

MAYO COLLEGE GIRLS' SCHOOL
CONSTRUCTION OF NEW SENIOR HOUSE 1

TENDER FOR
CIVIL, ELECTRICAL, PLUMBING and FIRE FIGHTING WORKS

VOLUME – I
GENERAL & SPECIAL CONDITIONS OF CONTRACT

CLIENT

MAYO COLLEGE GIRLS' SCHOOL
AJMER

ARCHITECTS

VINYAS
Delhi

SECTION - 1

NOTICE INVITING TENDERS

- 1 Sealed Item Rate Tenders are invited in the prescribed form by the Principal, Mayo College Girls' School, for the following:

Tender No.	Name of Work	Estimated Value (in Rupees)	Earnest Money (in Rs.)	Time of Completion (in months)
MCGS/NSH1/2026	Construction of New Senior House 1 at Mayo College Girls' School, Ajmer	Rupees Thirteen Hundred Fifty Lakhs	Rs.27.0 Lakhs (Rupees Twenty Seven Lakhs)	12 Months

- 2 Eligibility: The following eligibility criteria shall be complied with to fulfill the Qualification Bid
- Average annual financial turnover in building construction in the last three years should be at least 30% of the value of work as on the last completed financial year. The net worth of the contender should be minimum of INR Rupees Five Crores. (Please furnish the provisional balance sheet for the year, if not audited).
 - During last seven years (ending on March 31st of the last completed Financial Year) should have successfully completed either
 - Three similar works each not less than 40% value of respective work (or)
 - Two similar works each not less than 50% value of respective work (or)
 - One similar work not less than 80% value of respective work.
- 3 The works, as detailed in this tender, shall be executed and completed in all respects within a period of from the date of the written order to commence the work in accordance with the Tender Documents, Instructions to Tenderers, General & Special Conditions of Contract, Bill of Quantities and Drawings to the satisfaction of the Architect.
- 4 The Tenderer is required to deposit **Rs.27.0 Lakhs (Rupees Twenty Seven Lakhs)** as earnest money along with the tender in the form of Bank Draft on Ajmer Branch or by Electronic Transfer (along with proof of transfer) of any Nationalised Bank in favour of the **PRINCIPAL, MAYO COLLEGE GIRLS' SCHOOL, AJMER**. The tender which is not accompanied by Earnest Money shall be summarily rejected. The earnest money of unsuccessful Tenderer(s) will be returned to the Tenderer if his tender is not accepted but without any Interest/Bank Commission/ Collection Charges within **30** days from the date of acceptance/finalisation of the tender.
- 5 Tender Documents can be obtained Tender will be available for download on Mayo College Girls' School /Mayo College /Mayoor School Website i.e. <https://mcgs.ac.in/> <https://www.mayocollege.com/>; www.mayoorschool.org; from 21st February to 7th March 2026 till 4:00 P.M.
- 6 Tender fees of 5,000/- (Non-refundable) in cash and Earnest Money of Rs. 27,00,000/- needs to be deposited in the form of DD in favour of Principal, Mayo College Girls' School, Ajmer at the time of submission of the tender, failing which tender will not be considered for the bid.
- 7 A pre-bid meeting will be arranged on request to address queries of the interested bidders.

- 8 Tenders in prescribed form duly accompanied with Earnest Money should be submitted i sealed cover superscribed with the name of the work and must reach the office of the Principal, Mayo College Girls' School, Ajmer, **latest by 10.00 hrs on 09th March 2026.**
- 9 The Tenders shall remain valid for a period of **90 days** from the date of opening of tender.
- 10 The total amount of Security Deposit shall be 10% (Ten percent) of the total value of the contract for the work. The Earnest Money deposited shall be converted as initial Security Deposit in the case of successful tenderer. The balance of the Security Deposit would be made up by deduction of 10% (Ten percent) from the amount of each running/on account bill for the work done under the contract after adjusting initial deposit as mentioned earlier. No interest shall be paid on the said Security Deposit.
- 11 The Earnest Money of the successful tenderer shall be forfeited in the event of refusal or delay on his part in signing the Agreement within **7 days** of the of letter of award of the contract or refusal to start the work on instructions from the Architect/Engineer.
- 12 The Principal, Mayo College Girls' School, does not bind itself to accept the lowest or any Tender and reserves to itself the right to negotiate, accept or reject any or all the tenders either in whole or in part without assigning any reasons for doing so. Principal, Mayo College Girls' School, can bifurcate the works seeing the feasibility of execution/ early completion of works.

SECTION – 2

INSTRUCTIONS TO TENDERERS

2.1 The tenderers shall examine carefully all the tender documents consisting of:

- a) Notice inviting tenders.
- b) Instructions to tenderers.
- c) Tenderer's forwarding letter
- d) Form of Agreement.
- e) General and special conditions of contract.
- f) Technical specifications
- g) Drawings
- h) Bill of quantities/Tender Schedule

The tenderer is advised to visit and inspect the site at his own cost and responsibility and to secure all necessary information which may be required for completing the work. Ignorance of site conditions or local information shall not be considered as an excuse for non-performance of the contract. All costs, charges and expenses that may be incurred by the Tenderer in connection with preparation of his tender shall be borne by him and Principal, Mayo College Girls' School, will not accept any liability whatsoever in this regard.

2.2 Time is the essence of the contract, and the Tenderers are required to complete the work in all respects within **12 Months** from the date of issue of letter of intent/order and hand over the same complete in all respects to the satisfaction of Architect.

2.3 The Tenderer shall use only the Form issued with this tender to fill up the rates.

2.3.1 Every page of the tender shall be signed on the left-hand side bottom corner and any tender not so complied with is liable to be treated as defective.

2.3.2 The Tender Form must be filled in English, and all entries must be made by hand in ink. If any of the documents are missing, or unsigned, the tender is liable to be treated as defective tender.

2.3.3 Tenders not properly filled, mutilated with incorrect calculations or generally not complying with the conditions are liable to be rejected.

2.3.4 Any erasures and alterations made while filling the tender must be attested by initials of the Tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender liable for rejection.

2.4 A schedule of approximate quantities for various items accompanies this tender. It must be definitely and clearly understood that this schedule is liable to alteration by omissions, deductions or additions to any extent at the discretion of Principal, Mayo College Girls' School, without affecting the terms of the contract.

2.4.1 The scope of work may be reduced or increased either side due to variation in the space required to be constructed.

2.4.2 It shall be clearly understood that the rates quoted in the tender are for complete work at site as per Instructions to Tenderers, Conditions of Contract, Specifications, Schedule of

Quantities and drawings, addenda referred to therein and also for all such works as are necessary for the proper completion of the contract.

2.4.3 The tender should contain not only the rates but also the value of each item of work entered in the prescribed column of the schedule of quantities and all the items should be totaled up in order to show the aggregate value of the entire tender. The rates quoted by the Tenderer should be expressed accurately both in words and figures so that there is no discrepancy. The item rates quoted by the Tenderer in words and figures (whichever are lower) will be the basis (and not the amounts in case of discrepancies) in finalising the tender.

2.4.4 No alteration which is made by the tenderer in the Notice of Tender, Instructions to the Tenderer, Agreement Form, General and Special Conditions of Contract and Drawings, etc. accompanying the same shall be recognised, and if any such alterations are made, the tender is liable to be rejected.

2.5 The tender for the work shall remain open for acceptance for a period of **7 days** from the date of opening of the tender. If any tenderer withdraws his offer before the said period or makes any modifications in the terms and conditions of the tender, then Principal, Mayo College Girls' School, shall, without prejudice to any other right or remedy, be at liberty to forfeit the Earnest Money of the tenderer.

2.6 The Principal, Mayo College Girls' School, does not bind itself to accept the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders/offers either in whole or in part without assigning any reasons for doing so.

2.7 Canvassing in connection with the tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

2.8 Rates must be quoted for complete work at site. The rates shall include the impact of Royalty, Toll Tax, Excise duty, Goods and Service Tax including adjustment of the set-off against GST availed, Labour Welfare Cess or any other taxes levied or leviable by Central or State Governments or by any local Authorities/Bodies. No part of such taxes on contractor's labour or material shall be paid by the Employer. The Employer shall not entertain any claim whatsoever in this regard. Decision of the Employer in this regard shall be final and binding. GST at prevalent rate will be paid over and above value of work. Necessary documentation with regard to GSTIN and proof of deposit of GST and Labour Cess may be required by the School before the GST and Labour Cess components of the bill(s) are released.

2.8.1 Any new tax or any increase in rates of levies/taxes on the finished work introduced by Central or State Government or by any local authorities after the opening of the tender, shall be reimbursed to the contractor only on production of certificates from concerned authorities with authenticated documents to the fact that the same has already been deposited by the contractor. The contractor shall also be required to submit undertaking for any kind of liability of the labour engaged in this project. Any abolition of tax or decrease in rates of levies/taxes on the finished work introduced by Central or State Government or by any local authorities after the opening of the tender, shall be recovered by Principal, Mayo College Girls' School, from running/on-account bills of the Contractor.

2.9 The contractor's operations and proceedings in connection with the work shall at all times be conducted during the continuance of the contract in accordance with the laws, ordinance, rules and regulations for the time being in force and the contractors shall further observe and comply with the bye-laws and regulations of the Government of India, State Government and

Municipal and other authorities having jurisdiction over the area involved in connection with the works or site and over operations such as those as carried out by the contractor and shall give all notices required by such bye-laws and regulations.

2.10 The Agreement for this acceptance shall be executed on a non-judicial stamp paper of requisite value for which the stamp duty shall be borne by the Contractor.

2.11 Deduction towards Income Tax and works tax as per rules shall be made by Employer from the contractor's bills.

2.12 Unknown/Indefinite Liabilities:

Tenders containing any conditions leading to unknown/indefinite liabilities are liable to be rejected. If at all any rebate(s) is/are to be offered, the Tenderer shall first quote his rates strictly on the terms and conditions stipulated in the tender documents and then show separately any rebate(s) offered specifying the conditions for such rebate(s), if any.

2.13 List of documents to be submitted with the tender:

- (i) Tender with earnest money in sealed cover, superscribed "Tender for **Construction of New Senior House 1 at Mayo College Girls' School, Ajmer** should reach the Principal, Mayo College Girls' School, not later than **10.00 hrs on** Principal, Mayo College Girls' School, shall not accept any loss or delay in transit as an excuse for delayed/late tendering.
- (ii) Tender documents will be submitted along with detailed programme and targets of completion of each item of work.
- (iii) Details of deployment of manpower, machinery, plant and equipment.
- (iv) Solvency certificate from banker for last one year.
- (v) Tenderer to furnish GSTR 3B for any one of the 3 months immediately preceding the month from the date of submission of the tender.
- (vi) Partnership Deed and Articles of Association etc. as applicable.
- (vii) Power of Attorney
- (viii) List of works executed in last three years of value more than Rs. Six Crores with following details (please use additional pages as required):

Name of Work	Value of Work	Client's Name and address	Period of Construction	
			As per Contract	As executed

Note: The client's certificate of completion of works and photographs in each case shall be furnished.

- (ix) List of all works in hand irrespective of monetary limit with following details (please use additional pages as required):

Name of Work & Client's Name and address	Value of Work	Work Completed Upto 31.03.2025 (Financial Value)	Anticipated outlay 2025-26	Anticipated outlay 2026-2027

Note: The client's certificate of award of the works & work completed in each case shall be furnished.

- (x) Turnover of the firm in last 3 years, duly supported by I.T.C.C. (Attested copies) or any other document acceptable, for year (x) Solvency certificate from banker for last one year.
- (xi) Tenderer has to be a registered AA Class contractor with any one of the government departments. The tenderer must submit details of registration with State Government and/or Semi-Government authorities with documentary proof.
- (xii) The Tenderer has to furnish documentation establishing his Bid Capacity along with the Bid Capacity Calculation Formula. A contractor's available bid capacity must exceed the tender's estimated cost to be considered eligible.
- (xiii) Arbitration cases, if any, during last three years.
- (xiv) Any other information tenderer wants to give.

2.14 MODE OF SUBMISSION OF TENDER

The tenderers are required to submit their offer in the following manner:

1. Envelope marked "Number 1 – Earnest Money" shall contain the Earnest money deposit
2. Envelope marked "Number 2 –Techno-commercial Bid" shall contain technical data or other information as stated below:
 - (i) Covering letter to the tender
 - (ii) Any comments which the tenderer desires to make in the form of a statement, as brief as possible and with proper reference to the items, clauses and pages of the tender documents to which the comments pertains.
 - (iii) Documents as per **clause 2.13**.
 - (iv) Book-let superscribed "**Tender documents – Part-I "Construction of New Senior House 1 at Mayo College Girls' School, Ajmer"**".

3. Envelope marked "Number 3 – Price Bid" shall contain only the price bid on the tender booklet superscribed "**Tender documents - Part-II (Price-Bid) "Construction of New Senior House 1 at Mayo College Girls' School, Ajmer"**", in a prescribed manner and must be sealed.
4. Envelopes marked number 1, 2 and 3 shall be put in a large envelope of adequate size. It shall be sealed and marked to the Principal, Mayo College Girls' School,. The full name and address of the Tenderer and the name of the work shall be written on the cover.

2.15 ACCEPTANCE OF TENDER

Principal, Mayo College Girls' School, reserves the right to reject any or every tender without assigning any reason whatsoever and or to negotiate with the tender(s) in any manner the Principal, Mayo College Girls' School, considers suitable.

SECTION – 3
(Covering Letter to the Tender)

FROM
M/s

Date:

To,
Principal,
Mayo College Girls' School,
Ajmer

Ref: Construction of New Senior House 1 at Mayo College Girls' School, Ajmer.

Dear Sir,

With reference to the tender invited by you, I/We hereby offer to perform, provide, execute and complete the works in conformity with the conditions of contract, drawings and specifications for the respective items of schedule of quantities attached hereto.

