching and mixing operations shall be prepared as specified and as per the instructions of the Engineer in Charge.

Receipt



6.3 Hand Mixing

Normally, hand mixing of concrete shall not be permitted. However this may be allowed by the Engineer in Charge in special cases (such as far away isolated places). Ten percent (10%) extra cement shall have to be added to the normal mix when mixed by hand. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. No extra payment shall be made to the Contractor for mixing by hand or for using extra cement due to hand mixing. However, extra cement consumed shall be considered for reconciliation purpose.

6.4 Admixtures

Admixtures shall be used in concrete only with the approval of the Engineer in Charge.

7.0 TRANSPORTATION, PLACING AND COMPACTION

7.1 General

Before any concrete is placed the entire placing programmed and transporting arrangement showing deployment of equipment, layout, proposed procedures and methods shall be submitted in writing to the Engineer in Charge 24 hrs. Prior to concreting for approval. No concrete shall be placed until his approval has been received. The Engineer's-in-Charge approval for pouring concrete shall be taken as conveyed when concrete pour card is signed.

7.1.1 Chuting

The use of long troughs, chutes and pipes for conveying the concrete from the mixer to the forms shall be permitted only on written authorization from the Engineer-in-Charge. In case an inferior quality of concrete is

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produced by the use of such conveyors, the Engineer-in-Charge may order discontinuance of their use and the substitution of a satisfactory method of placing. Open troughs and chutes shall be equipped with baffles and be in short lengths to avoid segregations. Chutes shall be designed so that the concrete is to some extent remixed at the lower end by passing down through a funnel shaped pipe or drop chute. Alternatively they should discharge into a storage hopper from which the concrete should be transported to the point of placing by wheel barrows or other means. Where drop chutes are used, a sufficient number must be provided so that the concrete discharged from the chute is not required to flow laterally more than 1.0M. Where a drop chute is swung from the vertical, the bottom two sections must be maintained in a vertical position to avoid segregation. The addition of water at any point in the system of transportation, to facilitate the movement of concrete shall not be permitted. All chutes, troughs and pipes, shall be kept clean and free from coatings of hardened concrete by thoroughly flushing them with water after each run; water used for flushing shall be discharged clear of the structure. Concrete shall not be permitted to fall freely from a height of more than 1.5M nor to strike the forms at an angle.

7.1.2 Vibrators

Concrete shall be compacted with mechanical vibrating equipment supplemented, if necessary to obtain consolidation by hand spading, ridding and tamping. The vibrators shall be immersion type with operational frequency ranging between 8000 to 12,000 vibrations per minute. Vibrators shall be used in sufficient number of units and power to properly consolidate all concrete.

Immersion type vibrators shall be inserted in a vertical position at intervals of about 600mm, depending upon the mix, the equipment used, and continued experience on work. The vibrators shall be withdrawn slowly. The spacing shall provide some overlapping of the area vibrated at each insertion. In no case shall vibrators be used to transport concrete inside the forms. Over vibration shall not be permitted. Hand tamping in some cases may be allowed subject to be approval of the Engineer-in-Charge.

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In placing concrete inlayers which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, bonding and molding of the concrete between the succeeding batches.

The vibrators shall penetrate the layer being placed and also penetrate the layer below while the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.

Care shall be taken to prevent contact of vibrators against reinforcement steel. Vibrators shall not be allowed to come in contact with forms.

The use of form work vibrators shall not be permitted for compaction of in-situ concrete without specific authorization of the Engineer-in-Charge.

The use of surface vibrators of screed board type shall not be permitted for consolidation of concrete under ordinary conditions. However for thin slabs (of thickness less than 200mm) surface vibration by such vibrators may be permitted, upon approval of the Engineer-in-Charge.

7.2 Transportation

All concrete shall be conveyed from the mixer to the place of final deposit as rapidly as possible in suitable buckets, dumpers, containers or conveyors which shall be mortar leak tight. Care shall be taken to prevent the segregation or loss of the ingredients and maintaining the required work ability.

During hot or cold weather shall be transported in deep containers. Other suitable methods to reduce the loss of water by evaporation in hot weather and heat loss in cold weather may also be adopted. All equipment used for transporting and placing of concrete shall be maintained in clean condition. All buckets, hoppers, chutes, dumpers and other equipment shall be thoroughly cleaned after each period of placement.

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7.3 Placing and compaction

7.3.1 Before placing concrete all soil surface upon which or against which concrete is to be placed shall be well compacted and free from standing water, mud or debris. Soft or yielding soil shall be removed and replaced, with lean concrete or with selected soils and compacted to the density as directed by Engineer-in-Charge. The surface of absorption soil (against which concrete is to be placed) shall be moistened thoroughly so that moisture is not drawn from the freshly placed concrete.

Concrete shall not be so placed until the formwork, the placement of reinforcing steel, embedded parts etc. have been inspected and approved by the Engineer-in-Charge. Any accumulated water on the surface of the bedding layer shall be removed by suitable means before start of placement. No concrete shall be placed on a water covered surface.

7.3.2 Concrete shall be discharged by vertical drop only and the drop height shall be not exceed 1.5M thorough out all stages of delivery until the concrete comes to rest in forms.

7.3.3 Concrete shall be deposited as near as practicable in its final position to avoid remanding. Concrete shall be placed in successive horizontal layers. The bucket loads, or other units of deposit, shall be spotted progressively along the face of the layer with such over-lap as will facilitate spreading the layer of uniform depth and texture with a minimum of hand shoveling. Any tendency to segregation shall be corrected by shoveling stones into mortar rather than mortar on the stones. Such a tendency for segregation shall be corrected by redesign of mix, change in process or other means, as directed by the Engineer-in-Charge.

All struts, stays and braces (serving temporarily to hold the forms in correct shape and alignment pending the placing of concrete at their locations) shall be removed when the concrete placing has reached an elevations rendering their service unnecessary. These shall not be

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buried in the concrete. Concrete shall be thoroughly compacted with vibrators and fully worked around the reinforcement, embedded fixtures and into corners of formwork before setting commences. In no case this shall be subsequently disturbed. Methods of placing shall be such as to preclude segregation. The formation of stone pockets or mortar bondage in corners and against face forms shall not be permitted. Should these occur, they shall be dug out, performed and refilled to sufficient depth and shape for thorough bonding as directed by the Engineer-in-Charge. Care shall be taken to avoid displacement of reinforcement or movement of formwork.

7.3.4 Unless otherwise approved, concrete shall be placed in single operation to the full thickness of slabs, beams and similar members. Concrete shall be placed continuously until completion of the part of the work between construction joints or as directed by the Engineer-in-Charge.

7.3.5 The method of placing and compaction employed in any particular section of the work shall be to the entire satisfaction of the Engineer-in-Charge.

7.3.6 During hot weather (atmospheric temperature above 40°C) or cold weather (atmospheric temperature below 5°C), the concreting shall be done as per the procedure set out in IS:7861.

7.3.7 Concrete that has been left standing and become stiffened shall not be deposited in the work.

7.4 Items Embedded in Concrete

7.4.1 Concreting shall not be started unless the electrical conduits, pipes, fixtures etc., wherever required, are laid by

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the concerned agency. The Contractor shall afford all the facilities and maintain co-ordination of work with other agencies engaged in electrical and such other work as directed by the Engineer-in-Charge.

7.4.2 Before concreting, the Contractor shall provide, fabricate and lay in proper position all metal inserts, anchor bolts, pipes etc. (which are required to be embedded in concrete members) as per relevant drawings and directions of Engineer in Charge.

8.0 CONSTRUCTION JOINTS

8.1 Construction joints shall be provided in position as shown or described on the drawings or as directed by the Engineer-in-Charge. Such joints shall be kept to the minimum. These shall be straight and at right angles to the direction of main reinforcement.

8.2 In a column, the joint shall be formed about 100mm to 150mm below the lowest soffit of the beams framing into it. Concrete in a beam and slab shall be placed throughout without a joint but if the provision of a joint is unavoidable, the joint shall be vertical and located within 1/3 to 1/4 of the span.

8.3 When stopping the concrete on a vertical plane in slabs and beams, an approved stop board shall be placed with necessary slots for reinforcement bars. The construction joints shall be keyed by providing a triangular or trapezoidal fillet nailed on the stop board. Inclined joints shall not be permitted. Any concrete flowing through the joints of stop board shall be removed soon after the initial set. When concrete is stopped on a horizontal plane, the surface shall be roughened and cleaned after the initial set.

8.4 When the work has to be resumed on a surface which has

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hardened, such surface shall be roughened to expose the tips of the coarse aggregate. It shall then be swept clean and thoroughly wetted. For vertical joints neat cement slurry shall be applied on the surface before it is dry. For horizontal joints the surface shall be covered with a layer of mortar about 10 to 15mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This layer of cement slurry or mortar shall be freshly mixed and applied immediately before placing the concrete.

- 8.5 Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of particles of aggregate. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry. On this surface, a layer

of concrete not exceeding 150mm in thickness shall first be placed and shall be well rammed against old work, particular attention being paid to corners and close spots; work thereafter shall proceed in normal way.

9.0 SEPARATION JOINT

Separation joint shall be obtained by using an approved alkathene sheet struck on the surface against which concrete shall be placed. Adequate care should be taken to cause no damage to the sheet.

10.0 EXPANSION JOINTS

Expansion joints in structures shall be formed in the positions and to the shapes shown in the relevant drawings. Joints shall be filled with joint filling material as stipulated in the drawings/schedule of rates.

11.0 WATER STOPS

The water stops shall be of G.I./PVC/Rubber as specified in the relevant drawings. G.I. water stops shall be fabricated from "22" gauge sheets of specified width and bent, folded to shape, soldered and fixed as per the drawings. The G.I. sheets shall have medium coating of

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zincas per IS:277. The PVC and rubber water stops shall be of ribbed/serrated type with central bulb and of minimum thickness 6 mm.

Water stops shall be accurately cut, fitted and integrally joined as per manufacturer's specifications to provide a continuous, watertight diaphragm at all points.

The water stops shall be located and embedded at expansion/construction joints as indicated in the drawings.

Adequate provision shall be made for the support and protection of water stops during the progress of the work. Damaged water stops shall be replaced and / or repaired as directed.

12.0 PROTECTION OF FRESHLY LAID CONCRETE

Newly placed concrete shall be protected by approved means from rain, sun and wind. Concrete placed below the ground level shall be protected from falling earth during and after placing. Surface shall be kept free from contact with such ground or with water draining from such ground during placing of concrete for a period of at least 3 days unless otherwise directed by the Engineer in Charge. The ground water around newly poured concrete shall be kept to an approved level by pumping of other approved means of drainage and adequate steps shall be taken to prevent floatation and flooding. Steps shall be taken to protect immature concrete from damage by debris, loading, vibration, abrasion, mixing with deleterious materials that may in the opinion of the Engineer in Charge impair the strength and / or durability of the concrete.

13.0 CURING

13.1 Curing of concrete shall be in accordance with IS:456. Concrete shall be cured by keeping it continuously moist wet for the specified prior of time to ensure complete hydration and hardening. Curing shall be started after 8 hours of placement of concrete and hot weather after 4

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hours.

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances such as hose, sprinklers etc. A layer of sacking, canvass, hessian, or other approved material which will hold moisture for long periods and prevent loss of moisture from the concrete shall be used as covering. Type of covering which would stain, disfigure, or damage the concrete during and after the curing period shall not be used. Only approved covering shall used for curing.

Exposed surfaces of concrete shall be maintained continuously in a damp or wet condition for at least for at least the first 7 days after placing except that high early strength concrete shall be so maintained for at least the first 3 days. For other types of concrete using low heat or supersulphated or high alumina cement etc., curing period shall be as directed by the Engineer in Charge.

The Contractor shall have all equipment and materials required for curing on hand and ready to use before concrete is placed.

For curing the concrete in pavements, floors, flat roofs or other level surfaces the pending method of curing is preferred after the expiry of first 24 hours during which (i.e. first 24 hours) the concrete shall be cured by use of wet sacking, canvass, Hessian etc. The minimum water depth of 25 mm for pending shall be maintained. The method of containing the pounded water shall be approved by the Engineer-in-Charge. The pounded areas shall be kept continuously filled with water and leaks, if any, shall be promptly repaired.

Approved curing compounds may be used in lieu of moist curing with the permission of Engineer-in-Charge. Such compounds shall be applied to shall exposed surfaces of the concrete as soon as possible after the concrete has set.

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14.0 DAMP PROOF COURSE (DPC)

The 40 mm thick Damp proof course shall consist of plain cement concrete of nominal mix 1:1-1/2:3 by volume (1 Cement : 1-1/2 Coarse Sand : 3 Crushed Stone Aggregates) with 10 mm and sown size graded aggregate, unless otherwise specified.

The Damp proof Course shall be laid at plinth level of brick walls, flush with the floor surface and shall not be carried across doorways.

Before laying, the top surface of wall shall be thoroughly cleaned and watered. The D.P.C. shall be laid in layers of 20 mm thickness retaining the edges by necessary formwork and shall be well tamped and trowel led to smooth finish.

The layer shall be cured by keeping the surface wet for 40 hours and after it has dried, two coats of hot bitumen of grade A90/S90 conforming to IS:73 shall be applied over it at the rate of 1.7Kg/M². Over this, the second layer of 20 mm thick concrete shall be laid and cured as described in case of the first layer and two coats of hot bitumen at the rate of 1.7 Kg / M² shall be applied again in a similar manner. Over this, dry sharp sand shall be sprinkled evenly.

15.0 FIELD TESTS

15.1 Grading Test

Grading test on coarse and fine aggregates shall be carried out as per IS:2386 at intervals specified by Engineer-in-Charge.

15.2 Vee-Bee Test/Slump Test of Concrete

At least one Vee-Bee Test/Slump Test shall be made for every compressive strength test carried out. More frequent tests shall be made if there is a distinct change in working conditions or if required by the Engineer-in-

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Charge.

15.3 Strength Test of Concrete

15.3.1 Samples from fresh concrete shall be taken as per IS:1199 and cubes shall be made, cured and tested at 28 days in accordance with IS:516.