1. I/We have satisfied myself/ourselves as to the location and prevailing conditions of the site, and have read carefully the tender booklet(s) containing Articles of Agreement, conditions of Contract, Specifications, General and Special Conditions, Drawings etc. and I/We understand that the works are to be completed within **12 Months** from the date of issue of Letter of Intent/Order and fully understand that the time will be the essence of the contract.
2. I/We enclose a demand draft for **amount of Rs. _____/- (Rupees _____ only) as per clause no. 1.3 of Notice Inviting Tenders**, drawn on _____, payable in favour of _____ as Earnest Money and fully understand that this amount will not bear any interest.
3. I/We agree to keep the offer open for **15 days** from the date of opening of the tender.
4. Should this tender be accepted in whole or in part, I/We hereby agree to abide by and fulfill all the terms and conditions annexed hereto. If I/We fail to commence the work specified in tender documents, I/We agree that my/our earnest money shall stand forfeited absolutely to the Employer otherwise the said Earnest Money shall be retained by the Employer towards Security Deposit (retention money). I/We also agree to the balance security money being deducted from my/our bills in accordance with the conditions of contract.
5. All the terms and conditions contained in the Notice Inviting Tenders, General & Special Conditions of Contract, Specifications, for execution of work and additional conditions and the Agreement etc. constituting the tender documents have been fully read by me/us and explained to me/us and I/We hereby accept the same and sign hereunder in token of their acceptance.
6. We are further enclosing herewith the following documents:
 - (i) Partnership deed, Articles of Association and Power of Attorney. We agree that no change will be made in these documents without prior approval of Principal, Mayo College Girls' School,.
 - (ii) Tender Documents duly signed along with detailed programme and targets of completion of each item of work.

- (iii) Details of deployment of manpower, machinery, plant and equipment. Total list of plant and machinery in possession of the firm and the list of plant and machinery which will be exclusively deployed on this work.
- (iv) Latest Income Tax Clearance Certificate.
- (v) Draft No. _____ dated __.__.20__. drawn on _____.
- (vi) Name of Proprietor/Director/Partners of the firm:

Yours Faithfully

Name and Signature of Tenderer

M/s

.....

Office stamp & seal of Tenderer(s)

Date : _____

Witness : _____

Address : _____

Occupation: _____

SECTION – 4

ARTICLES OF AGREEMENT

Articles of agreement made this day ____ of _____ **20__** between Principal, Mayo College Girls' School, having its registered office at _____ (hereinafter referred to as "Employer" which expression shall mean and include its successor in office executor, administrator assignees) of the one part and **M/s** _____ having its office at _____, hereinafter referred to as "contractor", which expression shall include his heir, executor, administrator and assignees) of the other part. Whereas the Employer is desirous of getting **Construction of New Senior House 1 at Mayo College Girls' School, Ajmer** and has caused drawings, specifications and schedule of quantities describing the works to be done, to be prepared by the Employer and whereas the said drawings issued by the Employer from time to time, and notice inviting tenders, instructions to Tenderers, general and special conditions of contract, technical specifications and schedule of quantities have been signed by or agreed to execute upon and subject to the conditions set-forth herein (hereinafter referred to as the said conditions) and the Special Conditions and specifications of the work shown upon the said drawings and/or described in the said specifications and included in the said schedule of quantities at rates therein set-forth amounting to the sum of **Rs. _____ (Rupees _____ only)** hereinafter referred to as "the said contract amount". And whereas the contractor has deposited with the Employer the sum of **Rs. _____ (Rupees _____ only)** as the earnest money which shall become part of security deposit to be retained until the expiry of the defects liability period for the due observance and performance of this contract.

Now it is hereby agreed as follows:

1. In consideration of the said contract amount to be paid at the times and in the manner set-forth in the said conditions, the contractor shall, upon and subject to the said conditions execute and complete the work shown upon the said drawings and described in the said specifications and/or the schedule of quantities and other conditions and within **12 Months** of the date of commencement of the work the latest day by **__ . __ . 20__**.
2. The commencement of work will be taken as the date of issue of the letter of intent/order for award of the contract.
3. The contractor clearly understands that time is the essence of the contract, and penalty will be imposed for delay in execution of the work, as per terms of the contract.
4. The Employer shall pay the contractor the said contract amount or such other sum as shall become payable at the times as hereinafter specified in the conditions.
5. The following documents shall be deemed to form and be read and construed as part of the agreement along with the amendments, negotiated and confirmed in various subsequent letters exchanged as mentioned hereinafter.
 - (i) Notice inviting tenders.
 - (ii) Instructions to tenderers.
 - (iii) General and special conditions of contract.
 - (iv) Technical specifications.
 - (v) Schedule of quantities.
6. Employer's letter No. _____ dated _____ to the contractor for awarding the contract.
7. Contractor's letter No. _____ dated _____ to the Employer in acceptance of the award of contract.
8. Drawings

Parties hereto shall respectively abide by submitting themselves to the conditions and perform the agreement on their part respectively in such conditions contained.

As witness our hands this _____ day of _____ **20__**.

1. Signed by the said

2. Signed by the said

Employer (First Party)

Contractor (Second Party)

M/s

Principal, Mayo College Girls' School,

In the presence of

In the presence of

Address

Address

SECTION - 5

GENERAL CONDITIONS OF CONTRACT

- I. Definitions and interpretations
- II. General obligations
- III. Execution of works
- IV. Variations in extent of contract
- V. Measurements, Certificates and Payments
- VI. Labour
- VII. Claims
- VIII. Determination of Contract
- IX. Settlement of Disputes

I. Definitions and Interpretations

5.1. Definitions: In these general conditions of contract, the following terms shall have meaning hereby assigned to them except where the context otherwise requires:

- a) "Employer" shall mean the Principal, Mayo College Girls' School, or any other Committee/representative acting on his behalf and includes their authorized representative to deal with any matters on their behalf.
- b) "Engineer" shall mean "Chief Project Manager" who shall be accredited representative of the Employer at site.
- c) "Engineers representative" means any Engineer or assistant appointed from time to time by the Employer.
- d) "Architect" means, appointed by the Employer or their representative to act on their behalf in connection with the execution of the project.
- e) "Contractor" shall mean the persons or company whether they are incorporated or not who enter into the contract with the Principal, Mayo College Girls' School, and shall include their heirs, executors, administrators, successors and permitted assignees.
- f) "Contract" shall mean and include the notice inviting tenders, the letter of intent, the agreement and work order, the accepted schedule of rates and quantities, the general conditions of contract, special conditions of contract, drawings and specifications (if any) including all the modifications thereof incorporated in their execution.
- g) "Works" shall mean the works to be executed in accordance with the contract.
- h) "Specifications" shall mean the standard specifications for works and materials of the Employer and specifically brought out in the notice inviting the tender, as amplified added to, or superseded by special specifications and embodied in the contract. In absence of any specifications for any item of the work, the relevant specifications in PWD BSR Ajmer Circle and IS Code shall be followed in that order and work shall be executed accordingly.
- i) "Drawings" shall mean the maps, drawings, plans and tracing or prints thereof annexed to the contract and shall include any modification of such drawings and further drawings as may be issued by the Architect from time to time.
- j) "Constructional Plant" shall mean all appliances or things of whatsoever nature required for the execution, completion or maintenance of the works or temporary works (as hereinafter defined) but does not include materials or other things intended to form or forming part of the permanent work.
- k) "Temporary Work" shall mean all temporary works of every kind required for the execution, completion or maintenance of the works.

- l) "Site" shall mean the lands and other places on, under, in or through which the works are to be carried out and any other lands or places provided by Principal, Mayo College Girls' School, for the purpose of the contract.
- m) "Period of maintenance" shall mean the specified period of maintenance from the date of completion of the works, as certified by the Architect/Engineer.
- n) "Hindrance Register" shall mean the register maintained at the site of work showing the item affected, the date on which the delay occurred and the date on which the delay was cleared and reason for delay. These entries shall be signed by the contractor, Employer/Engineer or their authorised representative.
- o) "Virtual Completion": Virtual completion shall mean that the works are completed in all respects and fit for use in every respect including installation of all services complete in working order to the full satisfaction of the Architect and the Owner.
- p) Definitions of Time
 - i. "A day" shall mean a day of 24 hours from midnight to midnight irrespective of number of hours worked on that day.
 - ii. "Normal working hours" shall mean 9 (nine) hours per day. The specific timing would vary depending upon the season.
 - iii. "A week" shall mean 7 (seven) days without regard to the number of hours worked on any day in that week.
 - iv. "A Month" shall mean a calendar month without regard to the number of days in that month.

5.1.1 "Singular and Plural" words imparting the singular number shall also include the plural and vice versa where the context so requires.

5.1.2 "Headings and marginal headings": -

The headings and marginal headings in these general conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or of the contract.

II. GENERAL OBLIGATIONS

5.2 Intent & Scope of Contract:

5.2.1 The intent of the contract is that the Contractor shall provide a work/building and/or systems in complete functioning order and all work or materials necessary for the above intent shall be deemed to be included and all items will be paid for at the rates established in the Contract.

5.2.2 The Contractor shall supply at his own cost all materials, plants, tools, appliances, implements, ladders, cordage, tackles, scaffolding, shuttering and temporary works required for the proper execution of the work whether original, altered or substituted and whether included in the specification or other documents forming part of the contract or referred to in these conditions or not or which may be necessary for the purpose of satisfying the conditions or as directed by the Engineer or his representatives at the site of work.

5.2.3 The Contractor shall also provide all necessary fencing and lights required to protect the public from accident, and shall be bound to bear the expenses of defense of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to the neglect of the above precautions and to pay any damages and costs which may be awarded in such suits, actions 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. In no case, the Employer shall be a party to any such claim/claims.

5.2.4 Sufficiency of tender:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the work and of the prices stated in the schedule which shall except in so far as it is otherwise provided in the contract, cover all his obligations under the contract and all matters and things necessary for the proper completion, functioning and maintenance of the work.

5.2.5 Law Governing the Contract:

The Contract shall be governed by the law for the time being in force in the country. The Contractor when called upon to do so shall enter into and execute the Contract Agreement with the Employer. The Contract Documents are complimentary and what is called for by any one shall be binding as if called for by all.

5.2.6 Compliance with Regulations and Bye-Laws:

The Contractor shall conform to the provisions of any Statutes relating to the works and Regulations and Bye- Laws of any local authority and of any water and lighting companies or undertakings with whose system the work is proposed to be connected and shall before making any variations from the drawings or the specifications that may be necessitated by so conforming, give to the Engineer notice specifying the variations proposed to be made and the reasons for making the variations and shall not carry out such variation until he has received instructions from the Engineer in respect thereof. The Contractor shall be bound to give all notices required by statutes. Regulations or Byelaws as aforesaid and to pay all fees and taxes payable to any Authority in respect thereof.

5.2.7 Communications to be in writing:

All notices, communications references and complaints made to Employer or the Engineer or the Engineer's representative or the Contractor concerning the works shall be in writing and no notice, communication, reference or complaint not in writing shall be recognised.

5.2.8 Service of notice on Contractor:

The Contractor shall furnish to the Engineer the name, designation and address of his authorized agents and all complaints, notices, communications and references shall be deemed to have been duly given to the Contractor if delivered to the Contractor or his authorised agents or left at or posted to the address so given and shall be deemed to have been so given in the case of posting on the day on which they would have reached such address in the ordinary course of post or on the day on which they were so delivered or left.

5.2.9 Constitution of Firm:

The Tenderer(s) who is/are constituents of the Firm, Company, Association or Society must forward attested copies of the constitution of their concern, partnership deed and power of attorney with their tender. Tender Documents in such cases are to be signed by such person as may be legally competent to sign them on behalf of the Firm, Company, Association or Society as the case may be. Co-operative societies must likewise submit an attested copy of their certificate of registration along with the documents as aforementioned. EMPLOYER will not be bound by any power of attorney granted by the Tenderer(s) or by changes in the composition of the Firm made subsequent to the execution of the Contract. EMPLOYER may, however, recognise such power of attorney and changes after obtaining proper legal advice, cost of which will be chargeable to the Contractor. If the Tenderer expires after the submission of his tender or after the acceptance of his tender, EMPLOYER shall deem such Tender/Contract as cancelled. If a partner of firm expires after the submission of their tender, EMPLOYER shall deem such tender cancelled unless the firm retains its character. If the Contractor's firm is dissolved on account of death, retirement of any partners or for any reason whatsoever, before fully completing the whole work or any part of it, undertaken by the Principal Agreement, the surviving partners shall remain jointly/severely and personally liable to complete the whole work to the satisfaction of EMPLOYER due to such dissolution. The cancellation of any documents such as power of attorney, partnership deed, etc. shall forthwith be communicated to EMPLOYER in writing, failing which EMPLOYER shall have no responsibility or liability for any action taken on the strength of the said documents.

5.2.10 Occupation and use of land:

No land belonging to or in possession of EMPLOYER shall be occupied by the Contractor without the permission of EMPLOYER. The Contractor shall not use, or allow to be used, the site for any purpose other than that of executing the works. The equipment and materials shall be removed from the site after raising of the building structure so that land is available for the external development works. In **case of failure to keep the site clear as mentioned above a penalty @ Rs.50/- per sq.m. per month will be levied**, without prejudice to other rights and remedies.

5.2.11 Assignment or sub-letting of Contract:

The Contractor shall not assign or sublet the Contract or any part thereof or allow any person to become interested therein in any manner, whatsoever, without the special permission of EMPLOYER. Any breach of this condition shall entitle EMPLOYER to rescind the Contract under clause 5.8.2 (v) of these conditions and also render the Contractor liable for payment to EMPLOYER in respect of any loss or damage arising or ensuing from such cancellation. Provided always that execution of the details of the work by petty contractor under the direct and personal supervision of the Contractor or his agent shall not be deemed to be subletting under this clause. The permitted subletting of work by the Contractor shall not establish any contractual relationship between the sub-contractor and EMPLOYER and shall not relieve the Contractor of any responsibility under the Contract.

5.2.12 Representation on works:

The Contractor shall, when he is not personally present on the site of the works, place and keep a responsible agent at the works during working hours who shall on receiving reasonable notice, present himself to the Engineer and orders given by the Engineer or the Engineer's representative or Architect to the agent shall be deemed to have the same force as if they had been given to the Contractor. Before absenting himself, the Contractor shall furnish the name and address of his agent for the purpose of this clause. Such agents shall not be changed and shall not leave during the duration of the Contract, unless the consent of the Engineer have been previously obtained. Any failure on the part of the Contractor to comply with this provision at any time will entitle EMPLOYER to levy a penalty of Rs.10,000/- per month or rescind the Contract under clause 5.8.2 of these conditions.

5.2.13 Relics:

All gold, silver, oil and other minerals of any description and all precious stones, coins, treasure, relics, antiquities and other similar things which shall be found in or upon the site shall be the property of EMPLOYER and the Contractor shall duly preserve the same to the satisfaction of EMPLOYER and shall from time to time deliver the same to such person or persons as EMPLOYER may appoint to receive the same.

5.2.14 Excavated materials:

The Contractor shall not sell or otherwise dispose of or remove except for the purpose of this Contract, the said stone, clay, ballast, earth, rock or other substances or materials which may be obtained from any excavation made for the purpose of the works or any building or produce upon the site at the time of delivery of the possession thereof but all such substances, materials, buildings and produce shall be the property of EMPLOYER provided that the Contractor may, with the permission of the Engineer, use the same for the purpose of the works either free of cost or pay the cost of the same at such rates as may be determined by the Engineer.

5.2.15 Indemnity by Contractor:

The Contractor shall indemnify and save harmless EMPLOYER from and against all actions, suits, proceedings, losses, costs, damages, charges, claims and demands of every nature and description brought or recovered against EMPLOYER by reason of any act or omission of the Contractor, his agents or employees, in the execution of the works or in the guarding of the same.

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

5.2.16 Earnest Money and Security Deposit:

Every Tenderer shall deposit along with his tender Earnest Money as indicated in the Notice Inviting Tender in the form of Bank Draft payable at Ajmer Branch of any Nationalised Bank in favour of Principal, Mayo College Girls' School. The Earnest Money deposited by the successful Tenderer shall be converted to form part of the Security Deposit to be paid by the successful Tenderer. In case the Tenderer withdraws his offer before the expiry of his validity period of 90 days or if the tender is accepted by EMPLOYER, but the Tenderer does not sign the necessary Contract Agreement within seven days of issue of letter of intent/order or refuses to start the work on instructions from Architect/Engineer, the Earnest Money so deposited, shall stand forfeited to EMPLOYER.

5.2.17 Refund of Earnest Money:

The Earnest Money of the Unsuccessful Tenderer(s) shall be refunded without any interest/Bank Commission/Collection charges within **60 Days** of the acceptance/finalisation of the Tender.

5.2.18 Payment of Security Deposit:

- (i) On receipt of the Letter of Intent/Order, the successful Tenderer shall pay Security Deposit on the scale mentioned thereunder for the due and faithful fulfillment of the Contract. The total amount of Security Deposit shall be **10% (Ten percent)** of the total value of the contract for the work. The Earnest Money deposited shall be converted as initial Security Deposit in the case of successful tenderer. The balance of the Security Deposit would be made up by deduction of 10% (Ten percent) from the amount of each running/on account bill for the work done under the contract after adjusting initial deposit as mentioned earlier. No interest shall be paid on the said Security Deposit. However as soon as the Security Deposit so deducted from running/on account bills amounts to one half of the total security deposit due, the Contractor will, on production of a Bank Guarantee from any Nationalised Bank for an amount equal to one quarter of the total security deposit due valid till 30 days of expiry of maintenance period be entitled for a refund of an amount equal to one quarter of the total security deposit due. Thus keeping an amount equal to one quarter of the total security deposit due in cash as security deposit which shall be retained till 30 days of expiry of maintenance period Subsequent security deposit deducted from running/on account bills, i.e., balance of an amount equal to one half of the total security deposit due can be converted into two bank guarantees, each of an amount equal to one quarter of the total security deposit due, whenever the amount of security deposit deducted reaches an amount equal to one half of the total security deposit due. These two subsequent bank guarantees each of an amount equal to one quarter of the total security deposit due shall remain valid till three months of the completion of the entire work.
- (ii) Alternatively, at the start of contract, contractor can furnish three bank guarantees from Nationalised bank, each equal to one quarter of the total security deposit due. Two bank guarantees should be valid till three months after completion of the entire work and the other one should be valid till 180 days of expiry of maintenance period. In such cases, balance amount will be deducted from running on account bills towards security deposit only up to an amount equal to one quarter of the total security deposit due in cash, which shall be retained till 30 days of expiry of maintenance period.

5.2.19 Refund of the Security Deposit:

- (i) On faithfully completion of the contract one half of the Security Deposit shall be refunded the Contractor on completion of **180 days** of the completion of the entire work, subject to the issue of completion certificate by the Architect/Engineer. However, refund of part of the Security Deposit shall not relieve the Contractor from his obligations and liabilities to make good any defects, imperfections, shrinkage of faults which may appear during the period of maintenance specified in the Contract. In case Contractor has furnished Bank Guarantee(s), the Bank Guarantee(s), valid till three months of the completion of the entire work and amounting to one half of the Security Deposit will be released within 180 days of the completion of the entire work subject to the issue of completion certificate by the Architect/ Engineer.
- (ii) The balance half of the Security Deposit shall become due and shall be paid to the Contractor after 30 days of the expiry of the period of maintenance, handing over of

external development works to local authorities satisfactorily, and issue of certificate of completion comprising the whole of the works.

- (iii) Provided always that no Security Deposit shall become due nor shall be payable to the Contractor unless all the stipulations of the Contract have been fulfilled by the Contractor and all claims and demands made against the Employer for and in respect of damages or loss by firm or in consequences of the works, but excluding the claims made by the Contractor on the Employer have been finally satisfied.
- (iv) Security Deposit shall be liable to be forfeited by the Employer in the event of breach of Contract on the part of the Contractor, without prejudice to other rights and remedies.
- (v) Security Deposit shall be liable to be forfeited by the Employer in the event of breach of Contract on the part of the Contractor, without prejudice to other rights and remedies.

5.2.20 Interest on amount: No interest shall be payable on the Earnest Money or the Security Deposit or any amount payable to the Contractor under the Contract, except as provided for under the Conditions of this Contract.

5.2.21 Illegal gratification:

Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the Contractor or his partner, agent or servant or any one of his or on their behalf to any officer, or employee of EMPLOYER or to any person on his or their behalf in relation to obtaining or execution of this or any other Contract with EMPLOYER shall, in addition to any criminal liability which he may incur subject the Contractor to the rescission of the Contract and EMPLOYER shall be entitled to deduct the amounts so payable from any money due to the Contractor under the Contract or any other Contracts with EMPLOYER. The Contractor shall not lend or borrow from or have or enter into any monetary dealings or transactions either directly or indirectly with any employee of EMPLOYER and if shall do so, EMPLOYER shall be entitled forthwith to rescind the Contract and all other Contracts with EMPLOYER. Any question or dispute as to the commission of any offence or compensation payable to EMPLOYER under this clause shall be settled by the Principal, Mayo College Girls' School, in such manner as he shall consider fit and sufficient and his decision shall be final and conclusive.

5.2.22 Time Limitation:

The time allowed for execution of the works or part of works as specified in the Contract Documents in accordance with these conditions shall be the essence of the Contract. Subject to any requirement in the Contract as to completion of any portion or portions of the works before completion of the whole of the work, the Contractor shall fully and finally complete the whole of the work comprised in the Contract (with modifications as may be directed under conditions of this Contract) by the date entered in the Contract or extended date.

5.2.23 Date of Commencement and Completion:

The Contractor shall be allowed admittance to the site on the "Date of commencement" stated in the Appendix, and he shall thereupon and forthwith begin the works and shall regularly proceed with to complete the same (except such painting or other decorative works as the Engineer may desire to delay) on or before the "Day of Completion" stated in the Appendix subject nevertheless to the provisions for extension of time hereinafter contained.

5.2.24 Accepted Programme of Work:

As soon as the work is awarded, but not later than 7 days after the date of issue of letter of intent, the Contractor shall submit a detailed programme of work in the form of CPM/ PERT Network, BAR charts indicating the time schedule for commencement and completion of various items of works and the organisation in labour, plant and machinery that he intends to utilise for execution of the works, and complete the same by the stipulated dates of completion. The programme of work amended as necessary after discussions with the Engineer shall be treated as agreed programme for the purpose of this Contract and Contractor shall endeavour to fulfil this programme of work. Nothing stated herein shall preclude the Contractor in achieving earlier completion of the individual items or whole of the work than indicated in this programme.

5.2.25 Delays & the Extension of Time:

- i. If in the opinion of the Engineer, the work is delayed:
 - (a) by force MAJEURE or
 - (b) by reasons of any exceptionally inclement weather or

- (c) by reason of proceedings taken or threatened by or dispute with adjoining or neighbouring owners or public authorities arising otherwise than through the Contractor's own default or
 - (d) by the works or delays of other Contractors or Tradesmen engaged by the Employer and not referred to in the schedule of Quantities and/or Specifications or
 - (e) by reasons of Engineer's instructions or
 - (f) in consequence of the Contractor not receiving in due time necessary instructions from the Engineer for which he shall have specifically applied in writing, the Employer shall make a fair and reasonable extension of time for completion of the Contract works.
 - (g) by reasons of civil commotion, local combination of workmen or strike or lockout affecting any of the building traders. In case of such strike or lockout, the Contractor should give immediately written notice thereof to Engineer, but the Contractor shall nevertheless constantly use his endeavours to prevent delays and shall do all that may reasonably be required to proceed with the work to the satisfaction of the Engineer.
- ii. The Contractor's right to an extension of time limit for completion of the work in the above-mentioned cases is subject to the following procedures:
- (a) That, within 10 days after the occurrence of case of force MAJEURE but before the expiry of the stipulated date of completion, he informs the Engineer in writing that he considers himself entitled to an extension of the time limit.
 - (b) That, he produces evidence of the date of occurrence and the duration of the force MAJEURE in an adequate manner by means of documents drawn up by reasonable authorities.
 - (c) That, he proves that the said conditions have actually interfered with the carrying out of the Contract.
 - (d) That, he proves that the delay incurred is not due to his own action or lack of action. In the cases mentioned above for delays in completion of works, such failures or delays shall in no way affect or vitiate the Contract or alter the character thereof or entitle the Contractor to damages or compensations thereof but the Contractor shall apply for extension of time at least 45 days before the completion of the Contract period and EMPLOYER shall grant such extension or extensions of the completion dates as shall appear to the Employer reasonable in the circumstances and his decision in the matter will be final and binding on the Contractor.
- iii. In all other cases EMPLOYER may grant extension of time with penalty, liquidated damages and without escalation.

5.2.26 Liquidated Damages for Delay: The time and date stipulated in the Contract for the completion of the work or any part or stage thereof shall be deemed to be the essence of the Contract. The work shall, throughout the stipulated period of Contract, be carried out with all diligence. If the Contractor fails to complete the work within the time prescribed or within the extended time under the Contract, he shall pay to EMPLOYER on demand without prejudice to other rights and remedies, EMPLOYER may have against the Contractor, a sum of **0.5%** of the contract value per week or part thereof as liquidated damages for such default, and not as a penalty for every week or part thereof after the stipulated date of completion, provided that the total liquidated damages payable shall not exceed **5%** of the Contract value. EMPLOYER may, without prejudice to any other method of recovery, deduct the amount of such damages from any moneys due or which become due to the Contractor. The recovery or deduction of such damages shall not relieve the Contractor from any obligations and liabilities under the Contract. During this period of delay, no escalation of prices shall be payable viz., original quoted rates will be paid.

5.2.27 Failure by Contractor to Comply with Engineer's Instructions:

If the Contractor after receipt of written notice from the Engineer requiring compliance within ten days fails to execute such works as per drawings or as per Engineer's instructions, the Engineer may employ and pay other persons to execute any such work, whatsoever, that may be necessary to give effect thereto, and all costs incurred in connection therewith including loss, if any, shall be recoverable from the Contractor by the Engineer as a debit or may be deducted by him from any money due or to become due to the Contractor.

III. EXECUTION OF WORKS

5.3.0 Contractor's understanding:

It is understood and agreed that the Contractor has by careful examination, satisfied himself as to the nature and location of the work, the configuration of ground, the character, quality of the materials to be encountered, the character of equipment and facilities needed preliminary and during the execution of the works, the general and local conditions, the labour conditions prevailing therein and all other matters which can in any way affect the works under the Contract.

5.3.1 Commencement of Works:

The Contractor shall commence the works within immediately after the receipt of order in writing to this effect from the Employer and shall proceed with the same with due expedition and without delay.

5.3.2 Programme of work and Compliance to Engineers Instructions:

The Contractor shall on receipt of the letter of intent/order or as soon as possible thereafter, but not later than **30 days** from the date of issue of letter of intent/order submit to Engineer for his approval, CPM, PERT and Bar Charts. The programme shall be prepared in such a manner that it shall have adequate float for the unforeseen items and additional works, if any, and also programme showing the order and procedure in which he proposes to carry out the work. The Contractor shall, whenever required by the Engineer, also provide in writing for his information general description of the arrangement and methods which the Contractor proposes to adopt for the execution of the work. If at any time it should appear to the Engineer that the actual progress of the work does not conform to the approved programme referred to above, the Contractor shall produce at the request of the Engineer a revised programme showing the modification to the approved programme necessary to ensure timely completion of the Contract. The submission to and approval by the Engineer of such programmes or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities or obligations under the Contract. The Employer or their representatives shall have full powers and authorities during progress of the work to issue such instructions as may be necessary for the proper execution of the work and the Contractor shall carry out and be bound by the same. In case the Contractor fails to submit the above referred programme charts or connected/modified programme charts, the Engineer will have the option to get these prepared at the cost of Contractor in addition to the levy of penalty which will be binding.