In order to get a relatively quicker idea of the quality of concrete, optional tests on beams for modulus of rupture at 72" +2 hours or at 7 days, or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength tests. For this purpose, the values given in Table- 4 may be taken for general guidance in the case of concrete made with ordinary portland cement. In all cases, the 28 days compressive strength specified in Table -I shall be the criterion for acceptance or rejection of the concrete. If, however, from tests carried out in a particular work over a reasonably long period, it has been established to the satisfaction of Engineer-in-Charge that a suitable ratio between 28 days compressive strength and the modulus of rupture at 72 +2 hours or compressive strength at 7 days may be accepted, the Engineer-in-Charge may suitably relax the frequency of 28 days compressive strength specified in Cl.16.3.4 provided the expected strength values at the specified early age are consistently met.

TABLE - 4

OPTIONAL TESTS REQUIREMENT OF CONCRETE

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Grade of Concrete	Compressive strength	Modulus of rupture	
	on 15cm. cubes, min. at 7 days	by beam test, min. at 72+2 hrs. at 7 days	
	(N/mm ²)	(N/mm ²)	(N/mm ²)
M 15	10.0	1.5	2.1
M 20	13.5	1.7	2.4
M 25	17.0	1.9	2.7
M 30	20.0	2.1	3.0
M 35	23.5	2.3	3.2
M 40	27.0	2.5	3.4

15.3.2 Procedure: A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested, that is the sampling should be spread over the entire period of concreting and cover all mixing units.

15.3.3 Frequency of sampling: The minimum frequency of sampling of concrete for each grade shall be in accordance with the following :

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Quantity of concrete in Number of samples the work 3

1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51 and above	4 Plus one additional sample for each additional 50 M3 or part thereof.

NOTE: At least one sample shall be taken from each shift.

15.3.4 Test Specimen: Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or at the time of striking the formwork, or to determine the duration of curing, or to check the testing error. Additional cubes may also be required for testing cubes by accelerated methods as described in IS:9013. The specimen shall be tested as described in IS:516.

15.3.5 Test Strength of Sample: The test strength of the sample shall be the average of the strength of three specimens. The individual variation should not be more than +15 percent of the average.

15.3.6 Standard Deviation

i) Standard deviation based on test results:

a) Number of test results: The total number of test

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results required to constitute an acceptable record for calculation of standard deviation shall be not less than 30. Attempts should be made to obtain the 30 test results, as early as possible, when a mix is used for the first time.

b) Standard deviation to be brought up to date: The calculation of the standard deviation shall be brought up to date after every change of mix design and least once a month.

ii) Determination of Standard Deviation :

a) Concrete of each grade shall be analyzed separately to determine its standard deviation.

b) The standard deviation of concrete of a given grade shall be calculated using the following formula from the results of individual tests of concrete of that grade obtained as specified in 15.3.5.

Estimated standard deviation(s) = Where
= deviation of the individual test strength from the average strength of n samples

n = number of sample test results.

c) When significant changes are made in the production of concrete batches (for example changes in the materials used, mix design, equipment of technical control), the standard deviation value shall be separately for such batches of concrete.

iii) Assumed Standard Deviation: Where sufficient test results for a particular grade of concrete are not available, the value of standard deviation given in Table - 5 may be assumed.

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TABLE - 5

ASSUMED STANDARD DEVIATION

Grade of concrete	Assumed standard deviation (N/mm ²)
M 15	3.5
M 20	4.6
M 25	5.3
M 30	6.0
M 35	6.3
M 40	6.6

However, when adequate past records for a similar grade exist and justify to the designer a value of standard deviation different from that shown in Table - 5, it shall be permissible to use that value.

Sample



15.3.7 Acceptance Criteri

15.3.7.1 The concrete shall be deemed to comply with the strength requirements if :

- a) every sample has a test strength not less than the characteristic value; or
- b) the strength of one or more samples though less than the characteristic value, is in each case not less than the greater of :

- (i) the characteristic strength minus 1.35 times the standard deviation; and
- (ii) 0.80 times the characteristic strength; and the average strength of all the samples is not less than the characteristic strength plus $\left(\frac{1.65}{\sqrt{n}} \right)$ times the (Number of Samples) standard deviation.

15.3.7.2 The concrete shall be deemed not to comply with the strength requirements if:

- a) the strength of any sample is less than the greater of:
- b)
 - i) the characteristic strength minus 1.35 times the Standard deviation; and
 - ii) 0.80 times the characteristic strength; or
- b) the average strength of all the samples is less than the characteristic strength plus $\left(\frac{3}{\sqrt{n}} \right)$ (1.65 - -----) times the standard Number of samples) deviation)

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- 15.3.7.3 Concrete which does not meet the strength requirements as specified in 15.3.7.1 but has a strength greater than that required by 15.3.7.2 may, at the discretion of the Engineer-in-Charge be accepted as being structurally adequate without further testing.
- 15.3.7.4 If the concrete is deemed not to comply pursuant to
15.3.7.5 the structural adequacy of the parts affected shall be investigated as stipulated in Clause 16.0.
- 15.3.7.5 Concrete of each grade shall be assessed separately.
- 15.3.7.6 Concrete shall be assessed daily for compliance.
- 15.3.7.7 Concrete is liable to be rejected if it is porous or honey-combed; its placing has been interrupted without providing a proper construction joint; the reinforcement has been displaced beyond the tolerances specified; or construction tolerances have not been met. However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer-in-Charge.

16.0 INSPECTION_OF_STRUCTURES

Immediately after stripping the formwork, all concrete shall be carefully inspected and any defective work of small defects either removed or made good before concrete has thoroughly hardened.

Scupts



16.2 Testing of structures or parts of structures

16.2.1 In case the results of work test cubes do not comply with the specified strength requirements of there is reasonable doubt regarding the strength of concrete used either due to poor workmanship or materials, the Engineer-in-Charge may instruct the Contractor to perform additional tests based on EIL Guideline 8-68-4008 (Quality Assessment Test of Hardened Concrete) and/or load test (as per the method and manner specified in Clause 16.2.2) to ascertain the quality of concrete. These tests shall also be required to be carried out in the event the Engineer-in-Charge is doubtful regarding the adequacy of strength of the structure sue to suspected overloading during construction, premature removal and non conformance to specification of formwork, improper curing or any other reason.

The number and type of tests to be carried out shall be determined by the Engineer-in-Charge whose decision shall be final and binding on the Contractor.

16.2.2 Load Test

Load test shall be carried out as soon as possible after expiry of 28 days from the time of placing of concrete. The structure shall be subjected to a load equal to full dead load of the structure plus 1.25 times the imposed load for a period of 24 hours and then the imposed load shall be removed. The deflection due to imposed load only shall be recorded. If within 24 hours of removal of the imposed load the structure does not recover at least 75 percent of the deflection under superimposed load, the test shall be repeated after a lapse of 72 hours. If the recovery is less than 80 percent, the structure shall be deemed to be unacceptable. If the maximum deflection in mm, shown during 24 hours underload is less than $40 L^2/D$, where L is the effective span in meters and D the overall depth of the section in mm, it is not necessary for the recovery to be measured and the recovery provision as given above shall not apply.

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17.0 FINISHING OF CONCRETE

17.1 On striking the formwork, all surface defects such as bulges, ridges and honey-combing etc. observed shall be brought to the notice of the Engineer-in-Charge. The Engineer-in-Charge may, at his discretion allow rectification by necessary chipping and packing or grouting with concrete or cement mortar. However, if honey-combing or sagging are of such extent as being undesirable, the Engineer-in-Charge may reject the work totally and his decision shall be binding. No extra payment shall be made for rectifying these defects, demolishing and reconstructing the structure. All burrs and uneven faces shall be rubbed smooth with the help of carborandum stone.

The surface of non-shuttered faces shall be smoothed with a wooden float to give a finish similar to that of the rubbed down shuttered faces. Concealed concrete faces shall be left as from the formwork except that honey-combed surface shall be made good as specified above. The top faces of slabs not intended to be covered shall be levelled and floated to a smooth finish to the levels or falls shown on the drawings or as directed. The floating shall not be executed to the extent of bringing excess fine materials to the surface. The top faces of slabs intended to be covered with screed, granolithic or similar finishes, shall be left with a rough finish.

17.2 Repair and Replacement of Unsatisfactory Concrete

Repairs shall be made as soon as possible after the forms are removed and before the concrete becomes too hard. Stone pockets, segregation patches and damaged areas shall be chipped out and the edges undercut slightly to form a key. All loose material shall be washed out before patching. No excess water shall be left in the cavity, but the concrete shall be damp while retaining some of its natural suction.

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A good bond between the patch and parent concrete shall be obtained by sprinkling dry cement on the wet surface or by throwing mortar with force on to the wetted concrete, or by brush in a coat of thick cement grout of about 1:1 (1 Cement :1 Sand) just before applying the patching material. Before this has dried, the remainder of the patch shall be filled with mortar or concrete, depending on the extent of the repair.

Cement concrete/mortar used in repair of exposed surface shall be made with cement from the same source as that used in concrete and blended with sufficient amount of white portland cement to produce the same colour as in the adjoining concrete. The proportions of ingredients shall be same as those used in parent concrete. The mortar shall be as dry as possible and well compacted into the cavity. All filling shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks after the filling has been cured and dried.

For larger repairs to hardened concrete, necessary formwork bearing tightly at the edges of the cavity shall be provided. Concrete shall be chipped out to a depth of atleast 100 mm and preferably 150 mm. Mortar shall be scrubbed into all surfaces with a wire brush before placing the concrete. Damaged reinforcement shall be adequately spliced with new steel so as to maintain the original strength. Additional reinforcement, if required in the patch, shall be provided as per the instructions of Engineer-in-Charge.

17.3 Curing of Patched Work

Immediately after patching is completed, the patched area shall be covered with an approved non-staining water saturated material which shall be kept wet and protected against sun and wind for a period of 12 hours. Thereafter, the patched area shall be kept continuously wet by a fine spray or sprinkling for not less than 10 days.

Seal



17.4 The use of an epoxy, for bonding fresh concrete used for repairs shall be permitted at the discretion of the Engineer-in-Charge. Epoxy shall be applied in strict accordance with the instructions of the manufacturer.

18.0 CEMENT_WASH

If instructed by the Engineer-in-Charge, the Contractor shall provide one coat of cement wash over the concrete surfaces of foundation, pipe racks, column, walls etc. which are not plastered. Cement used by the Contractor for providing the cement wash shall be taken into account for material reconciliation purposes.

19.0 FORM_WORK

19.1 Forms for concrete shall be of plywood or steel or as directed by the Engineer-in-Charge and shall give smooth and even surface after removal thereof.

If it is desired by the Engineer-in-Charge, the Contractor shall prepare, before commencement of actual work, design and drawings for formwork and get them approved by the Engineer-in-Charge. The form work shall conform to the shapes, lines and dimensions as shown on the drawings within the tolerances given below:

a) Deviation from specified dimensions of cross - 6 mm
section of columns and beams. +12 mm

b) Deviation from dimensions of footings (see note).

(1) Dimensions in plan - 12 mm
+ 50 mm

Accepted



(2) Eccentricity

0.02 times the width of the footing in the direction of deviation but not more than 50 mm.

(3) Thickness

+0.05 times the specified thickness.

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

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19.2 Form Requirement

The formwork shall be true, rigid and adequately braced both horizontally as well as diagonally. The forms shall have smooth and even surface and be sufficiently strong to carry without deformation the dead weight of the green concrete, working load, wind load and also the side pressure exerted by the green concrete. As far as practicable, clamps shall be used to hold the forms together. Where use of nails is unavoidable minimum number of nails shall be used and these shall be left projecting so that they can be easily withdrawn.

Where the rods are used to hold the forms, provision shall be made for removal of a part of each rod at the surface of concrete for a depth of approximately 50mm. The cavities so caused shall be filled and finished with cement mortar in the manner specified in clause 17.

Tie wires shall be permitted only upon approval of the Engineer-in-Charge and shall be cut off flush with the face of the concrete or counter sunk, filled and finished in the manner specified in clause 17.

From joints shall not permit any leakage. The formwork shall be strong enough to withstand the effect of vibrations practically without any deflection, bulging, distortion or loosening of its components. Forms for beams and slabs (span more than 6.0 m) shall have camber of 1 in 500 so as to offset the deflection and assume correct shape and line after desposition of concrete. For cantilevers, the camber at free end shall be 1/100 th of the projected length. Where architectural considerations and adjunctive work are critical, smaller form cambers

shall be adopted as decided by the Engineer-in-Charge.

All vertical wall forms may be designed and constructed

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for the following minimum pressure. The pressure listed in Table - 6 are intended as guide only and the Contractor shall ensure that the formwork is adequately strong and sturdy.

TABLE - 6

Rate of pour in Meter/hour	Pressure Kg/Sq.M	
	100"	240C
0.6	3600	2900
0.9	4000	3200
1.2	4400	3500
1.5	4600	3700

19.3 Inspection of Forms

Temporary openings shall be provided at the base of column and wall forms and other places necessary to facilitate cleaning and inspection. Before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and tight, thoroughly

Dr. Singh



cleaned, properly treated and free from foreign material. The complete form work shall be inspected and approved by the Engineer-in-Charge before the reinforcement bars are placed in position. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete as per the instructions of the Engineer-in-Charge.

19.4 Treatment of forms

The surfaces of forms that would come in contact with concrete shall be treated with approved non-staining release agents such as soft soap, oil, emulsions etc. Care shall be taken that such release agents are kept out contact with the reinforcement.

19.5 Chamfers and fillets

All corner and angles shall be formed with 45° moldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise detailed or specified shall be 25 x 25 mm. For

heavier work chamfers or fillets shall be 50 x 50 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the moulding shall be planed or surfaced to the same texture as the forms to which it is attached.

19.6 Reuse of forms

Before reuse, all forms shall be thoroughly scrapped, cleaned, examined and when necessary repaired and retreated before resetting. Formwork shall not be reused, if declared unfit or un-serviceable by the Engineer-in-Charge.

19.7 Removal of Forms/Stripping Time

In the determination of time for removal of forms, consideration shall be given to the location and character

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of the structures, the weather and other conditions including the setting and curing of the concrete and material used in the mix.

Forms and their supports shall not be removed without the approval of the Engineer-in-Charge. Methods of form removal likely to cause overstressing or damage to the concrete, shall not be adopted. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take the stresses due to its own weight.

In normal circumstances and where ordinary portland cement is used, forms may generally be removed after expiry of following periods.