5.3.3 Instructions of Engineer's Representatives: Any instruction or approval given by the Engineer's representatives to the Contractor in connection with the works shall bind the Contractor as though it had been given by the Engineer provided as follows:

- (a) Failure of the Engineer's Representatives to disapprove any work or materials shall not prejudice the power of the Engineer thereafter to disapprove such works or materials and to order the removal or breaking up thereof.
- (b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's representative he shall be entitled to refer the matter to the Engineer who shall there upon confirm or vary such decision.

5.3.4 Responsibilities for Structural Adequacy:

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

5.3.5 Supervision of Works:

Provision of efficient and competent staff: The Contractor shall place and keep on the works at all time efficient, competent and qualified staff to give the necessary directions to his workmen and to see that they execute their work in sound and proper manner and shall employ only such supervisors, workmen and labourers in or about the execution of any of the works as are careful and skilled in their various trades and callings. The Contractor shall at once remove from the works any agent, permitted subcontractor, supervisor, workmen or labourer who shall be

objected to by the Engineer and if and whenever required by the Engineer, he shall submit a correct return showing the names of all staff and workmen employed by him. In the event of the Engineer being of the opinion that the Contractor is not employing on the works sufficient number of staff and workmen as is necessary for the proper completion shall forthwith on receiving intimation to this effect take on the additional number of staff and labour specified by the Engineer within seven days of being so required and failure on the part of the Contractor to comply with such instructions still entitle EMPLOYER to levy penalty or rescind the Contract under relevant provisions of these conditions.

5.3.6 The Contractor shall employ at site at his own cost at least one full-time Civil Engineering diploma Engineer with minimum experience of 7 years in carrying out similar types of works with adequate number of Assistants. The name, qualifications, and experience of the Engineer proposed to be employed by the Contractor shall have to be got approved from the Engineer before the commencement of the work. A penalty of Rs.10,000/- per month shall be recoverable from the Contractor for Non-compliance of this clause. Continued noncompliance of Engineer's instructions shall amount to breach of the Contract by the Contractor who shall be solely responsible for all the consequences arising therefrom, without prejudice to other rights and remedies.

5.3.7 Other Works:

Separate Contracts in connection with works: EMPLOYER shall have the right to allot other Contracts in connection with the works. The Contractor shall afford other Contractors reasonable opportunity for the storage of their materials and the execution of their work and shall properly connect and co-ordinate his work with theirs. If any part of the Contractor's work depends for the proper execution or results upon the work of another contractor, the Contractor shall inspect and promptly report to the Engineer any defect in such work that renders it unsuitable for such proper execution and results. The Contractor's failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other contractor's work after the execution of his work.

5.3.8 Setting out of Works:

The Contractor shall be responsible for the true, correct and proper setting out of the works in relation to the original points, lines and levels of reference given by the Engineer in writing, subject to above mentioned, all the positions, 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 the progress of the work, any error shall appear or arises in any part of the work, the Contractor on being required to do so by the Engineer shall at once rectify such errors to the satisfaction of the Engineer. The checking of any setting out of line or level by the Engineer or his representatives shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all benchmarks, site levels, pegs, etc. used in setting out all the work. In case the Contractor is required to revise the setting out of work due to any reason he shall do so without any extra charges.

5.3.9 **Contractor to keep Site clear:** During the execution of work, the Contractor shall keep Site reasonably free from obstructions and shall store or dispose off any constructional plant and surplus material and clear away and remove from site any rubbish or temporary work no longer required.

5.3.10 Clearance of Site on Completion:

On the completion of the work, the Contractor shall clear away and remove from site all constructional plant surplus materials, rubbish and temporary work of every kind and restore the ground to original level unless otherwise instructed by the Engineer. Contractor shall leave whole of the site, work of every kind, and 10 metres distance from the site periphery clear in workman like conditions to the satisfaction of the Engineer.

5.3.11 Watchman:

The Contractor shall make his own security arrangements to always guard the site and premises at his own expense at all times. Security arrangements should be adequate to maintain strict control on the movement of materials and labour. The Contractor shall extend the security

arrangements to guard the material stacked and/or fixed on the premises by the sub-Contractors. Nothing extra shall be payable in this regard.

5.3.12 Safety Provisions:

The Contractor shall at his own expense, arrange for the safety provisions as required under various statutory laws imposed in respect of labour directly or indirectly employed for the performance of the work and shall provide all facilities in connection therewith. Precautions in the safety clause are the minimum necessary and shall not relieve the Contractor from taking additional safety precautions as may be required for particular type of the work. Also, mere observance of these precautions shall not absolve the Contractor of his liabilities in case of loss or damage to the property or injury or death of any person including Contractor's labour, Engineer's representatives or any member of the public.

5.3.13 Alterations to be Authorised:

No alterations in or additions to or omission or abandonment of any part of the works shall be deemed authorised, except under instructions from the Architect/Engineer and the Contractor shall be responsible for obtaining in writing such instruction in each and every case from the Principal, Mayo College Girls' School.

5.3.14 Extra Works:

Should works over and above those included in the Contract be required to be executed at the site, the Contractor shall have no right to be entrusted with the execution of such works which may be carried out by another Contractor or Contractors or by other means at the option of EMPLOYER.

5.3.15 Adherence to Specifications and Drawings:

The whole of the works shall be executed in perfect conformity with the Specifications and Drawings. If the Contractor performs any work in a manner contrary to the Specifications or Drawings or any of them and without such reference to the Engineer, he shall bear all the costs arising or ensuing therefrom and shall be responsible for all losses to EMPLOYER.

5.3.16 Drawings and Specifications of the Works:

The Contractor shall keep one copy of Drawings and Specifications at the site in good order, and also such other Contract Documents as may be necessary, to be made available to the Engineer and the Engineer's representatives.

5.3.17 Ownership of Drawings and Specifications:

All drawings and specifications and copies thereof furnished by Architect/Employer to the Contractor are deemed to be the property of Architect. They shall not be used on other works and with exception of the signed Contract set, shall be returned by the Contractor to the Architect on completion of the works or Termination of the Contract.

5.3.18 Compliance with Contractor's request for details:

The Architect/Engineer shall furnish with reasonable promptness after receipt, by him of the Contractor's request for the same, additional instructions by means of Drawings or otherwise, necessary for the proper execution of the works or any part thereof, all such Drawings and instructions shall be consistent with the Contract Documents and reasonably inferable therefrom.

5.3.19 Meaning and intent of Specifications & Drawings:

If any ambiguity arises as to the meaning and intent of any portion of the Specifications and Drawings or as to execution or quality of any work or material or as to the measurements of the works, the decision of the Engineer thereon shall be final subject to appeal (within seven days of such decision being intimated to the Contractor) to the Architect who shall have the power to correct any errors, omissions, or discrepancies in the Specifications, Drawings, classification of work or materials, and whose decision in the matter, in dispute or doubt, shall be final and conclusive.

5.3.20 Work during Night:

The Contractor shall not carry out any work between sunset and sunrise without the previous permission of the Engineer.

5.3.21 **Damage to EMPLOYER property and private life and property:**

The Contractor shall be responsible for all risks to the works and for trespass and shall make good at his own expense all loss or damage whether to the works themselves or to any other property of EMPLOYER or the lives, persons or property of others from whatsoever cause in connection with the works until they are taken over by EMPLOYER even though all reasonable and proper precautions may have been taken by the Contractor and in case EMPLOYER shall be called upon to make good any such costs, loss or damages, or to pay compensation (including that payable under the provisions of the Workmen's Compensation Act or any Statutory Amendment thereof) to any person or persons sustaining damage as aforesaid by reason or any act, or any negligence or omission on the part of the Contractor, the amounts of any costs or charges (including costs and charges in connection with legal proceedings), which EMPLOYER may incur in reference thereto, shall be charged to the Contractor. EMPLOYER shall have the power and right to pay or to defend or compromise any claims of threatened legal proceedings or in anticipation of legal proceedings being instituted consequent on the action or default of the Contractor, to take such steps as may be considered necessary or desirable to ward off or mitigate the effect of such proceedings, charging to the Contractor, as aforesaid, any sum or sums of money which may be paid and any expenses whether for reinstatement or otherwise which may be incurred and the propriety of any such payment, defence or compromise, the incurring of any such expenses shall not be called in question by the Contractor.

5.3.22 Sheds, Store-houses and Yards: The Contractor shall at his own expense provide himself with sheds, store-houses and yards in such situations and in such numbers as in the opinion of the Engineer are requisite for carrying on the works and the Contractor shall keep at each of such sheds store- houses and yards a sufficient quantity of materials and plant in stock as not to delay the carrying out of the works with due expedition and the Engineer and the Engineer's representatives shall have free access to the said sheds, store houses and yards at any time for the purposes of inspecting the stock of material and plant so kept in hand, and any materials or plant which the Engineer may object to shall not be brought upon or used in the works, but shall be forthwith removed from the sheds, store-houses or yards by the Contractor. The Contractor shall at his own expenses provide and maintain suitable generators, soaking vats, etc. or any other equipment necessary for the proper execution of the works.

5.3.23 **Workmanship and Testing:**

The whole of the works and/or supply of materials specified and provided in the Contract or that may be necessary to be done in order to form and complete any part thereof shall be executed in the best workman like manner with materials of the best and approved quality of their respective kinds, agreeable to the particulars contained in or implied by the specifications and as referred to in and represented by the drawings or such other additional particulars, instructions and drawings as may be found requisite to be given during the execution of the works and to the entire satisfaction of the Engineer according to the instructions and directions which the Contractor may from time to time receive from the Engineer. The Contractor shall, at his own cost and expense, supply to the Architect/Engineer samples of materials proposed to be used in the works. The samples must be produced at least **six weeks before** they are to be incorporated in works. The Architect/Engineer shall within **fifteen days** supply of samples or within such further period as he may require, inform the Contractor whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply the Engineer for his approval fresh samples complying with the specification laid down in the Contract.

5.3.24 No materials shall be brought by the Contractor to site unless samples are approved. The materials may be subjected to tests by means of such machines, instruments and appliances as the Engineer may direct and entirely at the expenses of the Contractor.

5.3.25 The materials brought to site by the Contractor and before they are allowed to be used in the works by the Engineer shall be inspected by the Contractor to ensure that these conform to the required stipulations and record a certificate to that effect in the register to be maintained for this purpose.

5.3.26(a) **Testing Laboratory:**

The Contractor during the course of execution of works shall at his own expense provide a Testing Laboratory for conducting necessary tests for materials such as bricks, sand, aggregate, Cube strength of concrete, batching of concrete etc. The Laboratory should be equipped with

all such instruments as required by the Engineer such as Cube Testing Machine, Sieves, Weighing Scales, Graduated cylinders, Slump Cone Test, Vernier Callipers, Micrometers, Cable Gauge, Multimeter, Earth Testing, Maggar, Bubble Levels, Theodolite, Dumpy Level, Oven, etc. No equipment shall be removed from the laboratory by the Contractor without specific approval of the Engineer. **However the tests required by the Architect/Engineer may also be carried out by any other approved laboratory, all the costs for such tests shall be borne by the Contractor.**

5.3.26(b) Workmanship:

The Contractor shall engage specialist firms for the execution of the following works:

- (i) Electrical sub-Contractor(s) (holding registration with Government Departments).
- (ii) Plumbing, sanitary, sewerage and water supply sub-Contractor(s) (holding registration with Government Departments).
- (iii) Water proofing works (company's authorised applicator)
- (iv) Anti-termite works (company's authorised applicator)

5.3.27 Removal of Improper Work and Materials:

The Engineer or the Engineer's Representative shall be entitled to order from time to time:

- (i) The removal from the site (within the time specified) any materials which in his opinion are not in accordance with the Specifications or Drawings.
- (ii) The substitution of proper and suitable materials.
- (iii) The removal and proper re-execution (not withstanding any previous tests thereof or "On Account" payments thereof) of any work which in respect of materials or workmanship is not in his opinion in accordance with the specifications and in case of default on the part of the Contractor in carrying out such order, EMPLOYER shall be entitled to levy a penalty of **Rs.10,000/- per month** and continuous noncompliance of order will entitle EMPLOYER to rescind the Contract, under relevant clause of these conditions.

5.3.28 Facilities for Inspection and Access to Site of work:

The Contractor shall afford the Principal, Mayo College Girls' School, authorities, Engineer, Architect and their representatives every facility for entering in and upon every portion of the work at all hours for the purpose and the Engineer and the Engineer's representative shall at all times have free access to every part of the works and to all places/workshops/factories at which material for the works are stored or being obtained/manufactured.

5.3.29 Examination of work before covering up:

The Contractor shall give seven days' notice to the Engineer or Engineer's representative whenever any work or materials are intended to be covered up by the earth, in bodies or walls or otherwise to be placed beyond the reach of measurement in order that the work may be inspected or that correct dimensions may be taken before being so covered, placed beyond the reach of measurement in default whereof the same shall at the option of the Engineer or the Engineer's representative be uncovered and measured at the Contractor's expense or no payment shall be made for such work or materials.

5.3.30 Temporary Works:

The temporary works necessary for the proper execution of the works shall be provided and maintained by the Contractor and subject to the consent of the Engineer shall be removed by him at his expense when they are no longer required and, in such manner, as the Engineer shall direct. In the event of failure on the part of the Contractor to remove the temporary works, the Engineer will cause them to be removed and the cost as incurred for supervision and other incidental charges shall be recovered from the Contractor. If temporary huts are provided by the Contractor on EMPLOYER's land for labour engaged by him for the execution of the work, the Contractor shall arrange for handing over vacant possession of the said land whenever directed by the Engineer to do so. If the Contractor's labour refuses to vacate, and have to be ejected by EMPLOYER, necessary expenses incurred by EMPLOYER in connection therewith shall be borne by the Contractor. Hindrance caused to work will invite penalty also as envisaged in para 5.3.27.

5.3.31 Arrangements for Water and Electricity:

The Owner shall provide power for construction at one point at site of work at actual cost. The contractor shall provide all temporary service lines, boards, switches, cut-outs etc. as required for

his used on the works and remove the same on completion at his own cost. If the State Electricity Board supply is not available, then the contractor will have to make his own arrangement to carry out the work uninterrupted. The contractor shall be charged at relevant commercial rates of the state electricity board for the actual units of electricity consumed at the site. The contractor shall also pay 0.75% of the civil work as water charges for water provided by the Employer.

5.3.32 Property in Materials and Plant:

The materials and plant brought by the Contractor upon the site or on the land occupied by the Contractor in connection with the works and intended to be used for the execution thereof shall immediately as they are brought upon the site or the said land, be deemed to be the property of EMPLOYER. Such of them as during the progress of the works are rejected by the Engineer or are declared by him not to be needed for the execution of the work or such as on the grant of the certificate of completion remain unused shall immediately on such rejection, declaration or grant cease to be deemed property of EMPLOYER and the Contractor may then (but not before) remove them from the site or the said land. This clause shall not in any way diminish the liability of the Contractor nor shall EMPLOYER be in any way responsible for any loss or damage which may happen to or in respect of any such materials or plant either by the same being lost, stolen, or destroyed by fire, tempest or otherwise.

5.3.33 Tools, Plant and Materials supplied by EMPLOYER:

The Contractor shall take all reasonable care of all tools, plant and materials or other property, whether of alike description or not, belonging to EMPLOYER and committed to his charge for the purpose of the works and shall be responsible for all damage or loss caused by him, his agents, permitted sub-Contractors or his workmen or others while they are in his charge. The Contractor shall sign all receipts for tools, plants and materials made over to him by Engineer and on completion of the works shall hand over, the unused balance of the same to the Engineer in good order and repair, (fair wear and tear excepted) and shall be responsible for any failure to account for the same or any damage done thereto.

5.3.34 Precautions during progress of Works:

During the execution of works, unless otherwise specified, the Contractor shall at his own cost provide materials for and execute all shoring, timbering, shuttering and scaffolding, fencing and structuring work etc. as are necessary for the stability and safety of all structures, excavations and works and shall ensure that no damage, injury or loss is caused or likely to be caused to any person or property.

5.3.35 Roads and Water Courses:

Existing roads or water courses shall not be blocked, cut through, altered, diverted or obstructed in any way by the Contractor, except with the permission of the Engineer and the School Authorities. All compensation claimed for any unauthorised closure, cutting through, alteration, diversion or obstruction to such roads or water course by the Contractor or his agent or his staff shall be recoverable from the Contractor by deduction from any sums which may be due/become due to him in terms of the Contract or otherwise according to law.

5.3.36 Rates for Items of Works:

The rates entered in the accepted Schedule of Rates of the Contract are intended to provide for works duly and properly completed in accordance with the General and Special (if any) Conditions of Contract and the Specifications and Drawings together with such enlargements, extensions, diminution, reductions, alterations, or additions as may be ordered without prejudice to the generality thereof and shall be deemed to include and cover superintendence and labour, supply, including full freight of material, stores, patterns, profiles, moulds, fittings, centering, scaffolding, shoring, props, timber, machinery, derricks, tackle, ropes, pegs, posts, tools, etc. and all apparatus and plant required on the works, except such materials as may be specified in the contract to be supplied to the Contractor by EMPLOYER, the erections, maintenance and removal of all temporary works and buildings, all watching, lighting, bailing, pumping and draining, all prevention of or compensation for trespass, all barriers and arrangements for the safety of the public or of employees during the execution of works all sanitary and medical arrangements for labour camps as may be prescribed by EMPLOYER, the setting of all work and of the construction, repair and upkeep of all center lines, bench marks and level pegs thereon, site clearance, all fees, duties, royalties, rent and compensation to owners for surface damage or taxes and impositions payable to local authorities in respect of land, structures and all materials

supplied for the works, or other duties or expenses for which the Contractor may become liable or may be put to under any provision of law for the purpose of or in connection with the execution of the contract, and all such other incidental charges or contingencies as may have been specially provided for in the Specifications.

5.3.37 Co-ordination of Work:

At the commencement of work and from time to time, the Contractor shall confer with other Contractors, sub-Contractors, persons engaged on separate contracts in connection with the works, and with the Engineer for the purpose of the co-ordination and execution of various phases of works. The Contractor shall ascertain from the other Contractors, in connection with the works, the extent of all chiseling, cutting and forming of all openings, holes, grooves etc. as may be required to accommodate the various services. The Contractor shall ascertain the routes of all services and the positions of all floor and wall outlets, traps, etc. in connection with the installation of plants, services and arrange for the construction of work accordingly. The breaking and cutting of complete work shall not be done unless specifically authorised in writing by the Engineer. All breaking shall be done by the Contractor for execution of work and no work shall be done over broken or patched work without first ascertaining that the broken surface is adequately prepared and reinforced to receive and hold the future work. The work, broken without authorisation, will be subject to replacement at the direction of the Engineer.

5.3.38 Access Roads:

The Contractor shall provide necessary access roads to the site of work from the nearest thoroughfare/right of way at his cost.

5.3.39 Suspension of Works:

The Contractor shall on the order of the Engineer suspend the progress of the works or any part thereof or such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Engineer. No compensation shall be payable to the Contractor on whatsoever account for the suspension of work. In the event such suspension exceeds 14 days, the Contractor shall be entitled to such extension of time for completion of the works as the Engineer may consider proper and reasonable with regard to period or periods of such suspension provided suspension has not been ordered on account of any default on the part of the Contractor.

GUARANTEES

5.3.40 Quality of Work:

The Contractor shall guarantee that the materials and workmanship are the best of their respective kinds for the service intended and that all items of work will be free from all inherent defects in workmanship and material. he shall also guarantee that the work will not fail in any respect due to quality of material, workmanship and methods of construction. The specifications assume a proper degree of skill on the part of the Contractor and workmen employed. The Contractor shall consult the Engineer, whenever in his judgment variation in the methods of construction or in the quality of materials would be beneficial or necessary to fulfill the guarantees called for. Such variations may be made by the Contractor only when authorised by the Engineer.

5.3.41 Rejection:

If during the period of maintenance any work or material fails in any respect to meet the above guarantee, the Contractor shall replace such work or material in a condition which will meet the above guarantee, immediately.

5.3.42 Cost of Execution of work or repair etc.:

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

5.3.43 Remedy on Contractor's failure to carry out works required:

If the Contractor fails to do any such work or repair within the stipulated time as aforesaid required by the Engineer, the Engineer shall be entitled to carry out such works or repair at the Contractor's cost. The Engineer 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.

IV. VARIATIONS IN EXTENT OF CONTRACT

5.4.0 Powers of Modifications to Contracts:

The quantities of the various items indicated in the "Schedule of Quantities" forming part of this Contract are approximate and are subject to variations based on the ground strata, detailed drawings and instructions issued during the execution of work and other conditions under which the works are executed. The Employer reserves the right to make variations in the quantities or delete any of the item(s) altogether from the Schedule of Quantities and/or order extra items to be executed or substitute the item in the Schedule of Quantities, such variations shall in no way affect this Contract. The rates quoted by the Contractor and accepted as per these Contract Documents shall be firm and the Contractor shall not be entitled to any revision in rates due to any variation in quantities of items shown in the Schedule of Quantities. Time for completion of the work shall be modified in the proportion that of the actual work versus the original Contract work and the certificates of the Engineer shall be conclusive to such proportion.

5.4.1 Schedule of Quantities:

The Schedule of Quantities, unless otherwise stated, shall be deemed to have been prepared in accordance with the standard method of measurement of building works. Any error in description or in quantity or omission of items from the Schedule of Quantities shall not vitiate this Contract but shall be rectified and the value thereof as ascertained hereof shall be added to or deducted from the Contractor's amount (as the case may be) provided that there shall be no rectification of errors in the Contractor's schedule of rates.

5.4.2 Rate for Extra, Additional or Altered or Substituted work:

The Employer shall have full powers to order execution of extra additional, altered or substituted items not included in the Schedule of Quantities forming part of this Contract. The execution of such items and/or any instructions issued thereafter shall not, in any way, affect or vitiate the Contract and the Contractor shall be bound to carry out all such items required under the same terms and conditions as per these Contract Documents.

- a) If the rate for additional, altered and substituted work directly available in the Contract for the work, the Contractor is bound to carry out the work at the same rates as are available in the Contract for the work.
- b) If the rates for additional, altered or substituted work are not directly available in the Contract for the work, the rates will be derived from the rates for a similar class of work as are specified in the Contract for the work.
- c) **If the rates for altered, additional or substituted work cannot be determined in the manner specified in sub-clause (i) and (ii) above, the rates for such items will be worked out on the basis of rates given in BSR 2022 Jaipur as applicable to Ajmer. The rates for additional, altered and substituted work shall be paid as per BSR 2022 Jaipur as applicable to Ajmer @ % above/below.**
- d) If the rates for the altered, additional or substituted work cannot be determined in the manner specified in sub-clause (i) to (iii) above, then the Contractor shall execute the work under instructions of the Architect/ Engineer, and he will be paid on the basis of market analysis submitted by the Contractor and approved by the Architect/Engineer. For the purpose of market analysis of rates, overheads and Contractors' profit shall be taken at 15%. However, if the Contractor is not satisfied with the decision of the Architect/Engineer in respect of the rates so approved by him, then he may appeal to the Principal, Mayo College Girls' School, within 30 days of getting the decision of the Engineer supported by analysis of the rates or rates claimed. The Principal's decision after hearing from both the parties in the matter would be final and binding on the Contractor and Engineer/ Architect.

V. MEASUREMENTS, CERTIFICATES AND PAYMENTS

5.5.0 Quantities in Schedule of Rates annexed to Contract:

The quantities set out in the accepted Schedule of Rates with items of work quantified are the estimated quantities of the work and they shall not be taken as the actual and final quantities of the works to be executed by the Contractor in fulfillment of his obligations under the contract.

5.5.1 Measurements of Works:

- (i) The Contractor shall be paid for the works at the rates of the accepted Schedule of Rates and for all the authorised extra works at rates determined on the measurements taken by the Contractor and verified by the Engineer or the Engineer's Representative in accordance with the rules prescribed for the purpose by EMPLOYER.
- (ii) The quantities for items, the unit of which in the accepted Schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number. Any fraction below half being dropped and half and above being taken as one, for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals.
- (iii) Such measurements will be taken of the work in progress from time to time and at such intervals as in the opinion of the Engineer shall be proper having regard to the progress of the works. The date and time on which 'on account' or final measurement are to be verified shall be communicated to the Contractor who shall be present at the site and shall sign the results of the measurements.

5.5.2 On Account Payments:

- (i) Contractor shall be entitled to be paid from time to time by way of "On-account payable" only for such works as in the opinion of the Engineer he has executed at site subject to any deduction which may be made from the same.
- (ii) Detailed measurements for the work done at site will be recorded in the prescribed measurement book by the Contractor and On-Account Bill shall be prepared and submitted to the Engineer who will pass the same for payment after verification.
- (iii) The measurements submitted by the Contractor shall be jointly verified on the date and time fixed by the Engineer and the Contractor shall be present at site and shall sign the results of the measurements which will also be signed by the Engineer/Engineer's representative. These measurements so verified in the prescribed measurement book will be treated as an acknowledgment and acceptance of the accuracy of the measurement. Failing the Contractor's attendance, the work will be checked and measured up in his absence and such measurements, shall notwithstanding such absence, be binding on the Contractor whether or not he shall have signed the measurement book, provided always that any objection made by the Contractor in writing to any measurement shall be duly investigated and considered in the manner set-out above.
- (iv) The On-Account Bill shall be submitted in the prescribed proforma approved by the Engineer. No bill, submitted incomplete or not in the prescribed manner will be entertained. Once the On-Account Bill is submitted by the Contractor complete in all respects to the satisfaction of the Engineer, the same will be normally paid within 15 days of submission. The Contractor shall, however, not be entitled for any interest or any other compensation due to delayed payment. "The bill on receipt in corporate office of EMPLOYER after its having been checked at site will be passed for payment to the extent of **75%** of net amount which will be treated as advance. This amount will be adjusted while passing running/ on-account bill and balance **25%** paid thereafter. The next running/on account bill will be prepared only after the first bill is cleared."
- (v) Normally On-Account payments for the work done by the Contractor shall be made once a month provided that the gross value of work done since the previous payment is not less than **Rs.30 lacs**.

5.5.3. Final Measurement & Payment:

- (i) When the work has been actually completed and the Engineer shall have certified in writing that they have been so completed and the Engineer has reasonably satisfied himself about the same, the Contractor shall submit his final bills of quantities supported by detailed measurements within **15 days**. Subject to the joint checking of the measurements by the Engineer and the Contractor, the Engineer shall arrange to effect actual payment of

such of the amounts as are undisputed and accepted after checking therefrom of the amounts due to the Contractor in terms of the Contract.