- | | |
|---|---|
| (a) Walls, columns and vertical faces of all structural members | 24 to 48 hrs as may be decided by the Engineer-in-Charge. |
| (b) Slabs (props left under) | 3 days. |
| (c) Beam Soffits (props left under) | 7 days. |
| (d) Removal of props under slabs: | |
| 1. Spanning up to 4.5 M | 7 days. |
| 2. Spanning over 4.5 M | 14 days. |
| (e) Removal of props under beams and arches: | |

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1. Spanning upto 6 M 14 days.
2. Spanning over 6 M and upto 9 M 21 days.
3. Spanning over 9 M 28 days.

(f) Cantilever Construction

Formwork shall remain till structures for counter acting or bearing down have been erected and have attained sufficient strength (minimum 14 days).

Notes :

1. For rapid hardening cement, 3/7 days of the above mentioned period shall be considered subject to a minimum of 24 hours.
2. For other cement, the stripping time recommended for ordinary Portland cement shall be suitably modified as per the instructions of the Engineer-in-Charge.
3. The number of props left under, their sizes and disposition shall be such as to be safely carry the full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during curing or further construction.
4. Where the shape of the element is such that the formwork has re-entrant angles, the form work shall

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removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.

19.8 Staging/Scaffolding

Staging/scaffolding shall be properly planned and designed by the Contractor. The Contractor shall get it reviewed by Engineer-in-Charge before commencement of work. Double scaffolding sufficiently strong so as to withstand all loads likely to come upon it and having two sets of vertical supports, shall be provided. Where two sets of supports are not possible, the inner end of the horizontal scaffolding member shall rest in a hole provided in the header course only. Only one header for each member shall be left out. Such holes however shall not be allowed in pillars under one metre in which or immediately near the skewbacks of arches. Such holes shall be filled up immediately after removal of scaffolding/staging. The following measures shall be considered while designing and erecting of scaffolding/staging.

- a) Sufficient sills or under pinnings in addition to base plates shall be provided particularly where scaffoldings are erected on soft grounds.
- b) Adjustable bases to compensate for uneven ground shall be used.
- c) Proper anchoring of the scaffolding/staging at reasonable intervals shall be provided in each case with the main structure wherever available.
- d) Horizontal braces shall be provided to prevent the scaffolding/staging from rocking.
- e) Diagonal braces shall be provided continuously from bottom to top between two adjacent rows of uprights.

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- f) The scaffolding/staging shall be checked at every stage for plumb line.
- g) Wherever the scaffolding/staging is found to be out of plumb line it shall be dismantled and reerected afresh and effort shall not be made to bring it in line with a physical force.
- h) All nuts and bolts shall be properly tightened.
- i) Proper and effective supervision of the erection work shall be ensured by the Contractor.
- j) Erection work of a scaffolding/staging under no circumstances shall be left totally to semi-skilled or skilled workmen and shall rather be carried out in the presence of a technically qualified civil engineer of the Contractor.
- k) Wherever steel tubes are used care shall be taken that all the clamps/couplings are firmly tightened so as to avoid any slippage.

20.0 REINFORCEMENT

- 20.1 Reinforcement shall be cut, bent to shape and dimensions as shown in the bar bending schedules/drawings. In normal course the bar bending schedule shall be supplied to the Contractor, however, in case, bar bending schedule is not provided, the Contractor shall develop the same at no extra cost to the Owner and get it reviewed by the Engineer-in-Charge. The Contractor shall check the bar bending schedule (issued by the Owner) prior to fabrication and satisfy himself about the correctness of

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the same.

20.2 Straightening, Cutting and Bending

Procedure for cutting and bending shall be as given in IS:2502.

Cold twisted deformed bars shall be bent cold. Bars larger than 25 mm in size (except cold twisted deformed bars) may be bent hot at cherry red heat to a temperature not exceeding 850°C as per the instructions of the Engineer-

in-Charge. The bars shall be allowed to cool gradually without quenching.

Bars shall be bent in slow and regular movement to avoid fractures. Bars which develop cracks or splits after bending shall be rejected. A second bending of reinforcement bars shall be avoided but when reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care should be taken to ensure that at no time is radius of the bend less than 4 x bar diameter for plain mild steel or 6 x bar diameter for deformed bars. Care shall be also be taken when bending back bars to ensure that concrete around the bars is not damaged. All bars shall be properly tagged for easy identification.

20.3 Placing and Fixing

All reinforcement shall be cleaned to ensure freedom from loose mill scale, loose rust, oil, grease or any other harmful material before placing them in position.

All reinforcement shall be fixed in the correct position and shall be properly supported to ensure that displacement will be not occur when the concrete is placed.

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The reinforcement bars shall be tied at every intersections by two strands of 16 SWG black sqft annealed binding wire. Crossing bars shall not be tack welded for assembly of reinforcement. The reinforcement bars shall be kept in position by using the following methods.

- a) In case of beam and slab construction, precast cover blocks (having the same cement sand contents as the concrete which shall be placed) of size 40 x 40 mm and thickness equal to the specified covers shall be placed firmly in between the bars and forms so as to secure and maintain the specified covers over the reinforcement.

When reinforcement bars are placed in two or more layers in beams, the vertical distance between the horizontal bars shall be maintained by introduction spacer bars at 1 to 1.2m centre to centre.

- b) In case of thick rafts & pile caps having two or multi layers of reinforcement, the vertical distance between the horizontal bars shall be maintained by introducing suitable chairs, spacers, etc.
- c) In case of columns and walls, the vertical bars shall be kept in position by means of timber templates with slots accurately cut in them. The templates shall be removed after the concreting has been done it.
- d) Exposed portions of reinforcement bars shall not be subjected to impact or rough handling and workman will not be permitted to climb on extending bars until the

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concrete has attained sufficient strength so that no movement of the bars in the concrete is possible.

20.4 Splicing/Overlapping

Only bars of full length shall be used as shown in the drawings. But where this can not be done, overlapping of bars shall be done as directed by the Engineer-in-Charge. Where practicable, the overlapping bars shall not touch each other, but these shall be kept apart by 25 mm or 1.25 times the maximum size of the coarse aggregate whichever is greater. But where this is not possible, the overlapping bars shall be tied with two strands of 16 SWG black soft annealed binding wire. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending moment is maximum.

20.5 Welded Joints

Welding of reinforcing bars shall not be permitted without the written permission of the Engineer-in-Charge. Where welding is permitted, it shall be in accordance with the recommendations of IS:2751 and IS:9417. Welded joints shall be located at suitable staggered positions. Tests shall be made to prove that the joints are of the full strength of the bars.

20.6 Mechanical Connections

The mechanical splices in reinforcement by means of couplers, clamps etc. shall be used (as per manufacturer's specifications) with the written approval of the Engineer-in-Charge. However, tests shall be made to prove that the connections are of the full strength of the bars.

20.7 Tolerances

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Unless otherwise specified by the Engineer-in-Charge, reinforcement shall be placed within the following tolerances :

(a) For effective depth 200mm or less +10 mm

(b) For effective depth more than 200 mm +15 mm

The cover shall in no case be reduced by more than one third of specified cover or 5 mm whichever is less.

20.8 Substitution

When specified diameter of reinforcement bars is not available, the Contractor shall use other diameter of reinforcement bars on written approval of the Engineer-in-Charge.

20.9 Cover

Cover to reinforcement shall be as indicated on the drawings and in their absence as directed by the Engineer-in-Charge.

21.0 PRECAST CONCRETE

21.1 Specifications contained in clauses above regarding concrete, formwork and reinforcement shall apply in addition to the clauses given as under. The Contractor shall get the precasting bed approved by the Engineer-in-Charge prior to the start of work.

21.2 Necessary lifting hooks of 12 mm diameter M.S. rounds shall be provided for handling as indicated in drawings or as directed by the Engineers-in-Charge.

21.3 Unless otherwise specified, the exposed surface of precast members shall be finished smooth with 1:3 (1 Cement : 3

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sand) cement mortar. Surface used as walkways shall be given a non-skid finish.

21.4 The precast concrete units shall be marked clearly on top surface with the letter "T" for identification of surfaces at the time of erection and shall be stored until required for erection. The precast units shall be handled and erected by methods approved by Engineer-in-Charge to protect them from damage.

21.5 The Contractor shall take all necessary precautions for safe handling during the course of erection. The Contractor shall replace at his own expense all such units which are damaged during the course of erection. Cement used for a damaged/rejected precast elements shall not be taken into account for material reconciliation.

22.0 PAYMENT

22.1 Plain and Reinforced Concrete

22.1.1 Payment for plain and reinforced cement concrete (cast in-situ) shall be made on cubic meter [M3] basis of the volume of the actual finished work done or as per approved construction drawings, whichever is less and shall be inclusive of providing pockets, openings, recesses of all sizes, chamfers, fillets construction joints, cement wash, curing etc. The rates shall be deemed to include complete cost of taking and testing concrete cubes and carrying out other tests as per specifications and as directed by Engineer-in-Charge.

22.1.2 The rate shall however be exclusive of reinforcement metal inserts, pipe sleeves, formwork and bars. Where the strength of concrete mix (nominal or design) as indicated by tests, lies in between the strengths of any two grades given in clause 2.0 and it is accepted by the Owner/Engineer-in-Charge, such concrete shall be

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classified as a grade belonging to the lower of the two grades between which it lies. In case the cube strength shows higher results than those specified for the particular grade of the concrete, it shall not be placed in the higher grade nor shall the Contractor be entitled for any extra payment on such account. The concrete giving lower strength than specified may be accepted at reduced rates after satisfying the safety of the structure by checking it with devices such as impact hammer, load test etc; or rejected entirely at the discretion of the Engineer-in-Charge. The rejected concrete shall be dismantled at no extra cost to the owner and no payment shall be made for the concrete so rejected and the formwork and reinforcement used for the same. In case the concrete of lower strength can be improved by carrying out some strengthening measures entirely at the discretion of the Engineer-in-Charge, then the said measures shall be carried out by Contractor at his own cost. If the Contractor is able to make up the strength to the required grade by such improvement measures, payment shall be made for the grade achieved.

However, if the strength of concrete is not made up to the strength of required grade, then no payment whatsoever shall be made for any improvement measures undertaken by the Contractor and payment shall be made only for the lower strength if accepted by the Engineer-in-Charge.

22.1.3 Deductions for openings, pockets etc. shall be as specified in relevant Indian Standard Codes.

22.2 Form Work

Unless otherwise specified, payment for form work shall be on square meter [M²] basis of the actual area in contact with the concrete cast. The rates shall be inclusive of keeping the formwork for the full period as specified in the above clauses and removing the same

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after the period is over. No extra payment shall be made for providing scaffolding/staging.

Superior quality form work for exposed/architectural concrete work shall be measured and paid separately under the relevant item in the schedule of rates.

22.3 Reinforcement

22.3.1 Payment for plain round mild steel reinforcement bars and high yield deformed bars shall be on the basis of weight in metric tons. The weight shall be derived from the sizes and corresponding unit weights given in handbook of Bureau of Indian Standards. Standards hook lengths, chairs, spacer bars and authorized laps only shall be included in the weight calculated. Binding wire shall not be weighed nor otherwise measured. Measurements for weight shall not include cutting allowance, etc.

22.3.2 Rate quoted for reinforcement should include cost of supplying decoying, straightening, cleaning, cutting, bending, placing, binding, welding if required and Providing necessary cover blocks of concrete.

22.3.3 Payment for mechanical threaded couplers shall be made on number basis (each). The rate shall include supply of complete assembly, fixing, testing etc

22.4 Damp proof Course (D.P.C)

22.4.1 Payment shall be made on square meter basis of the area laid inclusive of form work, curing, providing and applying bitumen, supplying and spreading sand over bitumen etc.

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PLASTERING & POINTING

5.1 Materials

5.1.1 Cement:

Cement shall conform to "Specification no. 6-68-02 'Material' Clause No. 5.0" of "Technical Specification for Civil and Structural Works" unless otherwise specified.

5.1.2 Sand:

Sand for plastering and pointing shall conform to IS 1542. Sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain any appreciable amount of silt, clay balls or pellets. Sand shall not contain harmful impurities such as iron pyrites, coal particles, lignite, mica shale etc.

Sand whose grading falls outside the limits of IS 460 due to excess or deficiency of coarse or fine particles shall be processed to comply with the standards.

Fine sand shall be obtained from river beds not affected by tidal water of the sea and shall be clean, sharp and free from excessive deleterious matter. The sand shall not contain more than 8 percent of mud and silt as determined by field test with a measuring cylinder.

5.1.3 Water:

Water for plastering and pointing shall conform to 'Specification No. 6068-02 'Material', clause No. 2.0 of "Technical Specification for Civil and Structure Works".

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5.1.4 Cement Mortar

Preparation of cement mortar shall conform to "Specification No. 6-68-09 'Brick Masonry', clause no. 3.0" of 'Technical Specification of Civil and Structural Work' unless otherwise mentioned.

5.2 Workmanship

5.2.1 Preparation of background surface

The surface shall be cleaned off all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be roughened by wire brushing or hacking for non-hard and hard surfaces respectively. Projections on surfaces shall be trimmed wherever necessary to get even surfaces. In case of brick/stonemasonry, raking of joints shall be carried out wherever necessary. The masonry shall be allowed to dry out for sufficient period before carrying out the plaster work. The masonry shall not be soaked but only damped evenly thereafter before applying the plaster.

In case of concrete work, projecting burrs of mortar formed due to the gaps of joints in shuttering shall be removed. Such surface shall be scrubbed clean with wire brushes. The surface shall be pock marked with a pointed tool at spacing of not more than 50mm. centers, the pocks being made not less than 3 mm. deep to ensure a proper key for the plaster. The surface shall be washed off and cleaned of all oil, grease etc. and well wetted before the plaster is applied.

5.3.2 Sequence of Operations:

For external plaster, the plastering operations shall be started from the top floor and carried downwards. For internal plaster, the plastering may be started wherever the building frame, roofing, and brick work are ready.

The surfaces to be plastered, shall first be prepared as described in 'Preparation of background surface' in

Swaps



clause 5.3.1.

The first underlay shall then be applied to ceilings. After the ceiling plaster is complete and scaffolding for the same removed, plastering on wall shall be started.

After a suitable time interval as detailed under various types of plaster in subsequent paras, depending upon the type of mortar, the secondary layers if required shall be applied. After a further suitable time interval as detailed under various type of plaster in subsequent paras, the finishing coat shall be applied first to the ceiling and then to the walls.