- (ii) The Contractor shall be entitled to the payment of the final bill on the basis of final certificate to be issued in writing by the Engineer at the expiration of the period referred to as the "Defects Liability Period" in the Appendix hereto from the date of virtual completion or as soon as after the expiration of such period as the works shall have been finally completed and all defects made good according to the true intent and meaning hereof whichever shall last happen, provided always that the issue by the Engineer of any certificate during the progress of the work and after the completion shall not relieve the Contractor from his liability in cases of fraud, dishonesty, or fraudulent concealment relating to the works or materials or to any matter dealt within the certificate in case of all defects and insufficiencies in the works or materials which on reasonable examination could not have been disclosed. No certificate of the Engineer shall of itself be conclusive evidence that any work or material which it relates is in accordance with the Contract and the Engineer therefore be empowered to withhold such sum or sums as deemed necessary for the time being till final measurements have been made and quantities and quality of work done have been checked and determined.
- (iii) The Engineer shall have power to withhold any certificate/payment if the works or any part thereof is not carried out to his satisfaction or some discrepancies or accounts/audit objections are noticed and raised requiring clarification or rectification(s).
- (iv) In case of termination/rescinding of the Contract, Contractor shall be required to measure work within seven days from the date of termination/rescinding for joint verification by the Engineer, failing which the Engineer will record the measurements after giving due notice to the Contractor of the date and time of the measurement to be recorded and in case the Contractor still fails to witness the measurements, then the measurements so recorded by the Engineer will be the final and binding on the Contractor.

5.5.4 Delayed Payments:

All payments as due to the Contractor in pursuance of any certificate given by the Engineer shall be made promptly unless some bill has been held up under objection in writing, pending clarification or reply from the Contractor. All objections shall be resolved to the satisfaction of the Employer if necessary, by holding meetings and discussions, minutes whereof shall be recorded. No interest, however, shall be claimed and payable for such delayed payments.

5.5.5.1 Maintenance of Works: The Contractor shall at all times during the progress and continuance of the works and also for the period of maintenance (Defects Liability Period) specified in the Tender form and after the date of issue of the certificate of completion by the Engineer or any other earlier date subsequent to the completion of the works that may be fixed by the Engineer be responsible for and effectually maintain and uphold in good substantial, sound and perfect condition all and every part of the works and shall make good from time to time at all times as often as the Engineer shall require, any damage or defect that may during the above period arise in or be discovered or be in any way connected with the works, provided that such damage or defect is not directly caused by act of providence or insurrection or civil riot and the Contractor shall be liable for and shall pay and make good to the Employer whenever required by the Engineer to do so, all losses, damages, costs and expenses they or any of them may incur or be put to or be liable to by reason or in consequence of the operations of the Contractor or of his failure in any respect.

5.5.5.2 Urgent measures/Emergency works:

Any Urgent measures/Emergency works which in the opinion of the Employer, become necessary during the progress of the work to obviate any risk of accident or failure, or which becomes necessary for security or rectification of essential services, during the defects liability period, shall be carried out by the Contractor without any extra charges. If any emergency work(s) become necessary and Contractor delays or fails to carry out such work(s), the Employer shall get the same work(s) carried out by any other agency at the risk and cost of the Contractor. All such expenses shall be recovered from the Contractor.

5.5.5.3 Handing over services and site Development Works:

The Contractor shall hand over the site development works, i.e. sewerage, drainage, water supply etc. to the concerned authorities in good substantial, sound and perfect condition, as

acceptable to the concerned authorities at his own cost, including liaison with and arranging inspection by, concerned local authorities.

5.5.6 Period of Maintenance for Complete Work: (Defects Liability Period)

The period of maintenance for the works shall be **Twelve months** starting from the date of virtual completion of the work or as certified by the Engineer.

5.5.7 Contract valid during Maintenance Period:

The Contract shall remain valid and in force until the expiry of maintenance (Defect Liability Period) period.

5.5.8 Certificate of Completion of Works:

As soon as the work is completed, the Contractor shall give notice of such completion whether the whole of the work or any part of the work for which a separate date of completion is stipulated in the Contract to the Engineer. Within thirty days of receipt of such notice Engineer shall inspect the work and shall also arrange for carrying out of such tests that may be prescribed under the Contract. If the Engineer notices any incomplete items of works or any defects which are to be rectified by the Contractor or if any part of or whole of the works fails to pass the specified tests, the Engineer shall furnish to the Contractor list of all such incomplete works, deficiencies, defects failure to pass test etc. and may refuse to issue a Certificate of Completion to the Contractor, provided, however, that such certificate shall not be refused only on the grounds of any defects in the work required to be carried out in respect of Contracts/items wherein a specific Defect Liability Period is provided for. If in the opinion of the Engineer, the works have been satisfactorily completed and have satisfactorily passed its final test or test that may be prescribed, the Engineer shall issue a Certificate of Completion duly accepted by the Employer indicating:

- (i) the date of completion
- (ii) Items for which payment shall be made at reduced rates and
- (iii) Defect Liability Period, if any, shall commence from the date of issue of such certificate, in case separate periods of completion have been specified for items or groups, the Engineer shall issue separate Completion Certificates for such items or groups of items. No completion certificate shall be issued nor shall the work be considered to be complete till the Contractor have removed from the premises on which the work has been executed all scaffolding, sheds and surplus materials except such as are required for rectification of defects, rubbish and all huts and sanitary arrangements, required for his workmen at the site in connection with the execution of the work as shall have been erected by the Contractor or the workmen and cleaned all dirt from the parts of building(s) in, upon or about which the work has been executed or of which he may have had possession for the purpose of the execution thereof and cleaned floors, gutters and drains, eased doors and sashes, oiled locks and fastening labeled keys clearly, handed them over to the Engineer or his representatives and made the whole premises fit for immediate occupation for use to the satisfaction of the Engineer. If the Contractor shall fail to comply with any of the requirements of these conditions, as aforesaid, on or before the date of completion of the works, the Engineer may at the expense of the Contractor fulfil such requirements and dispose of the scaffolding, surplus materials and rubbish etc. as he thinks fit and the Contractor shall have no claim in respect of any scaffolding or surplus materials except for any sum actually realised by the sale thereof less the cost of fulfilling the requirements and any other amount that may be due from the Contractor. If the expenses of fulfilling such requirements is more than the amount realised on such disposal as aforesaid, the Contractor shall forthwith on demand pay such excess. If at any time before completion of the entire work, items or groups of items for which separate periods of completion have been specified are completed, the Engineer shall take possession of any part or parts of the same (any such part(s) being hereinafter in the condition referred to as the relevant part) then notwithstanding anything expressed or implied elsewhere in this Contract.
- (iv) Within thirty days of the date of completion of such items or groups of items or of possession of the relevant part, the Engineer shall issue Completion Certificate for the relevant part as per condition above provided the Contractor fulfills his obligations under that condition for the relevant part.
- (v) The Defects Liability Period in respect of such items and the relevant part shall be deemed to have commenced from the certified date of completion of such items or the relevant part as the case may be.

- (vi) The Contractor may reduce the value insured by the full value of the completed items or relevant part as estimated by the Engineer for this purpose. This estimate shall be applicable for this purpose only and for no other purpose.

5.5.9 Contractor not absolved by Completion Certificate:

The Certificate of Completion in respect of the works referred to in **Clause 5.5.6** shall not absolve the Contractor from his liability to make good any defects, imperfections, shrinkage or faults which may appear during the period of maintenance specified in the tender arising in the opinion of the Engineer from materials or workmanship not in accordance with the Drawings or Specifications or instructions of the Engineer which defects, imperfections, shrinkage or faults shall upon the directions in writing of the Engineer be amended and made good by the Contractor at his own cost; and in case of default on the part of the Contractor; the Engineer may employ labour and material or appoint another Contractor to amend and make good such defects, imperfections, shrinkage's and faults and all expenses consequent thereon and incidental thereto shall be borne by the Contractor and shall be recoverable from any money due to him under the Contract. Any defect, shrinkage, settlement or other faults which may appear within the "Defects Liability Period" stated in **Clause 5.5.6** above or, if one stated, then within twelve months after the virtual completion of the works arising in the opinion of the Engineer from materials or workmanship not in accordance with the Contract, and shall upon the directions in writing of the Engineer, and within such reasonable time as shall be specified therein, be amended and made good by the Contractor, at his own cost and unless the Employer in consultation with their Engineer shall decide that he ought to be paid for such amending and making good, and in case of default the Employer may employ and pay other persons to amend and make good such damage, loss and all expenses shall be recoverable from him by the Employer upon the Engineer's Certificate in writing from any money due or that may become due to the Contractor, or the Employer may in lieu of such amending and making good by the Contractor deduct from any moneys due to the Contractor a sum to be determined by the Engineer equivalent to the cost of amending such work and in the event of the amount retained being insufficient, recover the balance from the Contractor together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done or material supplied by any sub-Contractor employed on the works, the Contractor shall be liable to make good in the same manner as if such work or material had been done or supplied by the Contractor. The Contractor shall remain liable under the provisions of this clause notwithstanding the signing by the Engineer of any certificate or the passing of any accounts.

5.5.10 Approval only by Maintenance Certificate:

No certificate other than the maintenance certificate referred to in **Clause 5.5.11** of these conditions shall be deemed to constitute approval of any work or other matter in respect of which it is issued or shall be taken part thereof or of the accuracy of any claim or demand made by the Contractor or additional or varied work having been ordered by the Engineer nor shall any other certificate conclude or prejudice any of the powers of the Engineer .

5.5.11 Maintenance Certificate:

The contract shall not be considered as complete until a maintenance certificate is signed by the Engineer stating that the works have been completed and maintained to his satisfaction. The maintenance certificate shall be given by the Engineer upon the expiration of the period of maintenance as soon as thereafter as any works ordered during such period shall have been completed to the satisfaction of the Engineer and full effect shall be given to this clause notwithstanding the taking possession of or using the works or any part thereof by EMPLOYER.

5.5.12 Cessation of Employer's Liability:

EMPLOYER shall not be liable to the Contractor for any matter arising out of or in-connection with the Contract or the execution of the works unless the Contractor shall have made a claim in writing in respect thereof before the issue of the maintenance certificate under this clause.

5.5.13 Unfulfilled Obligations:

Notwithstanding the issue of the maintenance certificate to the Contractor, the Contractor shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issue of the maintenance certificate by Architect which remains unperformed at the time such certificate is issued and for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties hereto.

5.5.14 Records to be produced by the Contractor for inspections:

The Contractor shall whenever required by the Engineer or his authorised representatives, produce or cause to be produced for examination any quotation, invoice cost or other accounts, books, vouchers, receipts, letters, memorandum or any copy of or extract from any such documents and also furnish information as may be required relating to the execution of this contract or relevant for verifying or ascertaining the cost of execution of this contract, or ascertaining that materials supplied by the Contractor are in accordance with the Specifications laid down in the contract. The Employer's decision on the question of relevancy of any documents or information or returns will be final and binding on the Contractor. If any part of the item of the work is allowed to be carried out by a sub-Contractor or any subsidiary or allied firm, the Engineer shall have power to scrutinise the books of such sub- Contractor or any subsidiary or allied firm through the Contractor and shall have powers to examine and inspect the same. The obligations imposed above are without prejudice to the obligations of the Contractor under any statute, rules or orders binding on the Contractor.

5.5.15 Withholding and Lien in respect of sums claimed:

Whenever any claim or claims for payment of a sum of money arises out of or under the Contract against the Contractor, the Employer shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any, deposited by the Contractor, and for the purpose aforesaid, the Employer shall be entitled to withhold the said cash Security Deposit or the security in any other form including Bank Guarantee(s) and also have a lien over the same pending finalisation or adjudication of any such claims. In the event of the security being insufficient to cover the claim amount or amounts or if no Security has been taken from the Contractor, the Employer shall have the right to withhold and have a lien to retain to the extent such claim amounts from any sum or sums, found payable or which any time with any other office, subsidiary of the Employer thereafter may become payable to the Contractor either alone or jointly with others under the same Contract or any other Contract with the Employer or pending finalisation or adjudication of any such claims. It is an agreed term of the Contract that the sum of money or moneys so withheld or retained under a lien referred to above by the Employer shall be kept withheld or retained by the Employer till the Employer's claim arising out of or under the Contract are mutually settled or determined by the Arbitrator (if the Contract is governed by the arbitration clause) or by the competent court, as the case may be, and that the Contractor will have no claim for interest or damages, whatsoever, on any account in respect of such withholding or retention under the lien referred to above and duly notified as such to the Contractor. For the purpose of this clause, where the Contractor is a partnership firm or a limited company, the Employer shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company, as the case may be, whether in his individual capacity or otherwise.

5.5.16 Lien in respect of claim in Other Contract:

Any sum of money due and payable to the Contractor either alone or jointly with others including the Security Deposit returnable to him, under the Contract, may be withheld or retained by way of a lien by the Employer against any claim of Employer or in respect of payment of a sum of money arising out of or under any other Contract made by the Contractor with the Employer or any other office or subsidiary of the Employer. It is an agreed term of the Contract that the sum of money so withheld or retained under this clause by the Employer shall be kept withheld or retained by the Employer till the claim arising out or any other Contract is either mutually settled or determined by the Arbitrator (if the Contract is governed by the arbitration clause) or by the competent court, as the case may be and the Contractor shall have no claim for interest or damages, whatsoever, on any account or on any other account in respect of any sum of money withheld or retained under this clause and duly notified to the Contractor.

5.5.17 Signature on Receipt for Amounts:

Every receipt of money which may become payable or for any security which may become transferable to the Contractor under this Contract shall if signed in the partnership name by any of the partners of a Contractor, firm or by a person (holding power of attorney if the Contractor's firm is a limited company) be a good and sufficient discharge to the Employer in respect of money or security purported to be acknowledged thereby. In the event of the death of any of the partners during the currency of the Contract, it is hereby expressly agreed that every receipt by any one of the surviving partner shall, so signed as aforesaid be good and sufficient discharge as aforesaid

provided that nothing in this clause shall be deemed to prejudice or effect any claim which the Employer may hereinafter have against the legal representatives of any of Contractor's partners so doing, for or in respect of breach of any of the Conditions of the Contract, provided also that nothing in this clause contained shall be deemed to prejudice or affect the respective rights or obligations of the Contractor's partners and of the legal heirs/representatives of any deceased Contractor/ Contractor's Partner(s).