Plastering of comices, decorative features, etc. shall be completed before the finishing coat is applied. Unless otherwise specified Corners and edges shall be rounded off to a radius of 25mm. such rounding off shall be completes along with the finishing coat to prevent any joint marks showing out later.

5.3.3 Scaffolding/Staging:

Scaffolding/staging for plastering/pointing shall be as 'Specification No. 6-68-09. Brick Masonry, clause no. 5.0' of 'Technical Specification for Civil and Structural Works'.

5.3.4 Damage Rectification:

Any cracks, damages, any part of work which sound hollow when tapped or found damaged or defective otherwise shall be cut in rectangular shape and redone as directed by Engineer-in-Charge.

5.4 Plain Cement Plaster

5.4.1 Preparation of Mortars:

The mortars of specified mix. shall be used as per the Specifications of 'Cement Mortar' in Clause No. 5.1.4.

5.4.2 Application of Plaster

5.4.2.1 One layer plaster work

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To ensure even, specified thickness, plaster of 150mm x 150mm shall be first applied horizontally and vertically at not more than 2 meter interval over the entire surface to serve as gauges. The surface of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall be brought to true surface by working with a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally the surface shall be finished off true with a trowel or wooden float to obtain a smooth texture. Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical/ horizontal and shall be carefully finished. Rounding or chamfering of corners, arises, junction etc. shall be carried out with proper templates to the size required.

In suspending the work, the plaster shall be left, cut clean to line, both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped clean and wetted before plastering the adjoining area. Plastering work shall be closed on the border of the wall and nearer than 150mm. to any corners or arises and shall not be closed on the body of the features such as plaster bands, cornices nor at the corners or arises.

5.4.3 Curing

Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of 7 days. During this period the plaster shall be suitably protected from all damages at the contractor's expense by such means as approved by the Engineer-in-Charge. The date of execution of plastering shall be marked on the plastering to ensure the proper duration of curing.

5.8 Measurement and Rate

- 5.8.1 The description of each item, unless otherwise mentioned includes wherever necessary all material, conveyance and delivery, handling, loading/unloading, storing, fabrication, all labour for finishing the work, preparation of background surface, staging/scaffolding, application, finishing, removal of staging/scaffolding,

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curing and other incidental charges. The rate shall be for all heights and all heights of work.

5.8.2 Plastering

Thickness of the plaster shall be the minimum thickness at any point on a surface and shall be exclusive of the key i.e. grooves or open joints in masonry. No extra payment shall be allowed for extra thickness of plaster done by contractor, drip moulds, rounding of edges etc.

All plastering/pointing shall be measured in square meters unless otherwise specified. Length breadth and height shall be measured correct to 0.1 meters. Soffits of stairs shall be measured as plastering on ceiling. Ceiling with projected beams shall be measured over beams and plastered side of beam shall be measured and added on ceiling.

Deductions and additions shall be made in the following manner:

- a) No deductions shall be made for end of joists, beams, posts, openings not exceeding 0.5sqm. area and no addition shall be made for reveals, jambs, soffits etc. of these openings not for finish to plaster around ends of joints, beams, posts etc.
- b) Deductions for openings exceeding 0.5sqm. but not exceeding 3sqm. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings.
 - i) When both faces of wall are plastered with same type of plaster, deduction shall be made for one face only.
 - ii) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed, deduction shall be made from the plaster or pointing on the side of frame for door, windows etc. on which width of reveals is lesser, but no deduction shall be made on the other side. Where widths of reveals on both faces of wall are

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equal, deduction of 50% of area of opening on each face shall be made.

- iii) When only one face is plastered, full deduction shall be made from plaster if width of reveal on plastered side is lesser. But if widths of reveal on both sides are equal or more on plastered side, no deduction shall be made.
- c) In case of openings of area above 3 sqm. each, deduction shall be made for openings but jambs, sopsists, and sills shall be measured.

Dr. Singh



**WHITE WASHING, COLOUR WASHING, DISTEMPERING, PAINTING AND
POLISHING.**

7.6 Waterproof cement paint

7.6.1 Workmanship

7.6.1.1 Scaffolding

Same as in Clause No. 1.4.9

7.6.1.2 Preparation of surface

Preparation of surface shall be thoroughly brushed free from mortar droppings and foreign matters and prepared satisfaction of Engineer in charge. The surface shall be wetted with clean water before the paint is applied.

7.6.1.3 Preparation of paint

Waterproof cement paint of approved make shall be mixed with water and stirred to obtain a thick paste which shall then be diluted to brush able consistency. the proportion of mixture shall be as manufacturer's recommendation. The paint shall be mixed in such quantity which can be used up within an hour of mixing to avoid setting and thickening of the paint.

7.6.1.4 Application of paint

The surface shall be treated with minimum two coats of waterproof cement paint. No less than 24 hours shall be applied only after the preceding coat become hard to resist marking by subsequent brushing.

The finished surface shall be even and uniform in shade without patches brush marks paint drops etc. Cement paints shall be applied with a brush with relatively short stiff hog or fibre bristles.

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7.6.1.5 Curing

Curing shall be started after the paint has hardened. Curing shall be done by sprinkling with water two or three times a day. This shall be done between coats and for atleast two days following the final coat.

7.6.1.6 Protective measure

Same as in Clause No. 7.2.1.5.

7.10 Painting of steel and other metal surface

7.10.1 General

Referance shall be made to the following Indian Standards:
IS 2524, IS 1447.

7.10.2 Preparation of surface

The surface, before painting, shall be cleaned of all rust, scale, dirt and other foreign matter with wire brushes, steel wood, scappers, sand paper etc. The surface shall then be wiped finally with mineral turpentine which shall then be removed of grease etc. The surface then shall be allowed to dry.

In case of GI surface, suhrface so prepared shall be treated with Mordant solution (5 litres for about 100 Sq. m.) by rubbing the solution generously

with brush. After about half an hour, the surface if required shall be retouched and washed down

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thoroughly with clean cold water and allowed to dry.

7.10.3 Application of priming paints

Approved quality primer and paint in specified no. of coats shall be applied as per manufacturer's recommendations either by brushing or spraying. Each subsequent coat shall be applied only after the preceding coat is dried.

7.11 Measurement and rate

All work shall be measured in areas. Areas shall be worked out to the nearest 0.01 sq. m. and all dimensions to the nearest 0.01 metre.

Deductions shall be made in accordance with Specification no. 6-75-05.

The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. and all works involved in specification. The rate shall also include, if not mentioned otherwise, conveyance, delivery, handling, unloading, storing etc.

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ELECTRICAL TECHNICAL SPECIFICATIONS

1.0 SPECIFICATION OF WORK, MATERIALS, TOOLS AND EQUIPMENT:

The Contractor shall supply all materials, tools, plants and instruments necessary for the efficient execution of the work to complete within the stipulated time.

The materials specified in the schedule of Rates will only be used, other than the specified make written approval from Engineer-in-Charge is to be taken for issuing these materials. And a copy of the approval is to be furnished to Technical Services Department before using these materials.

All materials brought to site shall be approved by Engineer-in-Charge. Materials which are sub-standard shall be rejected. The substandard materials brought to site or used in the work shall be removed by the Contractor within 24 hours on receipt of the notice to that effect from the Site Engineer. Decision of the Engineer-in-Charge in regard to quality of materials will be final & binding.

- i) Indian Electrical Act. 1910.
- ii) Indian Electricity Rules 1956 and regulations framed there under.
- iii) The rules and bye laws of the local Electric supply Authorities.
- iv) Standards & Practices maintain by Indian Oil.

Good and skilled workmanship is as essential as the good quality of materials. Where the workmanship is not considered to be approved standard, the work should be dismantled and redone as directed by the Engineer-in-Charge or by the Site Engineer. This will, however, be decided during the progress of work or within one month from the date of completion of the work. The of the Engineer-in-Charge will be final.

1.1 GENERAL

Work under this contract shall be executed as given in this tender document and as required at site whether specifically shown or not. The contractor shall carry out and complete the work under this contract in every respect in conformity with the contract documents and as per directions of and to the satisfaction of the engineer -in - charge / owners.

1.2 SYSTEM

All equipment to be supplied as a part of contract and the installation works shall be suitable for 415V, 3 ph, 4 wire system, as specified.

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1.3 SITE CONDITIONS

All equipment shall be suitable for satisfactory operation at the following site conditions Ambient Conditions

Max 46 deg C 92% relative Humidity.

Min 05 deg C 92% relative Humidity

2.0 POINT WIRING

2.1 General

Technical specifications in this section cover the internal wiring installation comprising of:

- Point wiring for lights,
- Point wiring socket outlets etc. including circuit wiring in concealed / surface conduit as mentioned in drawings.
- Point wiring for telephone outlets
- Sub-main wiring in concealed / surface conduits
- Supply, installation of the light fixtures
- Supply, installation of the distribution boards and the final sub distribution board for the entire building.
- Marking earth stations.

2.2 Standards and Codes

All equipment, components, materials and entire work shall be carried out in conformity with applicable and relevant Bureau of Indian Standards and codes of practice, as amended up to date and as below. In addition, relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and / or IEC Standards shall be applicable.

Equipments certified by Bureau of Indian standards shall be submitted, as required.

It is to be noted that updates and current standards shall be applicable irrespective of dates mentioned along with ISS's in the tender documents.

2.3 CONDUITING

2.3.1 PVC Conduits

All conduits used in the contract shall be ISI embossed. The conduits shall have perfectly circular and smooth tubing.

2.3.2 Sheet metal outlet / draw / inspection / junction boxes

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Outlet boxes shall be of required sizes and shall be fabricated from 1.6mm thick MS sheets excepting ceiling fan outlet boxes which shall be fabricated from minimum 2 mm thick sheets. Outlet boxes shall be provided with minimum 16 mm projected threaded collars. The outlet boxes shall be of approved quality, finish and manufacture. All outlet boxes shall be provided with an earth stud. The boxes shall be protected from rust by zinc phosphate primer process. For concealed conduiting work, boxes with primer only could be embedded. For surface conduiting work, the boxes shall be finished with minimum one coat of enamel paint of approved colour. Alternatively these boxes could be galvanized and painted if so stipulated. The outlet boxes shall be so protected at the time of fixing that no mortar finds its way inside during concrete filling or plastering. For concealed conduiting work, outlet boxes shall be completely embedded in walls / ceilings leaving edges flush with finished wall / ceiling surface.

2.3.4.1 Outlet boxes for light fittings

This shall be minimum 75mm X 75mm deep and provided with one or two threaded collars of conduit entry as required. For ceiling mounted florescent fittings, the boxes shall be provided 300 mm off center for a 1200 mm fitting and 150 mm off center for a 600mm fitting so that the wiring is taken directly to the down rod. 3mm thick Perspex / hylem sheet cover of matching colour shall be provided.

2.3.4.2 Ceiling fan outlet boxes

Outlet boxes for ceiling fans shall be fabricated from min. 2mm thick ms sheet steel. The boxes shall be hexagonal in shape of min. 100mm depth and 60mm sides. Each box shall be provided with one U shaped 15mm dia rod tied to the top reinforcement of the concrete slab for a length of min. 150mm on either side. 3mm thick hylem sheet cover of matching colour shall be provided.

2.3.4.3 Switch boxes

Switch boxes suitable to house plate type switches of required rating and fan regulator as required shall be provided. In case of no. of switches in one box is not tallying with that available in standard manufacturer, the box accommodating the next higher no. of switches shall be provided without any extra cost. In case fan regulator / regulators is / are to be provided at a later date, suitable provision for accommodating such regulator shall be made in the switch boxes and are blank off covers shall be provided without any extra cost..

Switch boxes shall be so designed that accessories are mounted on a grid plate with tapped holes for brass machine screws leaving ample space at the back and on the sides for accommodating conductors, check nuts and brass brushes at conduit entries. The grid plate and ms boxes shall be fitted with a brass earth terminal.

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Boxes shall be attached to conduits by means of check nuts on either side of their walls. No timber shall be used for any supports. Switch boxes shall be located with bottom at 1200 mm above floor level unless otherwise indicated.

2.3.4.4 Socket outlet boxes

Outlet boxes shall be suitable for housing switch socket outlets, telephone outlets and any other outlet as required. These shall be so designed that accessories are mounted on a grid plate with tapped holes for brass machine screws leaving ample space at the back and on the side for accommodating conductor, check nuts and brass bushes at conduit entries. The grid plate and ms boxes shall be fitted with brass earth terminal. These shall be attached to conduits by means of check nuts on either side of their walls. No timber shall be used for any supports. Boxes shall be located with bottom at 1200 mm above floor level unless otherwise indicated.

2.3.4.5 Draw boxes

Draw boxes of minimum 75mm X 75mm X 50mm Deep of larger as required shall be provided at convenient location to facilitate drawing of long runs of conductors / wires. These shall have screwed covers of 3mm thick hylem sheet.

2.3.4.6 Inspection boxes / junction boxes

Inspection boxes of minimum 75mm X 75mm X 50mm of larger as required shall be provide at suitable location in conduit runs to permit inspection and maintenance. These shall have screwed covers of 3mm thick hylem sheet

2.3.5 Cross Section

The conduit shall be of ample sectional area to facilitate simultaneous drawing of wires. In no case shall the total cross section of wires measured overall be more than half the area of conduit. Max. no. of wires permissible in various sizes of conduits shall be as below.

As per IS

Size of Wire Cu. Conductor	Diameter of conduits	
	19	25
1.5 sq.mm	5	10
2.5 sq.mm	5	8
4.0 sq.mm	4	6
6.0 sq.mm	3	5
10.0sq.mm	2	3

2.3.6 Laying of conduits

Conduits shall be laid either concealed in walls and ceiling or on surface on walls and ceiling or partly concealed and partly on surface as required. The surface of the wall must be finished and

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Painted to match the other part of the room in case of conceal wiring, PATCH MARKS MUST NOT BE VISIBLE. For surface Conduiting the works to be performed in highly professional manner with high quality of workmanship to maintain the aesthetic look of the conduit with sufficient no.s of 16 SWG GI saddles with bases. No Flexible conduits will be acceptable in Conduiting works. In case it becomes necessary to use flexible conduits then only flexible GI conduits or Wire Centered PVC conduits are acceptable that too with prior approval of Site Engineer. All the conduits must be threaded at the end and tightly fixed with boxes, conduits, bends, nipples etc. with proper check nuts/ coupler.