VI. LABOUR

5.6.1 Compliance with Labour Laws:

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

- (iii) The payment of Wages Act, 1936.
- (iv) The Minimum Wages Act, 1938.
- (v) The Workmen's Compensation Act, 1923.
- (vi) The Contract Labour (Regulations and Abolishing) Act.
- (vii) Employer's Liability Act, 1938.
- (viii) Industrial Disputes Act, 1947.
- (ix) Maternity Benefit Act, 1961.
- (x) Mines Act.
- (xi) The Employees State Insurance Act, 1948, Safety Code, Labour Welfare Acts or Rules or any modifications thereof, any other Laws & Regulations framed by the Competent Legislative Authorities from time to time.
- (xii) Employees Provident Fund.

5.6.2 Rest Days and Default Under Labour Laws:

So far as practicable, the Contractor shall observe days of rest for the labour so as to coincide with the days of rest specified by the Employer for his employees. The Employer on having received report from the competent Inspecting Officer as defined under any/all of the above Acts, shall have the power to deduct from the money due to the Contractor any sum required or estimated to be required for making good the loss suffered by the worker/workers/ for the non-fulfillment of the Conditions of the Contract for the benefit of the workers, non-payment of wages or wrongful deductions made from the wages. The Contractor shall indemnify Employer against any payments to be made under and for the observance of regulations aforesaid without prejudice to his right to claim indemnity from his sub-Contractors.

VII. CLAIMS

5.7.1 Monthly Statement of Claims:

The Contractors shall prepare and furnish to the Engineer once in every month an account giving full and detailed particulars of all claims for any additional expenses to which the Contractor may consider himself entitled and of all extra or additional works ordered by the Engineer which he has executed during the preceding month and no claim for payment for any such work will be considered which has not been included in such particulars.

5.7.2 Signing of 'No Claim' Certificate:

The Contractor shall not be entitled to make any claim, whatsoever, against EMPLOYER under or by virtue of, or arising out of this Contract nor shall EMPLOYER entertain or consider any such claim, if made by the Contractor, after he shall have signed a 'No Claim' certificate in favour of EMPLOYER in such form as shall be required by EMPLOYER after the works are finally measured up. The Contractor shall be debarred from disputing the correctness of the items covered by the 'No Claim' certificate. In such cases, it will be a term of Contract that there is no Arbitration Clause at all.

VIII. DETERMINATION OF CONTRACT

5.8.0 Right of Employer to determine Contract:

The Employer shall be entitled to determine and terminate the Contract at any time should, in the Employer's opinion, the cessation of work become necessary owing to paucity of funds or from any other cause, whatsoever, in which case the value of approved materials at site and of work done to date by the Contractor will be paid for in full at the rate specified in the Contract. Notice in writing from the Employer of such determination and the reason therefor shall be conclusive evidence thereof.

5.8.1 Payment on Determination of Contract:

Should the contract be determined under sub-clause 5.8.0 of this Clause, the Contractor shall have no claim to any payment of compensation or otherwise whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of determination of the Contract. The Employer's decision on the necessity and propriety of such expenditure shall be final and conclusive.

5.8.2 Determination of Contract owing to Default of Contractor:

If the Contractor should

- a) become bankrupt or insolvent or
- b) make an arrangement with or assignment in favour of his creditors, or agree to carry out the Contract under a committee of Inspection of his creditors, or
- c) being a company or corporation, go into liquidation (other than voluntary liquidation for the purpose of amalgamation or reconstruction) or
- d) have an execution levied on his goods or property on the works, or
- e) assign the Contract or any part thereof otherwise than as provided in Clause 5.2.11 of these conditions, or
- f) abandon the Contract or
- g) persistently disregard the instructions of the Engineer or contravene any provision of the Contract, or
- h) fail to adhere to the agreed programme of work by a margin of 10% of the stipulated period, or
- i) fail to remove materials from the site or to pull down and replace work after receiving from the Engineer notice to the effect that the said materials or works have been condemned or rejected or
- j) fail to take steps to employ competent or additional staff and labour as required, or
- k) fail to afford the Engineer or Engineer's representative proper facilities for inspecting the work or any part thereof as required, or
- l) promise, offer to give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of the Employer or to any person of his or on their behalf in relation to the execution of this or any other Contract with the Employer.

5.8.3 Then and in any of the said cases, the Engineer on behalf of the Employer may serve the Contractor with a notice in writing to that effect and if the Contractor does not within seven days after the delivery to him of such notice proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid to the entire satisfaction of the Engineer, the Employer shall be entitled after giving 48 hours' notice in writing under the hand of the Engineer (to rescind the Contract as a whole or in part or parts as may be specified in such notice) and adopt either or both of the following courses :-

- (i) to carry out the whole or part of the work from which the Contractor has been removed by the employment of the required labour and materials, the costs of which shall include lead, lift, freight, supervision and all incidental charges.
- (ii) to measure up the whole or part of the work from which the Contractor has been removed and to get it completed by another Contractor. The manner and method in which such work is completed shall be at the entire discretion of the Engineer, whose decision shall be final.
- (iii) And in both the cases (a) & (b) mentioned above, Employer shall be entitled

- (iv) to forfeit the whole or such portion of the Security Deposit as it may consider fit; and
- (v) to recover from the Contractor the cost of carrying out the work in excess of the sum which would have been payable according to the certificate of the Engineer to the Contractor if the works had been carried out by the Contractor under the terms of the contract, such certificate being final and binding upon the Contractor. Provided, however, that such recovery shall be made only when the cost incurred in excess is more than the Security Deposit proposed to be forfeited and shall be limited to the amount by which the cost incurred in excess exceeds the Security Deposit proposed to be forfeited. The amounts thus to be forfeited or recovered may be deducted from any moneys then due or which at any time thereafter may become due to the Contractor by the Employer under this or any other Contract or otherwise. Provided always that in any case in which any of the powers conferred upon the Employer by - sub-clause 5.8.0 shall have become exercisable and the same not be exercised, the non-exercise, thereof shall not constitute a waiver of any of the conditions thereof and such powers shall notwithstanding the exercisable in the event of any future case of default by the Contractor for which his liability for past and future shall remain unaffected.

5.8.4 Right of Employer after rescission of Contract owing to default of Contractor:

In the event of any or several of the courses, referred to in sub-clause 5.8.2 being adopted:

- (i) The Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any commitments or made any advances on account of or with a view to the execution of the work or the performance of the Contract and Contractor shall not be entitled to recover or be paid any sum for any work thereto or actually performed under the Contract unless and until the Engineer shall have certified the performance of such work and the value payable in respect thereof and the Contractor shall only be entitled to be paid the value so certified.
- (ii) The Engineer or the Engineer's representative shall be entitled to take possession of any materials, tools, implements, machinery and buildings on the works or on the property on which these are being or ought to have been executed, and to retain and employ the same in the further execution of the works or any part thereof until the completion of the works without the Contractor being entitled to any compensation for the use and employment thereof or for wear and tear or destruction thereof.
- (iii) The Engineer shall, as soon as may be practicable after removal of the Contractor fix and determine ex-parte, or by or after reference to the parties or after such investigation or inquiries as he may consider fit to make or institute and shall certify what amount (if any) has at the time of rescission of the Contract been reasonably earned by or would reasonably accrue to the Contractor in respect of the work then actually done by him under the Contract and what was the value of any unused or partially used materials, any constructional plant and any temporary works upon the site.
- (iv) The Employer shall not be liable to pay Contractor any money on account of the Contract until the expiration of the period of maintenance and thereafter until the costs of completion and maintenance damages for delay in completion (if any) and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum or sums (if any) as the Engineer may certify would have been due to him upon due completion by him after deducting the said amount, but if such amount shall exceed the sum which would have been payable to the Contractor, then the Contractor shall on demand pay to the Employer the amount of such excess and it shall be deemed a debit due by the Contractor to Employer and shall be recoverable accordingly.

IX. SETTLEMENT OF DISPUTE

5.9.0 Arbitration:

- (i) Any dispute or difference of any nature whatsoever any claim, Gross-claim, or set off the Employer against the Contractor or regarding any right, liability, act, omission or account of any of the parties hereto arising out of or in relation to this agreement shall be

referred to the Sole Arbitration of the Principal, Mayo College Girls' School, or to an arbitrator who may be nominated by the the Principal, Mayo College Girls' School,. The Contractor will not be entitled to raise any objection to any such arbitrator on the ground that the arbitrator is an Officer of the Principal, Mayo College Girls' School, or that he has dealt with the matters to which the contract relates or that in the course of his duties as an Officer of the Principal, Mayo College Girls' School, he had expressed views on all or any other matters in dispute or difference. In the event of arbitrator to whom the matter is originally referred being transferred or vacating his office for being unable to act for any reason, the Principal, Mayo College Girls' School, as aforesaid at the time of such transfer, vacation of office or inability to act may in the discretion of the Principal, Mayo College Girls' School, designate another person to act as arbitrator in accordance with the terms of the agreement to the end and intent that the original Arbitrator shall be entitled to continue the arbitration proceeding notwithstanding his transfer or vacation of office as an Officer of Mayo College Girls' School, if the Principal, Mayo College Girls' School, does not designate another person to act as arbitrator on such transfer, vacation of office or inability of original arbitrator. Such persons shall be entitled to proceed with the reference from the Principal, Mayo College Girls' School, or a person nominated by such Principal, Mayo College Girls' School, as aforesaid shall act as arbitrator hereunder. The award of the arbitrator so appointed shall be final conclusive and binding on all parties to the agreement subject to the provision of the Arbitration Act. 1940 or any statutory modification or re-enactment thereof and the rules made thereunder for the time being in force shall apply to the arbitration proceeding under this clause. (b) The award shall be in writing and published by the arbitrator within two years after entering upon the reference or within such extended time not exceeding further twelve months as the sole Arbitrator shall be a writing under his own hands appoint. The parties here too shall be deemed to have irrevocably given their consent to the Arbitrator to make and publish the award within the period referred to herein above and shall not be entitled to raise any objection or protest there to under any circumstances whatsoever.

- (ii) The arbitrator shall have power to order and direct either of the parties to abide by, observe and perform all such directions as the arbitrator may think fit having regard to the matters in difference i.e. dispute before him. The arbitrator shall have all summary powers and may take such evidence oral and / or documentary, as the arbitration in his absolute discretion thinks fit and shall be entitled to exercise all powers under the Indian Arbitration Act. 1940, including admission of any affidavit as evidence concerning the matter in difference i.e. dispute before him.
- (iii) The parties against whom the arbitration proceeding have been initiated, that is to say, the Respondents in the proceedings, shall be entitled to prefer a cross-claim, counter-claim or set off before the Arbitrator in respect of any matter in issue arising out of or in relation to the Agreement without seeking a formal reference of arbitration to the Principal, Mayo College Girls' School, for such Counter-claim Cross-claim or set off and the Arbitrator shall be entitled to consider and deal with the same as if the matter arising therefore has been referred to him originally and deemed to form part of the reference made by the Director (Personnel).
- (iv) The arbitrator shall be at liberty to appoint, if necessary, any accountant or engineer or other technical person to assist him, and to act by the opinion so taken.
- (v) The arbitrator shall have power to make one or more awards whether interim or otherwise in respect of the dispute and difference and in particular will be entitled to make separate awards in respect of claims or cross-claims of the parties.
- (vi) The arbitrator shall be entitled to direct any of the parties to pay the costs of the other party in such manner and to such extent as the arbitrator may in his discretion determine and shall also be entitled to require one or both the parties to deposit funds in such proportion to meet the arbitrators' expenses whenever called upon to do so.
- (vii) **Jurisdiction:** The parties hereby agree that the courts in the city of Ajmer alone shall have jurisdiction of entertain any application or other proceedings in respect of anything arising under this agreement and any award or awards made by the sole arbitrator hereunder shall be filed in the courts concerned in the city of Ajmer Only.

SECTION 6

SPECIAL CONDITIONS OF CONTRACT

6.1.0 Insurance for Works:

The Contractor at the time of signing the Contract or before commencing the execution of the work without limiting his obligations and responsibilities shall insure the works at his own cost and keep them insured until the virtual completion of the contract against all acts of God including Fire, Theft, Riots, War, Floods, etc. with a Nationalised Insurance Agency in the joint names of the Employer and Contractor (the name of the former being placed first in the policy) for the full amount of the contract. Such policy shall cover the property of the Employer and fees for assessing the claim and in connection with his services generally therein and shall not cover any property of the Contractor or of any sub-Contractor or Employee. The Contractor shall deposit the original policy and receipt for the premiums with the Employer within twenty-one (21) days from the date of signing the contract/commencement of execution of work or unless otherwise instructed by the Employer. In default of the Contractor insuring as provided above, the Employer on his behalf may so insure and may deduct the premiums paid from any moneys due or which may become due to the Contractor. The Contractor shall, as soon as any claim under the policy is settled or the work reinstated by the Insurance Office should elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the misfortune/accident had not occurred and in all respects under the same conditions of contract. 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.

6.1.1 Insurance in respect of damages to persons and property:

- (i) The Contractor shall be responsible for all injury to persons animals or things and for all structural and decorative damage to property which may arise from the operation or neglect of himself or of any approved sub-Contractor's or Employee's, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of this contract. The clause should be held to include any damage to building, whether immediately adjacent or otherwise, and any damage to roads, streets, footpaths, bridges, sewerage, water supply, other services and works forming the subject of this contract by frost or other inclemency of the weather. The Contractor shall indemnify the Employer and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claims made in respect of injury or damage under any Acts of Government or otherwise and also in respect of any award of compensation of damages consequent upon such claims.
- (ii) The Contractor shall reinstate all damages of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.
- (iii) The Contractor shall indemnify the Employer against all claims which may be made against the Employer by any member of the public or other third party in respect of works in consequence thereof and shall at his own expense arrange to effect and maintain, until the virtual completion of the contract, with any Nationalised Insurance Agency in the joint names of the Employer and the Contractor against such risks and deposit such policy or policies with the Employer from time to time during the currency of this contract. The Contractor shall similarly indemnify the Employer against all claims which may be made upon the Employer whether under the Workman's Compensation Act or any other statute in force during the currency of this contract or at common law in respect of any employee of the Contractor or any sub- Contractor and shall at his own expense effect and maintain with an approved office a policy of insurance in the joint names of the Employer and the Contractor (the name of Employer appearing first) against such risks and deposit such policy or policies with the Employer from time to time during the currency of the contract. The Contractor shall be responsible for anything which may be excluded from the Insurance policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract. He shall also indemnify the Employer in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any award of or compensation of damages arising therefrom.