Same rate shall apply for concealed and surface conduiting in this contract.

2.3.6.1 Concealed Conduiting

Concealed conduits in concrete members shall be laid before casting in the upper portion of slab or otherwise as may be instructed so as to embed the entire run of conduits and ceiling outlet boxes with a cover of min. 12 mm concrete. Conduit shall be adequately tied to the reinforcement to prevent displacement during casting at interval of max. 1 m. No reinforcement shall be cut to fix the conduits. Suitable flexible joints shall be provided at all locations where conduits cross expansion joints in the building.

2.3.6.2 Surface Conduiting

Wherever so desired, conduit shall be laid in surface over finished concrete and / or plaster brick works suitable cast aluminum spacer saddles of approved make and finish shall be fixed to the finished structural surface along the conduit route at interval not exceeding 600 mm. Holes in the concrete or brick works the saddles shall be made neatly by electric drills. Conduit shall be fixed on the saddles by means of good quality heavy duty ms clamps screwed to the saddles.

2.3.6.3 Painting of conduits and boxes

All draw/switch/junction/fan hook boxes shall be galvanized/CD plated/painted with red oxide in their manufactured form. All ungalvanized/ unplated boxes shall be again painted with red oxide paint as required before fixing. Boxes fixed on surface shall, in addition, be painted with finished paint of approved color and finish. Before laying conduits shall be painted at such places where paint has been damaged.

2.3.6.4 Protection of conduits

To safeguard against filling up with mortar/plaster etc.. All the outlets and switch boxes shall be provided with temporary covers and plugs which shall be replaced by sheet/plate cover as required.

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All screwed and socketed joints shall be made fully water tight with white lead paste.

CLEANING OF CONDUITS RUNS

The entire conduit system including outlets and boxes shall be thoroughly cleaned after completion of erection and before drawing in of cables.

2.3.6.5 Earthing

Continuous of wires shall be provided for all points, outlets. Earthing terminal shall be provided inside all switch boxes, outlet boxes and draw boxes etc. Earth wire for concealed conduits shall in variably be provided by means of bare copper wire draw inside the conduit and connected to earth stud of all outlet boxes, switch boxes and draw boxes etc. Earth wire for surface conduit shall be by means of bare wire as for concealed conduit or bare copper earth wire taken outside the conduit as per schedule of quantities. Connection with conduit shall be made by suitable screwed clamp, paint or conduit being removed for making effective electrical connection.

2.4 WIRING

Wiring shall be carried out with PVC insulated 660V grade unsheathed single core wires with electrolytic annealed stranded copper (unless otherwise stated) conductors and conforming to IS 694 / 1990. All wires shall be ISI embossed. All wires shall bear manufacturer's label and shall be brought to site in new and original packages. Manufacturer's certificate, certifying that wires brought to site are of their manufacturer shall be furnished as required. All the wires must be FRLS type.

Final connection to light fitting / appliance from termination of point wiring in ceiling / wall light outlet boxes shall be made with 660V grade stranded Cu. Conductor unsheathed PVC flexible cords conforming to IS 694/1990 and having a cross-sectional area not less than 0.75 sq.mm

2.4.1 Bunching of wires

Wires carrying current shall be so bunched in conduits that the outgoing and return wire are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit.

2.4.2 Drawing of wires

The drawing of wires shall be done with due regard to the following precautions:

No wires 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 wire so that no damage occurs to the insulation of the wire. Screwed buses shall be provided at conduit terminations .

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Before the wires are drawn into the conduits, conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing compressed air through the conduits if necessary.

2.4.2 Termination / jointing of wires

Sub circuit wiring shall be carried out in loping system. Joints shall be made only at distribution board terminals, switches / buzzers and at ceiling roses / connectors / lamp holders terminals for lights / fans / socket outlets. No joints shall be made inside conduits or junction / draw / inspection boxes. Switches controlling lights, fans or socket outlets shall be connected in the phase wire of the final sub circuit only. Switches shall never be connected in the neutral wire.

Wiring conductors shall be continuous from outlet to outlet. Joints where unavoidable, due to any special reason shall be made by approved connectors. Specific prior permission from Engineer-in-charge in writing shall be obtained before making such joint.

Insulation shall be shaved off for a length of 15 mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or wringing.

Standards of wires shall not be cut for connecting terminals. All stands of wires shall be soldered at the end before connection.

Ends of PVC insulated aluminum conductor wire ends before connection shall be properly soldered (at least 15 mm length) with suitable soldering material.

Conductors having normal cross sectional area exceeding 4 sq. mm shall always be provided with crimping sockets.

At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used.

Brass nuts and bolts shall be used for all connections.

The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less.

Switches controlling lights, fans, socket outlets etc. shall be connected to the phase wire of circuits only.

Only certified wiremen shall be employed to do wiring / jointing work.

2.4.4 LOAD BALANCING

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Balancing of circuits in three-phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

2.4.5 COLOUR CODE OF CONDUCTORS

Colour code shall be maintained for the entire wiring installation - red, yellow, blue for three phases, black for neutral and green for earth.

2.5 SWITCHES AND ACCESSORIES

2.5.1 SWITCHES

All 6 and 16 amps switches shall be of the modular flush mounting type unless otherwise stated, suitable for 250 volt AC supply, best quality and of approved make. The switch moving and fixed contacts shall be of silver nickel and silver graphite alloy and contact tips coated with silver. Housing of switches shall be made from high impact resistant, flame retarding and ultra violet stabilized engineering plastic material.

2.5.2 FAN REGULATORS

Fan regulators shall be fixed inside the switch boxes on grid plates with tapped holes and brass machine screws unless otherwise stated, leaving ample space at the back and sides for accommodating wires. If fan regulator is to be fixed at the later date by Owners, provision for such fixing in the switchbox shall be provided and a blank of plate over the space meant for regulator shall be provided without any extra cost.

2.5.3 SOCKET OUTLETS

6/16 amps socket outlets shall be of modular flush mounting type, unless otherwise stated, and shall be switched, three pin type and fitted with automatic linear safety shutters to ensure safety from prying fingers. Un switched 6/16 amp socket outlets where called for shall also be of three pin type socket outlets shall be made from high impact resistant, flame retarding and ultra violet stabilized engineering plastic material.

Switches and sockets shall be located in the same plate. Plates for 6 amp switched / un switched power and telephone outlets shall be of the same size and shape.

An earth wire shall be provided along the wires feeding socket outlets for electrical appliances. The earth wire shall be connected to the earthing terminal screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box.

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2.5.4 FLUSH PLATES

Switches, socket outlets, receptacles, and telephone outlets etc. in walls shall be provided with moulded cover plates of approved colour, shape and size made from high impact resistant, flame retarding and ultra violet stabilized engineering plastic material, and secured to the box with counter sunk / round head chromium plated brass screws unless otherwise stated. Where two or more switches are installed together, they shall be provided with one common switch cover plate as described above with notches to accommodate all switches either in one, two or three rows.

One and two gang switch cover plate, telephone outlet cover plate, 6 and 16 amps switched / un switched outlet plates, shall have the same shape and size. Three and four gang switch cover plates shall have the same shape and size. Six and eight gang switch cover plates shall have the same shape and size. Nine and twelve switch cover plates shall have the same shape and size. Whenever five switches, seven switches, ten switches and eleven switches are to be fixed the next higher size of gang switch cover plate to be used and extra openings shall be provided with blank-offs.

2.5.5 OUTDOOR SWITCHES

Switches located outdoors shall be, of required size, type and rating and shall be provided in weather proof enclosures, with weather proof gasket covers. The MCS's/ uses for all outdoor switches shall be separate and of required rating.

2.5.6 LIGHTING FIXTURES, FANS AND EXHAUST FANS

Light fixtures and fittings shall be assemble and installed complete as required and make ready for service, in accordance with drawings, instructions and as offered by Engineer-in-charge.

Wires brought out from junction boxes shall be encased in flexible conduits of make and quality approved by Engineer-in-charge for connecting to fixtures concealed in suspended ceilings. Flexible conduits shall be provided with a check nuts at both ends.

Pendant fixtures specified with overall lengths are subject to change and shall be checked with site conditions and installed as required.

All suspended fixtures shall mounted rigid and fixed in position in accordance with drawings, instructions and as approved by Engineer-in-charge.

Fixtures shall be suspended true to alignment, plumb, level and capable of resisting all lateral and vertical force.

All suspended light fixtures, fans etc. shall be provided with concealed suspension arrangement in the concrete slab / roof members. Making adequate provision for such arrangements at the

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appropriate stage of construction is deemed to be included in Contractors' scope.

Exhaust fans shall be fixed and locations shown on the drawings. They shall be wired to a plug socket at a convenient location near the fan in flexible conduits.

All switch and outlet boxes, and fan regulators shall be bonded to earth with bare copper wire or equivalent as required.

Wires shall be connected to all fixtures through connector blocks.

Down rods of ceiling fans shall be minimum 19 mm dia class B GI pipes. These shall be rigidly connected to the ceiling fan in an approved manner and shall be connected to the concealed hook in the ceiling by means of standard shackle arrangement as approved by Engineer-in-charge.

2.6 MEASUREMENT AND PAYMENT OF WIRING

Wiring for lights, fans, socket outlets, telephone outlets etc., carried out as per tender specifications shall be measured and paid on point basis only unless otherwise specifically stipulated. The point wiring basis shall assume average wiring length and average conducting length per point base on parameters stipulated in paragraph below. The average wiring length and average conducting length forming the basis of point wiring payment, shall take the electrical layouts of the entire project into consideration. Tenderers are advised to seek clarifications, if they so desire, on this aspect before submitting their tenders. No claim for extra payment on account of electrical layouts in parts of the project requiring larger average wiring and conducting length per point whether specifically shown in tender drawings or not shall be entertained after the award of contract.

2.6.1 POINT WIRING

Point wiring shall be carried out as per following parameter. In concealed / surface conduit system unless otherwise stipulated. Only looping system of wiring shall be adopted throughout.

All accessories shall be flush types unless otherwise stated.

For estimation of load, following loads per point shall be assumed.

Light points	100 Watts
6 amps socket outlet points	100 watts
Fan points	60 watts
Exhaust fan points	300 Watts or as specified
16-amp socket outlet points	1000 watts.

Light points, fan points and 6 amp socket outlet points may be wired on a common final such circuit. Such circuit shall not normally have more than a total of ten light, fan or socket outlets or a load of 800 watts. Wiring from DB to the first switch in each

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first sub-circuit is defined as circuit wiring which shall be wired with on size higher wire.

Power circuits shall normally have maximum one 16 amps socket outlet unless otherwise stated. Separate circuit shall be run for each geyser, kitchen equipment, window air conditioners and similar appliances.

Point wiring rates shall include painting of conduits and other accessories as required. Point wiring rates shall include cleaning of dust, splashes of colour wash or paint from all fixtures, fans, fittings etc. at the time of taking over of the installation.

2.6.2 LIGHT POINT

Light point wiring shall commence at the distribution board terminals and shall terminate at the terminate at the ceiling rose/connector in ceiling box/lamp holder via the control switch. Rates quoted shall be deemed to be inclusive of the cost of entire materials and labour required for completion of point wiring thus defined including: a) concealed/surface conducting system complete with all accessories, junction/draw/inspection boxes, screwed brass bushes, check nuts etc complete as required, b) wiring with stranded copper(unless otherwise stated) PVC insulated 660Volt grade wires for point wiring including circuit wiring(wiring from distribution board terminals to the first switch in the circuit) and terminals etc. complete as required), control switch with switch box and cover plate of specified type including fixing screws, earth terminal etc. complete as required) loop earthing with bare copper wires.

2.6.3 CEILING FAN POINT

Point wiring for ceiling fan points shall be same as for light points in para 6.3 above and shall in addition, include ceiling outlet box with recessed fan hoods and provision in the switch box for mounting the fan regulator.

Switch socket shall be earthed with bare copper wires as required.

2.6.4 EXHAUST FAN POINT

Point wiring for exhaust fan point shall be same as for light point above and shall in addition include socket outlet near the exhaust fan and control switch with regulator at a convenient location complete as required.

3 PINS 5 AMPS SOCKET OUTLET POINT (LIGHTING)

Point wiring for lighting convenience socket outlet points shall be same as for light points above and shall in addition include 3 pin 5 a control switch of specified type mounted in a ms box with cover as required and 3rd pin earthed with bare Cu wire as specified

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3 PINS 16 AMPS SOCKET OUTLET POINT (POWER)

Point wiring for lighting convenience socket outlet points shall be same as for light points above and shall in addition include 3 pin 5 a control switch of specified type mounted in a ms box with cover as required and 3rd pin earthed with bare Cu wire as specified

2.6.5 CIRCUIT WIRING

Wiring from DB to the first switch in any sub circuit is defined as circuit wiring min. size of PVC insulated Cu conductor wires for all circuit wiring for light, exhaust fan, ceiling fan, and lighting convenience outlet point shall be 2.5sq.mm unless otherwise specified. Circuit wiring shall not be separately measured and paid for point wiring rates shall include the cost of providing circuit wiring as required.

SUB MAIN WIRING

Sub main wiring shall comprise of stranded Cu conductor PVC insulated 660V grade wires in ms conduits including loop earthing, termination etc complete as required. Sizes of conduits, no. / type / size of wires and loop earthing shall be as stipulated in the schedule of quantities and / or drawings.

Wires shall be drawn in the concealed or surface conduits as required, without being damaged. For this purpose draw boxes shall be located at convenient locations.

Every sub mains shall run in an independent conduit with an independent earth wire of bare Cu as specified running along the entire run of conduit. For 1 Ph. One earth wire and for 3 ph. 2 earth wire shall run.

Necessary provision of wire lengths entering and emerging from the conduit shall be made for connection. Measurement shall be taken of the actual conduit run containing the wires from one point to another.

3.0 MEDIUM VOLTAGE CABLES

Specifications for cables will be as per enclosed.ES: 8160

4.0 MEDIUM VOLTAGE FINAL DISTRIBUTION BOARDS

STANDARDS AND CODES

Indian Standard Specifications and codes of practice will apply to the equipment and the work covered by the scope of this contract. In addition the relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended upto date shall apply.

MINIATURE CIRCUIT BREAKER

The MCB's shall be of the completely moulded design suitable for operation at 240 / 415 V 50Hz system. The MCB's shall have a rupturing capacity of 10 KA at 0.5 pf. The MCB's shall have inverse time delayed thermal overload and instantaneous magnetic short

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circuit protection. Type test certificates from independent authorities shall be submitted with the tender.

FINAL DISTRIBUTION BOARDS

Final distribution boards shall be flush mounting, today enclosed, dust and vermin proof and shall comprise of miniature circuit breakers, earth leakage circuit breakers neutral link etc. as detailed in the schedule of quantities. The distribution equipment forming a part of the distribution board shall comply with the relevant standards and codes of the bureau of Indian Standards and as per detailed specification included in this tender document. The board shall be fabricated from 14 gauge CRCA sheet steel and shall have a hinged lockable spring loaded cover. All cutouts and cover shall be provided with synthetic rubber gaskets. The entire construction shall have IP54 degree of protection. The bus bar shall be of Cu having a maximum current density of 1.6 A / sq.mm and PVC insulated throughout the length. All the internal connection shall be with either solid Cu PVC Insulated or Cu conductor PVC insulated wires of adequate rating. All the internal connection shall be concealed by providing a hinged protective panel to avoid accidental contact with live points. All outgoing equipment shall be concealed direct to the bus bar on the live side. The equipment shall be mounted on a frame work for easy removal and maintenance. The sheet steel work shall undergo a rigorous rust proofing process, two coats of filter oxide primer and final powder coated paint finish. All the circuit shall have an independent neutral insulated wire, one per circuit, and shall be numbered and marked as required by the Engineer -in-charge. A sample of the completed board is to be got approved by the Engineer-in-charge before commencement of supply and erection.

SHEET STEEL TREATMENT AND PAINTING

Sheet steel materials used in the construction of these units should have undergone a rigorous rust proofing process comprising of alkaline degreasing, de-scaling in dilute sulphuric acid and recognized phosphate process. The steel work shall receive two coats of oxide filler primer before final painting. All the sheet steel shall after metal treatment is given powder coating finish painted with two coats of shade 692 of IS-5 on the outside and white in the inside. Each coat of the paint shall be **properly stove** and paint thickness shall not be less than 50 micron.

NAME PLATES AND LABELS

Suitable engraved white on black nameplate and identification labels of metal for all switch board shall be provided. These shall indicate the feeder no. and feeder designation.

5.0 MEDIUM VOLTAGE SWITCHBOARD

Specifications for switchboard will be as per enclosed **ES : 8060**

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6.0 MUSIC SYSTEM

Supply, installation & commissioning of customised music cum audio system, amplifier with MP3/CD/DVD/BLU RAY/USB player & cassette player, fm radio facility etc. Make: PHILLIPS/ SONY/ KENWOOD with flush mounted on the false ceiling with proper clamping arrangement. Supply, installation & commissioning of PHILLIPS/ SONY/ KENWOOD make music speaker point wiring for music system: supply & installation of point wiring for music cum pa system comprising of 2x 1.5 sqmm standard, copper conductor, flexible PVC insulated & PVC sheathed wire pulled through 20mm dia PVC heavy gauge conduits and looped from one speaker to other hand to the volume control switch wherever applicable & finally terminated & tag block.

All necessary materials/works which is required for commissioning of customised audio/music system to be supplied by the contractor as per direction of EIC.

7.0 ADDRESABLE FIRE ALARM DETECTION SYSTEM

Supply, installation & commissioning of addressable low-profile photoelectric smoke detector with base(make Honeywell or equivalent as per direction of EIC), low-profile photoelectric heat detector with base(make Honeywell or equivalent as per direction of EIC), addressable manual call point(make Honeywell or equivalent as per direction of EIC), addressable loop isolation module(make Honeywell or equivalent as per direction of EIC), addressable intelligent wall mounted strobe cum sound recorder of (make Honeywell or equivalent as per direction of EIC), supply of necessary 2x1.5 sqmm (should FR type & make of polycab or equivalent) cable for wiring of necessary sensing device to the addressable standalone fire alarm control panel with adequate size PVC casing/pipe with all sort of fixing materials and accessories required to complete this job in all respect. Supply , installation & commissioning of addressable stand alone fire alarm control panel, 198 points (99 detectors & 99 devices), intelligent 80- character LCD display with backlighting , detector sensitivity test capability (NFPA 72 coplaint) history file with 1000- event capacity with facility of maintenance alert. Entire system should be integrated with existing system and commissioning to be done in all respect.

Wiring for fire detection and alarm system shall comprise of connecting main fire alarm system in existing fire station building with fire alarm and annunciation panel in the renovated canteen building, complete wiring for smoke detectors , heat detectors, response indicators, manual call points, electronic hooters etc. Inside the building including supply, erection , installation , testing and commissioning the system. Incoming supply from main fire alarm panel to 10 zone fire alarm and annunciation panel in the canteen building should be done with 6 core X 2.5 sq.mm. PVC

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insulated armoured Cu cable. Internal wiring for fire detection system inside the new building shall be done with 2 C X 1.5 sq.mm. PVC Insulated Cu wire laid in Heavy duty 16 SWG MS conduits. This wiring shall include interconnection of smoke detectors, heat detectors response indicators manual call points, electronic hooters and 10 zone fire alarm panel. Smoke detectors shall be Ionisation type complete with LED indicators and mounting base. Heat detector shall be ROR cum fixed temperature type with LED indicator complete with mounting base. Response indicators shall be with Red LEDs and complete with MS housing and anodized Aluminium cover plate etc. Manual call points shall be of glass break type complete with MS housing, Hammer and chain arrangement. Electronic hooters shall be dual tone type. Fire alarm and annunciation panel shall be 10 zone type panel with window type annunciation to indicate fire and fault through suitable indicator, audio alarm unit complete with push buttons for acknowledge / test / reset with main power supply block backed by 24 V 60AH battery backup including built in battery charger. Complete installation shall be done as shown in the GA drawing.

The Fire detection & Alarm System shall be a system comprising of automatic sensor e.g. smoke & heat detectors, main panel, zonal panel, hooter, battery charger and other hardware. The system shall be designed to provide audio-visual indication at the main panel to be located in fire station and zonal panel in control rooms.

Electrical siren shall be provided to cover entire plant area.

Hooters and exit lights shall be provided at required location in the buildings.

Panel design and component selection shall be done for future extension up to 10% of specified zone or one zone, whichever is maximum in each panel. The design of common facility and hardware shall be provided for future extension of zones.

Annunciation with accept/reset push button is to be provided in control room/panel.

Area wise grouping shall be done in parallel connection of each smoke detector contacts of particular.

It should meet with standard fire code of the India.

Fire alarm system employing intrinsically safe circuit and shall operate a 24 V DC supply.

8.0 EARTHING

General

All non-current carrying metal parts of electrical installation shall be earthed properly. All metal conduits, trunking, cable

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sheaths, switchgears, distribution fuse boards, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All earthing shall be in conformity with Indian Electricity Rules.

The earthing system shall comprise of-

- a) Earth electrode
- b) Earthing leads
- c) earth conductor

All three-phase equipment shall have two separate and distinct body earth and single phase equipment shall have single body earth.

EARTHING MATERIAL

Materials of which the protective system is composed shall be resistant to corrosion or be adequately protected against corrosion. The material shall be as specified in the schedule of quantities and shall comply with the following requirements:

1. Copper - When solid or stranded copper wire is used it shall be of the grade ordinarily required for commercial electrical work generally designated as being of 98% conductivity when annealed, conforming to Indian standard specifications.
2. Galvanised Steel - Galvanised steel used shall be thoroughly protected against corrosion by hot dipped Zinc coating. The material coating shall withstand the test specified in IS2309: 1969.
3. The strips to be used shall be in maximum lengths available as manufactured normally avoiding unnecessary joints.

EARTHING CONDUCTORS

Earthing conductors shall form the earthing network throughout the installation for earthing of all non-carrying metal parts.

CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main switch boards to all distribution boards in the network. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate, or otherwise at the commencement of run by an earthing conductor in effective electrical contact with cable sheathing. Switches, accessories, lighting fitting etc. shall be effectively connected to the loop Earthing conductors. These through rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered earthed, even though the run of metallic conduit is earthed.

EARTHING CURRENT INSTALLATION

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The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury by running the same in GI pipe of adequate size.

Joints shall be reverted and brazed in approved manner.

Sweated lugs of adequate size shall be used for termination. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other only substances and properly tinned.

PROHIBITED CONNECTION

Neutral conductor, pipes conveying water, gas or inflammable liquid, structural steel work, metallic enclosures, metallic conduits and lighting protection system conductors shall not be used as a means of earthing an installation or even as a link in an earthing system.

RESISTANCE TO EARTH

No earth electrode shall have a greater ohmic resistance 3ohms as measured by an approved earth testing apparatus. In rocky soil, the resistance may be up to 1 ohm. The electrical resistance measured between earth connection at the main switch board and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate fuses or circuit breakers and shall not exceed 1 ohm.

9.0 ROUTING AND COMPLETION TESTS

INSTALLATION COMPLETION TESTS

At the completion of the work, the entire installation shall be subject to the following tests—

1. Wiring continuity test
2. IR test
3. Earth continuity test
4. Earth resistivity test

Besides the above any other test specified by the local authority shall be carried out. All tested and calibrated instruments for testing, labour, materials and incidentals necessary to conduct the above tests shall be provided by the contractor at his own costs.

Wiring Continuity Test

All wiring systems shall be tested for continuity of circuits, short circuits and earthing after wiring is completed and before installation is energized.

Insulation Resistance Test

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The insulation resistance shall be measured between earth and the whole system conductors, or any section thereof with all fuses in place and all switches closed and except in concentric wiring all lamps in position of both poles of the installation otherwise electrically connected together, a direct current pressure of not less than twice the working pressure provided that it does not exceed 660 volts for medium voltage circuits. Where the supply is derived from AC three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 megohms divided by the number of points provided on the circuit the whole installation shall not have an insulation resistance lower than one megohm.

The insulation resistance shall also be measured between all conductors connected to one phase conductor of the supply and shall be carried out after removing all metallic connections between the two poles of the installation and in those circumstances the insulation shall not be less than that specified above.

The insulation resistance between the frame work of housing of power appliances and all live parts of each appliance shall not be less than that specified in the relevant Standard specification or where there is no such specification, shall not be less than half a megohm or when PVC Insulated cables are used for wiring 12.5 megohms divided by the number of outlets. Where a whole installation is being tested a lower value than that given by the above formula subject to minimum of 1 Megohms is acceptable.

Testing of Earth Continuity Path

The earth continuity conductor including metal conduits and metallic envelopes of cable in all cases shall be tested for electric continuity and the electrical resistance of the same alongwith the earthing lead but excluding any added resistance of earth leakage circuit breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

Testing of Polarity of non-linked Single Pole Switches

In a two-wire installation, a test shall be made to verify that all non-linked single pole switches have been connected to the same conductor throughout, and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three or four-wire installation, a test shall be made to verify that every non-linked single pole switch is fitted to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the

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final acceptance of the Engineer-in-charge as well as the local authorities.

Earth Resistivity Test

Earth resistivity test shall be carried out in accordance with IS Code of Practice for earthing IS 3043.

Performance

Should the above tests not comply with the limits and requirements as above the contractor shall rectify the faults until the required results are obtained. The contractor shall be responsible for providing the necessary instruments and subsidiary earths for carrying out the tests. The above tests are to be carried out by the contractor without any extra charge.

Tests and Test Reports

The contractor shall furnish test reports and preliminary drawings for the equipment to the Engineer-in-charge for approval before commencing supply of the equipment. The Contractor should intimate with the tender the equipment intended to be supplied with its technical particulars. Any test certificates etc., required by the local Inspectors or any other Authorities would be supplied by the Contractor without any extra charge.

10.0 LICENCED SUPERVISOR AND WORKMAN :

It is obligatory under the IE Rules that all electrical installation works shall be executed under qualified electrical Supervisor holding Electrical Supervisor's Certificate of Competency, granted by the State Licensing Board. The Contractor will decide in consultation with the Engineer-in-Charge on the number of Electrical Licensed Supervisors to be engaged on the job. If the volume of work is such that it requires more than one such supervisor, and than employ such number.

The Contractor may employ artisans and wiremen but must also have sufficient number of highly skilled licensed electricians and workmen for the installation of switch fuses, distribution board, HT & LT switch gears, under ground cable work etc.

The Contractor will remove any such workmen from the site of work who in the opinion of the Site Engineer is not sufficiently efficient or otherwise unsuitable for any reason whatsoever, upon receipt of intimation in writing by Engineer-in-Charge. The decision of Engineer-in-Charge shall be final.

D. S. Srinivasan



11.0 INFORMATION TO BE FURNISHED BY TENDERER:

The tenderer shall furnish the following information along with the tender:

1. Contractor's License Number and :
next date of renewal.
2. Name of Electrical Supervisor with :
registration Number.
3. Parts in which Electrical supervisor's :
certificate of Company has been issued
by the Licensing Board.
4. Next Date of renewal of supervisor's :
certificate.

The owner in case the above information is not furnished may reject the tender without assigning any reason whatsoever.

12.0 TEST REPORT AND BILLS:

Within 15 days from the date of completion of prior to the date of final measurement of work, which ever is earlier the Contractor will furnish the installation test report, of which all tests must be carried out in presence of the Site Engineer and Contractor's Supervisor and signed by both of them. First and final bill shall not be paid to the Contractor unless a complete and satisfactory test report is received by the Engineer-in-Charge on the installation.

13.0 TESTING AND COMMISSIONING OF INSTALLATION:

After satisfactory completion of the job, the contractor should apply to the AT&T or networking Contractor of IOCL for approving the networking work. The owner will assist the Contractor for get the installation approved before commissioning the installation.

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14.0 COMPLETION TEST:

On completion of wiring (or an extension to an installation) a certificate will be furnished by the Contractor in a prescribed form duly signed by the certified supervisor under whose direct supervision of the installation was carried out. The certificate will obtain the following main points.

- a) Continuity test for each circuit.
- b) Physical verification for ferruling, numbering and no damage.
- c) Megger value of all cables, circuits etc.
- d) Earth resistance value of earth stations.
- e) Any other routine test specified by the engineer in charge.

The contractor will be supplied with one copy of the drawing. On completion of the work, he will submit the drawing therein:

- a) Circuit routes and points.
- b) Schedule of wires.
- c) DB details.
- d) Schedule of DBs.
- e) All drawing as required by the Engineer in charge after completion.

WATER SUPPLY PIPES AND DRAINAGE

IS :	651-1971	Specification for salt glazed stoneware pipes and fittings.
IS :	778-1971	Gunmetal gate, globe and check valves for general purpose.
IS :	780-1969	Sluice valves for water work purpose.
IS :	781-1977	Cast copper alloy screw-down bib taps and stop valves for water service
IS :	172-1971	Code of basic requirements for water supply, drainage and sanitation.
IS :	1726-	Cast iron manhole covers and frames.
	Part-I-1974	General requirements.
	Part-IV-1974	Specific requirements for MD circular type.
	Part-V-1974	Specific requirements for MD rectangular type
	Part-VI-1974	Specific requirements for LD rectangular type
	Sec 1 :	Single seal
	Sec 2 :	Double seal
	Part-VII-1974	Specific requirements for LD square type
	Sec 1 :	Single seal
	Sec 2 :	Double seal
IS :	1742-1972	Code of practice for doubling drainage.
IS :	2065-1972	Code of practice for water supply in buildings.
IS :	2556-	Vitreous sanitary appliances (Vitreous Chin)
	Part-I-1974	General requirements.
	Part-II-1973	Specific requirements of wash down water closets.
	Part-III-1972	Specific requirements of squatting pans.
	Part-IV-1974	Specific requirements of wash basins.
	Part-VIII-XV	Wash down water-closets, bibes foot rests, shower-rose, foot traps for squatting pans, integrated squatting pans. Universal water closets.

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IS :	2963-1964	Non-ferrous waste fittings for wash basins and sinks.
IS :	311-1965	Waste plug and its accessories for sinks and wash basins.
IS :	4127-1967	Code of practice for laying of glazed stoneware pipes.
IS :	5531	Specification of cast iron special for asbestos cement for water, gas and Sewage

Pipe Installation

Shop drawings for the routing of pipes shall be prepared generally on the basis of layout drawings issued. The shop drawings shall reflect the site conditions, structural beams and columns, obstructions by way of any construction elements or any other service pipes, ducts etc. The drawings should clearly indicate openings required in brick or concrete walls, drain valves at low points, air valves at high points, isolating valves, if any, and invert levels at every 15m intervals. The drawings should also indicate typical details of hangers, supports, brackets etc. After approval of the drawings, pipe routes shall be marked with a distinct colour of paint on the site and got it approved by MDI, MURSHIDABAD.

All openings and chases in brick walls shall be made neatly and refilled to a reasonable finish. However, final finishing will be done by the civil contractor. Openings in concrete walls shall, however, be made only with the approval of MDI, MURSHIDABAD. Pipe penetrations, through wall or floor, shall be sealed with an approved fire resistant sealant.

Good workmanship and neat pipe layout are the pre requisites of these specifications. Horizontal pipes shall be truly horizontal with necessary slopes and hangers or supports as specified and shown on drawings. Vertical pipes shall be truly vertical and shall be laid away from the walls at least by 10mm or as required by MDI, MURSHIDABAD. All pipe runs shall be parallel to the ceiling or walls for presenting a neat appearance. Pipes buried in wall shall be laid in machine-made cases with galvanized steel anchors.

All pipes before and after testing shall be protected with wooden or brass plugs to prevent ingress of dust, sand or any extraneous matter.

Pipe supports; hangers & clamps

Pipe supports, clamps, suspenders shall be pre-fabricated and galvanized (after fabrication). Application of support systems shall follow the guidelines in the above specifications. Any other types of support, suspension or clamping to meet the site conditions shall be got approved before use.

All fittings shall be screwed type unless specified otherwise. However, flanged joints shall be provided at the following positions:

- i) Pairs of flanges for isolation and removal of equipment.
- ii) Mating flanges for equipment flange connections.
- iii) Mating flanges for valves, strainers, as the case may be.

EXTERNAL DRAINAGE: Trenches for drainage shall be carried out to the required level only. No refilling will be allowed for the purpose of making up bed of the trenches. Any excess excavation shall not be paid for, and shall be made good with well rammed and consolidated cement concrete M75 at the cost of the contractor, and for which no extra cost will be paid. The trenches shall be filled in and the earth shall be well rammed and properly consolidated. The surplus earth shall be placed or spread elsewhere, or near the site, or carted away free of charge as may be directed by MDI, MURSHIDABAD. The Contractor shall at his own expense and without extra charge make provision for all shoring, pumping, dredging soil or sub soil and bailing out or draining out water or rain water and the trenches shall be kept free of water.

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When trenches are opened for laying the drainage, water pipes, or any other work & if the depth is over 1.2 M (or even less in low bearing soil) then the sides shall be closely and securely supported by suitable shoring.

MANHOLES :- Manholes shall be circular and of conical shape with internal 600 MM dia opening at the top and internal 1 M to 1.2 M dia depending on the depth at the bottom. The required depth shall be provided at all junctions and change of directions. (Manholes can be rectangular only when the depth is less than 1.5 M. The size shall be 0.9 M x 0.45 M internal measurement) They shall be built in 230 MM brick wall in cement mortar 1:6 with cement plaster 1:4 smooth finish 20 MM thick from inside and rough finished from outside on a base of 230 MM cement concrete M100 projecting 150 MM beyond the brick work on all sides. Proper cement concrete channel shall be provided at the bottom and the branches from various pipes discharged in the channel with easy slope. The top of all the manholes shall be provided with cast iron circular air and water tight frame. In the case of any damage to the covers due to traffic or any other reason during construction or in the maintenance period, they shall be replaced immediately by the contractor at his own cost and if the damage is repeated, MDI, MURSHIDABAD may demand heavier types than what are supplied and the contractor has to comply with the same without asking for extra charges. The frame and covers shall be painted with Black Bitumen Anti-Corrosive paint and space between cover and frame to be filled with bitumen. In deeper manholes, i.e. where depths are more than 1 M necessary cast iron manholes steps shall be provided, cost of which is to be included in the cost of manholes and nothing extra shall be paid. Portland cement shall be thoroughly mixed dry with sand in the proportion of 1 to 3 with approved water-proofing compound added as per manufacturer's specifications. Water shall be then added gradually to make the mixture homogenous. Cement mortar shall be mixed which can be used within half an hour. The joints between the stones or bricks will be raked out to a depth of 12 MM and the surface shall be thoroughly watered and the mixture of sand and cement applied evenly on all surfaces that needs to be plastered. The surface shall be finished off with a thin layer of cement floating. The plaster work shall be kept thoroughly wet for a period of seven days. Thickness of plaster shall be 20 MM thick.

LAYING AND JOINTING OF G.I. PIPES (EXTERNAL WORK)

18.6.0 The specifications described in 18.4 shall apply, as far as applicable. 18.6.1 Trenches

The galvanised iron pipes and fittings shall be laid in trenches. The widths and depths of the trenches for different diameters of the pipes shall be as in Table 18.11.

Dia of pipe (mm)	Width of trench (cm)	Depth of trench (cm)
15 to 50	30	60
65 to 100	45	75

At joints the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line and gradient in accordance with general specifications for earth work in trenches.

When excavation is done in rock, it shall be cut deep enough to permit the pipes to be laid on a cushion of sand minimum 7.5 cm deep. 18.6.2 Cutting and Threading

Where the pipes have to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The end of the pipes shall then be carefully threaded conforming to the requirements of

IS 554 with pipe dies and tapes in such a manner as will not result in slackness of joints when the two pieces are screwed together. The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack, as

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the later procedure may not result in a water tight joint. The screw threads of pipes and fitting shall be protected from damage until they are fitted. 18.6.3 Jointing The pipes shall be cleaned and cleared of all foreign matter before being laid. In jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over. Teflon Tape should be used on threads instead of 'Dhaaga/ Safeda'. The end shall then be screwed in the socket, Tee etc. with the pipe wrench. Care shall be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burr from the joint shall be removed after screwing. After laying, the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter. 18.6.4 Thrust Blocks (Fig. 18.8) In case of bigger diameter pipes where the pressure is very high, thrust blocks of cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate of 20 mm nominal size) of adequate size and shape shall be provided on all bends to transmit the hydraulic thrust to the ground, spreading it over a sufficient areas, depending upon the type of soil met with. 967 SUB HEAD 18.0 : WATER SUPPLY 18.6.5 Painting The pipes shall be painted with two coats of anticorrosive bitumastic paint of approved quality. 18.6.6 Testing of Joints The pipes and fittings after they are laid and jointed shall be tested to hydraulic pressure of 6 Kg/ sq. cm (60 meter). The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw off taps and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should have been recalibrated before the test. The test pump having been stopped, the test pressure should be maintained without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds, having the joints exposed for inspection during the testing. Pipes or fittings which are found leaking shall be replaced and joints found leaking shall be redone, without extra payment. 18.6.7 Trench Filling The pipes shall be laid on a layer of 7.5 cm sand and filled up to 15 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth as described in 20.3.7. The surplus

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earth shall be disposed off as directed. 18.6.8
Measurements The lengths shall be measured in running
metre correct to a cm for the finished work, which
shall include G.I. pipe and G.I. fittings such as
bends, tees, elbows reducers, crosses, plugs, sockets,
nipples and nuts, but exclude brass or gun metal taps
(cocks), valves, unions, lead connection pipes and
shower rose. All pipes and fittings shall be
classified according to their diameters, method of
jointing and fixing substance quality and finish. In
case of fittings of an equal bore the pipe shall be
described as including all cuttings and wastage. In
case of fittings of unequal bore the largest bore
shall be measured. Note: G.I. unions shall be paid for
separately in external work as well as in internal
work. Digging and refilling of trenches shall either
be measured separately as specified in the appropriate
clauses of excavation and earth work or clubbed with
main item. 18.6.9 Rate The rate shall include the cost
of labour and materials involved in all the operations
described above. The rate shall not include excavation
in trenches, painting of pipes and sand filling all
round the pipes, unless otherwise specified.

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CHAPTER 5:

TENDER FORMS

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ANNEXURE - I

PART - I (TECHNICAL BID)

The Registrar
Management Development Institute Murshidabad

Reference Tender No.: _____

Date: _____

S/No.	Description	Details
1.	Name & address of the Agency with Phone No/ Fax/ E-mail	
2.	Name of authorized person with phone/ mobile no.	
3.	Status of the Firm (Proprietorship / Partnership / Company) Please attach documents in support	
	a) Name of Partners/ Directors	
	b) Details of infrastructure and network	
4.	Income Tax PAN number (Attach copy of PAN Card)	
5.	GST Registration No. (Attach copy of the registration certificate)	

[Handwritten Signature]

CREATIVE FORUM PVT. LTD.

[Handwritten Signature]
Director



8.	Annual turnover over the last 3 (Three) Financial Years (The tenderers need to submit the Audit Report for the last 3 Financial Years)	Financial Years	Annual Turnover
9.	Experience – Attach Self attested copies of experience certificates/ work completion certificates/ work orders etc. for completed work of similar nature for the last 5 Financial Years		
11.	Tender Fee: DD/ Pay Order/ Banker's Cheque No. _____ date _____ Amount _____ Drawn on Bank _____ NEFT/ RTGS Transaction No.: _____		
12.	EMD: DD/ Pay Order/ Banker's Cheque No. _____ date _____ Amount _____ Drawn on Bank _____ NEFT/ RTGS Transaction No.: _____		
13.	Name of the persons authorized to sign documents on behalf of the Contractor with specimen signature (Attach authority letter)		
14.	Any other information useful for consideration		

I/We confirm that I/We have carefully read the terms and conditions of the tender and that the information furnished above are correct to the best of my/our knowledge. In the event of my/our selection, I/we agree to comply with all the conditions stipulated in the tender documents. I/We have furnished/attached all required documents along with this Technical bid document.

Date:

Signature:

Place:

Name:

(Seal of office)

List of enclosures:

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CREATIVE FORUM PVT. LTD.

B. Shankar
Director

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ANNEXURE - II

PART - II (FINANCIAL BID)

SL.NO.	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT PRICE	TOTAL AMOUNT	AMOUNT (in Words)
1	Jungle Cutting Works					
	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared.	Sq.M.	290	₹ 12.55	₹ 3,639.50	Rupees Three Thousand Six Hundred Thirty Nine and Fifty Paises Only
2	Dismantling Works					
	Dismantling brick work in cement mortar manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. The demolition works also include dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking as per the directions of Engineer-in-Charge.	Sq.M.	105	₹ 339.10	₹ 35,605.50	Rupees Thirty Five Thousand Six Hundred Five and Fifty Paises Only
3	EARTH WORKS					
	Earth work in excavation of foundation trenches or drains, in all sorts of soil (including mixed soil but excluding laterite or sandstone) including removing, spreading or stacking the spoils within a lead of 75 m. as directed. The item includes necessary trimming the sides of trenches, levelling, dressing and ramming the bottom, bailing out water as required complete.					
	Depth of excavation for additional depth beyond 1,500 mm. and upto 3,000 mm. but not requiring shoring.	Cu.M.	302	₹ 252.30	₹ 76,194.60	Rupees Seventy Six Thousand One Hundred Ninety Four and Sixty Paises Only
4	Gravel Stone Filling					
	Filling in foundation or plinth by Gravel Stone in layers not exceeding 300 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of Gravel Stone. (payment to be made on measurement of finished quantity)	Cu.M.	19	₹ 850.00	₹ 16,150.00	Rupees Sixteen Thousand One Hundred Fifty Only
5	Stone Dust Filling					
	Filling in foundation or plinth by STONE DUST in layers not exceeding 300 mm as directed and consolidating the same by thorough saturation with water, ramming complete including the cost of supply of STONE DUST. (payment to be made on measurement of finished quantity)	Cu.M.	19	₹ 803.50	₹ 15,266.50	Rupees Fifteen Thousand Two Hundred Sixty Six and Fifty Paises Only
6	Brick Flat Soling					
	Single Brick Flat Soling of picked jhama bricks including ramming and dressing bed to proper level and filling joints with local sand/stone dust.	Sq.M.	65	₹ 430.50	₹ 27,982.50	Rupees Twenty Seven Thousand Nine Hundred Eighty Two and Fifty Paises Only
7	Plain Cement Concrete					



Signature

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Signature
Director

	Ordinary Cement concrete (mix 1:2:4) with graded stone chips (20 mm nominal size) excluding shuttering and reinforcement, if any, in ground floor as per relevant IS codes.					
	Pakur Variety	Cu.M.	26	₹ 6,788.60	₹ 1,76,503.60	Rupees One Lacs Seventy Six Thousand Five Hundred Three and Sixty Paises Only
8	Concrete Works for Reinforced Cement Concrete					
	Providing and laying in position mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured as per mix design of specified grade for reinforced cement concrete work, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS:9103 to accelerate / retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in - charge. Note :- Cement content considered in this item is @ 330kg/cum.	Cu.M.	182	₹ 9,400.85	₹ 17,10,954.70	Rupees Seventeen Lacs Ten Thousand Nine Hundred Fifty Four and Seventy Paises Only
9	Form Work for Reinforced Cement Concrete					
	Centering and shuttering including strutting, propping etc. and removal of form					
	Columns, Pillars, Piers, Abutments, Posts and Struts, Beams and Staircases	Sq.M.	499	₹ 453.35	₹ 2,26,221.65	Rupees Two Lacs Twenty Six Thousand Two Hundred Twenty One and Sixty Five Paises Only
10	Steel Work for Reinforced Cement Concrete					
	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.					
	Thermo-Mechanically Treated bars (TMT).	Tonnes	27	₹ 83,500.00	₹ 22,54,500.00	Rupees Twenty Two Lacs Fifty Four Thousand Five Hundred Only
11	Dewatering					
	Pumping out water caused by springs, tidal or river seepage, broken,					
	Water mains or drains and the like.	Kilo Liters	350	₹ 169.05	₹ 59,167.50	Rupees Fifty Nine Thousand One Hundred Sixty Seven and Fifty Paises Only
10	Plaster Work					
	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar including rounding off or chamfering corners as directed and raking out joints including throating, nosing and drip course, scaffolding/staging where necessary (Ground floor). [Excluding cost of chipping over concrete surface] With 1:4 cement mortar, 20 mm thick plaster.	Sq.M.	402	₹ 242.50	₹ 97,485.00	Rupees Ninety Seven Thousand Four Hundred Eighty Five Only
11	Neat cement					

Amph



Prakash Datta
Director

	Neat cement punning about 1.5mm thick in wall, dado, window sill, floor etc.	Sq.M.	402	₹ 62.75	₹ 25,225.50	Rupees Twenty Five Thousand Two Hundred Twenty Five and Fifty Paises Only
12	Paver Block					No Rupees Only
	50 mm thick interlocking designer concrete paver block M- 30 grade for non-traffic zone, building premises, garden, parks, domestic drive as per IS: 15658- 2006. Coloured Decorative	Sq.M.	80	₹ 800.00	₹ 64,000.00	Rupees Sixty Four Thousand Only
13	G.I. Pipes					
	Supplying, fitting and fixing Medium Class G.I. pipes with all necessary accessories, specials viz. socket, bend, tee, union, cross, elbo, nipple, long screw, reducing socket, reducing tee, short piece etc. fitted with holder bats clamps, including cutting pipes, making threads, fitting, fixing etc. complete in all respect including cost of all necessary fittings as required, joining materials and two coats of painting with approved paint in any position above ground.					
	80 mm (A Type)	Metre	1400	₹ 886.20	₹ 12,12,680.00	Rupees Twelve Lacs Twelve Thousand Six Hundred Eighty Only
14	Butterfly Valve					
	Providing, fixing, testing and commissioning of suitable insertion between flanges as per BS-10 Table DiE wafer type spring loaded, Nitrile rubber lining seat, SG iron disc, AISI-410 SS STEM and C.I. body Butterfly valve PN 1.0 Hand lever operated for Sewerage water application, conforming to IS : 13095. Body Test Pressure:2.4 Mpa and Seat Test Pressure: 1.6 Mpa.					
	80 mm.	Each	6	₹ 11,500.00	₹ 69,000.00	Rupees Sixty Nine Thousand Only
15	Non Return Valve					
	Providing and fixing cast iron dual plate wafer type non-return valve with flange ends with pressure rating of PN-1.0 of approved quality as per IS: 5312					
	80 mm dia.	Each	6	₹ 14,750.00	₹ 88,500.00	Rupees Eighty Eight Thousand Five Hundred Only
16	Submersible Pump					
	Supply, installation, testing and commissioning KIRLOSKAR / KSB / XYLEM make open well Submersible type non-clogging Pump motor set for sewage water transfer of required drive (Motor HP), having discharge capacity and pumping head as described below with all electrical accessories viz main switch and starter, with float arm (with fixed or flexible arm), over load protection relay, power cable and control cable from main switch and starter with auto on-off with dry running protection to respective motors, earthing having required M.S. galvanised supporting stay/ clamp etc. complete operational.					
	(1) A set of Sump pump (Non-clogging type) having discharge capacity of each pump approx. 10 cum/hr at 20 m. pumping head Suction from Septic tank, delivery to centralise storage tank. Including MCC and allied works. (5 HP)	Each	6	₹ 2,50,000.00	₹ 15,00,000.00	Rupees Fifteen Lacs Only



[Signature]
Director

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17	Grease Trap						
	Supply and Installation of Grease Trap	Each	2	₹ 75,000.00	₹ 1,50,000.00		Rupees One Lacs Fifty Thousand Only
18	Septic Tank						
	Clean up of Septic tank	Each	4	₹ 44,900.00	₹ 1,79,600.00		Rupees One Lacs Seventy Nine Thousand Six Hundred Only
19	Rain Water Harvesting Tank						
	Clean up harvesting storage tank (Non-clogging type pipe)	Each	4	₹ 50,000.00	₹ 2,00,000.00		Rupees Two Lacs Only
GRAND TOTAL (Without GST part consideration)				Rs. 81,88,677.00			Rupees Eighty One Lacs Eighty Eight Thousand Six Hundred Seventy Six and Fifty Five Paisas Only

PRICE QUOTATION FORM

	In Figures
PERCENTAGE RATE ON TOTAL PROJECT COST EXCLUDING GST PART (Please choose the percentage option then quote the valid percentage rate) Note: In addition, taxes (GST @ 18%) as applicable is payable.	BELOW
	AT PAR
	EXCESS

AMOUNT QUOTED (in Figures):

AMOUNT QUOTED (in Words):

SIGNATURE OF BIDDER

STAMP OF BIDDER

Place

Date

Signature:

Name:

(Seal of Office)

CREATIVE FORUM PVT. LTD.

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Director



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**REFERENCE LIST OF APPROVED MAKE RENOVATION OF EXISTING
SEWERAGE SYSTEM AT MDI MURSHIDABAD CAMPUS**

WATER SUPPLY / SANITARY ITEMS:-

SL NO.	MATERIAL	BRAND NAME
1	G.I. Pipes	Tata, Jindal , Prakash Surya etc.
2	Non Return valve	Zoloto / Kartar
3	Butterfly Valve	Zoloto / Kartar
4	P.V.C Pipe	Supreme, Oriplast etc
5	Submersible Pump	Kirloskar/ KSB/ Xylen
6	Grease Trap	Supreme / Aco

CREATIVE FORUM PVT. LTD.

Prakash Saha

Director



Super



LEGEND

1	ROAD	DEVELOPMENT
2	STREET	DEVELOPMENT
3	ALLEY	DEVELOPMENT
4	DRIVE	DEVELOPMENT
5	LANE	DEVELOPMENT
6	WALKWAY	DEVELOPMENT
7	ROAD	RESERVE
8	STREET	RESERVE
9	ALLEY	RESERVE
10	DRIVE	RESERVE
11	LANE	RESERVE
12	WALKWAY	RESERVE
13	ROAD	ADJUTANT/RESERVE
14	STREET	ADJUTANT/RESERVE
15	ALLEY	ADJUTANT/RESERVE
16	DRIVE	ADJUTANT/RESERVE
17	LANE	ADJUTANT/RESERVE
18	WALKWAY	ADJUTANT/RESERVE
19	ROAD	ADJUTANT
20	STREET	ADJUTANT
21	ALLEY	ADJUTANT
22	DRIVE	ADJUTANT
23	LANE	ADJUTANT
24	WALKWAY	ADJUTANT
25	ROAD	ADJUTANT
26	STREET	ADJUTANT
27	ALLEY	ADJUTANT
28	DRIVE	ADJUTANT
29	LANE	ADJUTANT
30	WALKWAY	ADJUTANT
31	ROAD	ADJUTANT
32	STREET	ADJUTANT
33	ALLEY	ADJUTANT
34	DRIVE	ADJUTANT
35	LANE	ADJUTANT
36	WALKWAY	ADJUTANT
37	ROAD	ADJUTANT
38	STREET	ADJUTANT
39	ALLEY	ADJUTANT
40	DRIVE	ADJUTANT
41	LANE	ADJUTANT
42	WALKWAY	ADJUTANT
43	ROAD	ADJUTANT
44	STREET	ADJUTANT
45	ALLEY	ADJUTANT
46	DRIVE	ADJUTANT
47	LANE	ADJUTANT
48	WALKWAY	ADJUTANT
49	ROAD	ADJUTANT
50	STREET	ADJUTANT
51	ALLEY	ADJUTANT
52	DRIVE	ADJUTANT
53	LANE	ADJUTANT
54	WALKWAY	ADJUTANT
55	ROAD	ADJUTANT
56	STREET	ADJUTANT
57	ALLEY	ADJUTANT
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93	ALLEY	ADJUTANT
94	DRIVE	ADJUTANT
95	LANE	ADJUTANT
96	WALKWAY	ADJUTANT
97	ROAD	ADJUTANT
98	STREET	ADJUTANT
99	ALLEY	ADJUTANT
100	DRIVE	ADJUTANT



Dyan Saha

ESTABLISHED BRANCH
SITING AND PLANNING
DEPT. COLLEGE

NOTES:-

1. ALL DIMENSIONS ARE IN MM
2. TIME CALCULATED FROM TOP OF RAILWAY BUILDING WHICH IS MARKED ON DPC AS THE VALUE OF TIME IS TAKEN AS ASSUMED
3. TOTAL AREA OF THE PLOT=664684 Sq.M.=102.81 AC. IN
IN WHICH 7 WATER & CANAL 11.88 AC. & 10.03 AC

PROJECT
M.D.I. UNAMPUK WEST BENGAL

TITLE
SEWERAGE LINE

CREATED BY
MURSHIDABAD

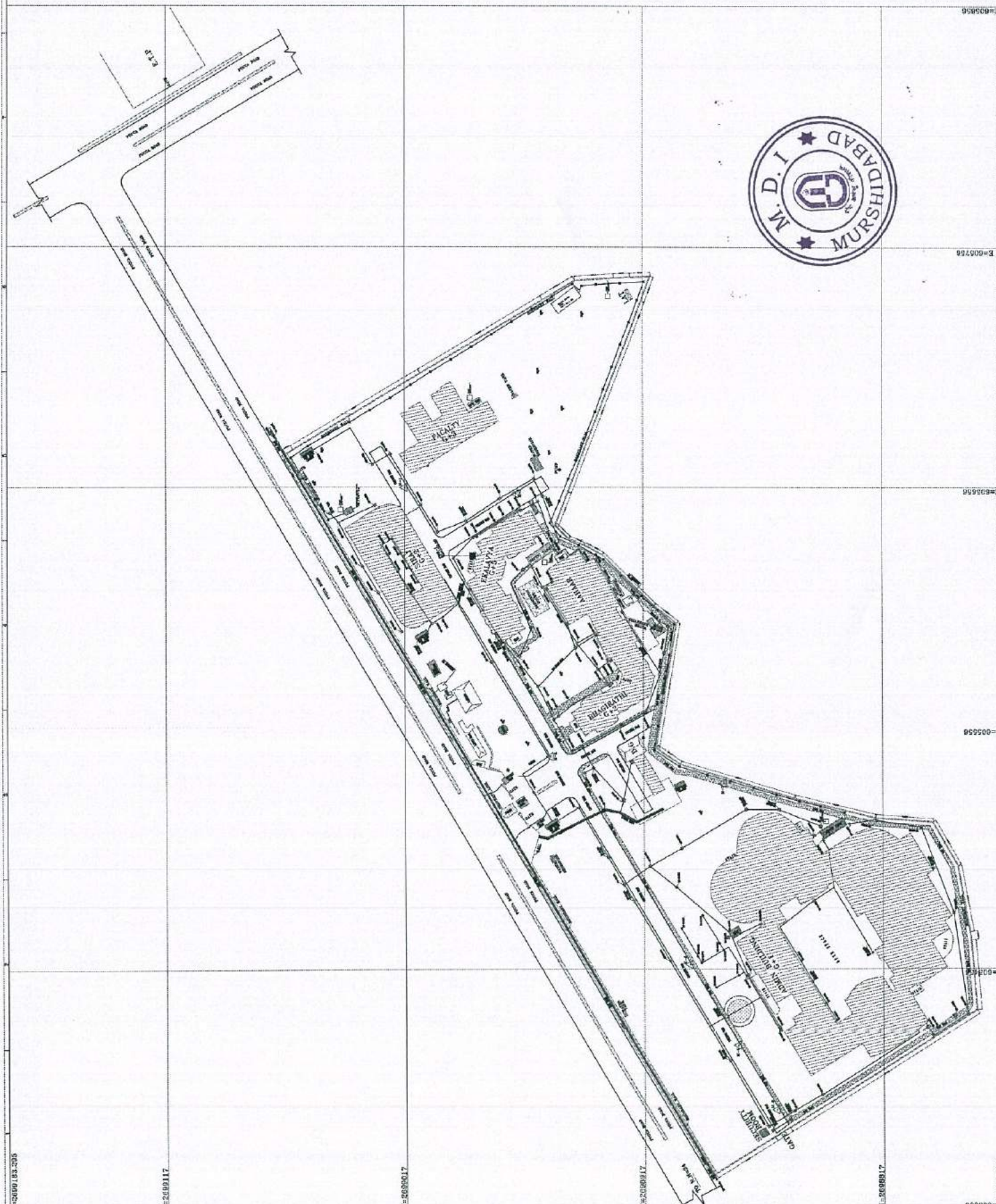
DATE
19/08/2017

SCALE
1:100

REVISION

NO.

DATE



PROJECT

TITLE

CREATED BY

DATE

SCALE

REVISION

NO.

DATE