- (iv) The Employer shall be at liberty and is empowered to deduct the amount of any damage, compensation costs, charges and expenses arising or accruing from or in respect of any such claim or damage from any sum or sums due to or become due to the Contractor including the Security Deposit.
- (v) If the Contractor fails to comply with the terms of these conditions, the Employer may insure the works and may deduct the amount of the premiums paid from any moneys that may be or become payable to the Contractor or may as an option, not release running payment to the Contractor till the Contractor shall have complied with the terms of this condition.
- (vi) Such insurance, whether effected by the Employer or the Contractor will not limit or bar the liability and obligation of the Contractor to deliver works to the Employer complete in all respects according to the contract. In case of loss or damage due to any of the aforesaid causes the moneys payable under any such insurance shall be received and retained by the Employer until the works are finally completed and such moneys shall then be credited to the Contractor in final settlement of accounts.

6.2 Issue of Materials by the Employer:

For execution of work under this Contract, the following materials are also likely to be procured and supplied by the Employer, to the site:

- (i) Chemicals for Anti termite treatment.
- (ii) All Hardware for woodwork including accessories,
- (iii) All Chinaware, taps & faucets and toilet requisites for toilets, kitchens, pantries etc.,
- (iv) All light fixtures and fittings etc.,
- (v) Flooring stone such as Marble, Kota, granite stone, Sandstone such as Mandana, Red Agra, Dholpur etc.
- (vi) Ceramic tiles for wall and floors.
- (vii) Chemicals for Water proofing treatment
- (viii) In addition to the above the Employer reserves the right to supply any material (in entirety or in part) for use in the works.

6.3 Firm Price Contract:

Prices quoted by the Contractor shall be firm. No escalation in prices shall be payable on any account whatsoever.

6.4 Sample Work:

Upon the request of Principal, Mayo College Girls' School, or his nominee samples of works shall be prepared by the contractor without charging any costs for the same. The samples so made shall be removed if required without charging any costs.

6.5 If any ambiguity arises to the meaning and intent of any portion of specifications and drawings or to the execution or quality of any work or material or as to the measurement of the works, Employer shall have the power to correct any errors, omissions or discrepancies in the Specifications, Drawings, classification of the work or materials and whose decision in the matter shall be final and conclusive. In case of discrepancy between schedule of quantities, Specifications and/or drawings, the following order of preference shall be observed:-

- (i) Description of items in the Schedule of quantities.
- (ii) Technical Specifications and Special Conditions of Contract.
- (iii) Working Drawings.
- (iv) C.P.W.D. Specifications
- (v) P.W.D. Specifications
- (vi) Indian Standard Specifications
- (vii) General Conditions of Contract

6.6 The contractor shall have to work in close co-ordination with the other Contractors (Electrical, Sanitary, Carpentry, Steel and Aluminium works etc.) who may appointed separately for carrying out related works for the Construction of New Senior House 1 at Mayo College Girls' School, Ajmer.

SECTION - 7

TECHNICAL SPECIFICATION FOR ALL CIVIL WORKS

7.1 Indian Standards:

- a) All materials shall conform to the latest edition of the Indian Standard Specifications. Standards issued elsewhere may be used only if approved by the Engineer and for those materials only for which appropriate Indian Standards do not exist.
- b) All works shall be carried out in general as per the latest Central PWD specification with up to date correction slips, amendments and additions.

7.2 Sampling and Testing: All materials used in the works shall be subjected to Inspection and test. Samples of all materials proposed to be employed in the permanent works shall be submitted to the Engineer for approval, before they are brought to the site. These samples shall be submitted 15 days in advance when required for works. After the sample is approved the material shall be arranged and brought to site within a fortnight. Samples provided to the Engineer or his representatives for their retention are to be in labelled boxes suitable for storage.

7.3 Storage of Materials: All materials used in the 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. Cement shall be stored in such quantities as can be consumed within a short time after receipt from the manufacturers. It shall be stored in such a manner as to permit easy access for proper inspection and in a suitable weather tight building to protect it from dampness and to minimise deterioration by using water proofing membranes.

7.4 LIST OF MATERIALS OF APPROVED MAKES/BRANDS		
S.NO.	MATERIALS	BRAND NAMES
1.	Grey Cement	a) Ultratech OPC b) Ambuja OPC c) Shree Ultra OPC
2.	Steel Reinforcement - Primary Manufacturer for all Structural RCC Work	a) TISCO (Preferred) b) SAIL c) Jindal
3.	Steel Reinforcement - Secondary Manufacturer for other works	a) Rathi b) Kamdhenu c) Bansiwala
4.	Sand for Construction	a) Banas River Sand
5.	Shuttering Ply (all RCC Shuttering work shall be done with good quality ply)	a) National b) Northern c) Black Cobra
6.	Fired Brick	a) Approved brand from Punjab b) VBC c) JMD
7.	AAC Block	a) Finecrete b) Birla Aerocon c) Aerotuff
8.	Flush doors	a) Green b) Century
9.	High Pressure Laminate Doors	a) Merino b) Green
10.	Marine Plywood/ BWP plywood for paneled shutters	a) Kitply / Duro b) Green c) Century
11.	Particle board for paneled shutters	a) Duroboard b) Bhutan Board
12.	Paints & Distemper	a) Asian (Preferred) b) Berger c) Nerolac d) Opus
13.	Waterproof Cement Paint	a) Super Snowcem
14.	Water proofing Compound	a) Pidilite / Dr.Fixit b) Fosroc c) Cicco
15.	Ceramic Glazed Tiles	a) Kajaria (first quality) b) Johnson (first quality) c) Simpolo (first quality)
16.	Vitreous China Sanitary ware	a) Jaquar b) Kohler c) Grohe d) Corsa
17.	Plastic W.C. seat and cover	a) Jaquar b) Kohler c) Grohe d) Corsa
18.	Stainless Steel Sinks	a) Nirali b) Neelkanth c) Parryware
19.	C.P. brass fittings fixtures & C.P. Waste	a) Jaquar b) Ess Ess
20.	Cast iron items (C.I.)	a) BC b) HIF c) RIF

21.	Cast iron soil pipes & fittings	a) A-1 b) SRIF c) SKF
22.	Cast iron pressure pipes & fittings	a) A-1 b) SRIF c) Rly. Equipments & Engg.
23.	C.I. Spun Pipes	a) NECO Centi b) Tata c) BST
24.	G.I. pipes	a) TATA b) Jindal (Hissar)
25.	U.P.V.C. pipes and fittings	a) Astral (preferred) b) Supreme c) Prakash d) Prince
26.	C.P.V.C. pipes and fittings	a) Astral (preferred) b) Supreme c) Prakash d) Prince
27.	Stainless Steel Pipes	a) Viega Sanpress Inox
28.	PEX-AL-PEX Pipes	a) Viega Pexfit Pro Fosta b) Supreme c) Astral d) Kitec
29.	G.I Fittings	a) Unik b) R-Brand
30.	Aluminium Accessories	a) Everite b) Classic c) Argent d) Crown
31.	Gunmetal Valves	a) Leader b) Sant
32.	Brass Stop & Bib Cocks	a) Leader b) L & K
33.	Ball Valve with Float	a) Zoloto b) Leader c) L & K
34.	Stone ware pipes and Gully traps	a) Perfect b) Anand
35.	CI Covers and Manholes	a) RIF b) BC (Agra) c) NECO
36.	SFRC Covers for Manholes	a) KK b) Steel fiber Products c) Cemo Crete Industries
37.	RCC Pipes	a) Usha Spun Pipes b) Pragati
38.	S/S CI Pipes and Fittings	a) IISCO b) Kesoram c) SIF
39.	CI Sluice Valve and Non-Return Valve	a) Kirloskar b) I.V.C c) Leader
40.	Factory made door/window shutters	a) Approved Factory
41.	Factory made door/window, pressed steel frames	a) Approved Factory
42.	Glass	a) Modi float Glass b) Saint Gobain
43.	Mirror	a) Modi float Glass b) Saint Gobain

44.	Bitumen	a) Indian Oil Corporation b) BPCL
45.	PVC Water Storage tanks	a) Sintex b) Astral
46.	PVC Doors and Window Frames and shutters	a) Sintex
47.	Aluminium Glazing and Partitioning work	a) Jindal b) Hindalco
48.	Pumps	a) Kirloskar b) Jyoti c) Wasp d) Crompton Greaves
49.	Electric Motors	a) Siemens b) Kirloskar c) Crompton Greaves
50.	PVC insulated copper conductor wires 1100V grade and Flexible wires	a) Havells b) RR Kabel c) Finolex
51.	Telephone Wire and TV Cables	a) Delton b) Skytone c) Skyline
52.	HRC switches and fuses	a) Siemens b) English Electric c) L & T
53.	MCB DB/MSBs	a) Legrand b) L&T c) MDS (Load Kontakt) d) Standard Switchgear e) Indo Asian f) Havells
54.	Switches, sockets, bell push holders, ceiling rose, etc.	a) Legrand b) Anchor c) SSK d) MK
55.	PVC Conduit (2mm only)	a) Polycab b) BEC c) NTC
56.	M.S. conduit	a) Steel Craft b) BEC
57.	Distribution board	a) Fabricated with GE Alsthom or L & T or Crompton Greaves or Siemens SFU switches
58.	Bakelite Sheet	a) Hylam b) Formica
59.	IP Dome Camera	a) Dahua b) Hikvision
60.	IP Bullet Camera	a) Dahua b) Hikvision
61.	Network Cable (CAT 6 or better)	a) DLINK

Notes:

1. The Contractor shall endeavour to supply ISI marked material of the first/preferred make/brand listed above. If for any reason the first/preferred make/brand is not available then the contractor may choose any of the makes or brands indicated above after taking approval of the Engineer in charge / Architect. In case ISI marked material for any of the brands is not being manufactured by the firm(s), first quality material shall be accepted. The samples of the material in either case must be approved by the Architect/Engineer.
2. Material where no make/brand has been mentioned, ISI marked samples shall be submitted by the Contractor for approval of Architect/Engineer. For those classes of materials, where no firm exists with ISI approval, sample of first quality material of the firm shall be submitted for the approval of the Engineer.
3. Any variation from the above-mentioned makes / brands will require specific approval of Architect/Engineer.

SECTION – 8

TECHNICAL SPECIFICATION INTERNAL ELECTRICAL WORK

The work shall be performed in accordance with the technical specifications and approval drawings as set forth in this document and listed in the schedule of rates.

Works shall be carried out in the best workmanship manner in conformity with this specification / codes of practices of the Indian standards institution in case of any contradictions, stipulation under these specifications shall govern.

In additions the works shall also conform to the requirements of latest editions / amendments of the following:

- Indian electricity rules and act framed there under.
- Fire insurance regulations.
- Regulations laid down by the chief electrical inspector of the state.
- Any other regulations laid down by the local authorities.
- Relevant codes of practice and standards published by the Indian standards institution.
- CPWD specification for electrical works.

GUARANTEE

The contractor shall guarantee the installation for a period of 1 Years from the date of issue of completion certificate. Any damages or defect that may arise after of lie undiscovered as the time of issue of completions certificate connected in any way with the equipment or fittings supplied by the contractor or his workmanship shall be rectified or replaced by the contractor at his own expense as deemed necessary by the Engineer – In – charge.

1.0 WIRING:

1.1 Scope:

1.1.1 The scope of this section covers the supply, erection, testing and commissioning of conduits & wiring for lighting and power. Wiring shall be carried out in accordance with relevant I.S. rules and regulations.

1.2 System of wiring:

1.2.1 All lights and power wiring shall be carried out in surface conduits or recess wiring in conduits or floor ducts as specified.

1.2.2 I.E.E. regulations shall be applicable for all material and workmanship.

1.2.3 The wiring to be carried out in such a manner that specified 'Power' wiring shall be kept separate and distinct from 'Lighting' wiring. The wiring shall be done on the distribution system with main and branch distribution boards at convenient physical and electrical centers as shown in drawings. All conductors shall be run as far as possible along the walls and ceiling and above false ceiling so as it can be easily accessible and capable of being thoroughly inspected. In all types of wiring, due consideration shall be given for neatness and good appearance.

1.2.4 The balancing of load in three wire or poly phases installations shall be arranged before hand to the satisfaction of Engineer-in-charge. In large or important areas, light and socket outlet points shall be distributed over more than one circuit as directed.

1. Medium pressure wiring and associated apparatus shall comply in all respects with the requirements of IEE rules.
2. No wiring shall be carried out until the appropriate tests required in Section "Inspection and Testing" have been done and the Engineer-in-Charge has given his clearance for wiring to commence.
3. At expansion joints, adequate slack shall be left in the cables.
4. Where conduits are installed for wiring by others, a draw wire shall be provided between each draw-in position.
5. Cables forming part of communication circuits shall have identification sleeves at their terminations. Identification shall be consistent with the relevant wiring diagrams.

1.3 Joints & Looping Back:

1.3.1 The wiring shall be done in a 'looping System'. Phase or live conductors shall be looped at the switch box and neutral conductor can be looped either from the light, fan or socket outlet.

1. No bare or twist joints shall be made at intermediate points in the through run of cables, unless the length of final sub circuit or sub-main or main is more than the length of the standard coil given by the manufacturer of the cable.
2. Termination of multistrand conductors shall be done using suitable crimping type thimbles.

1.4 PVC CONDUIT AND CONDUIT ACCESSORIES:-

1.4.1 All non-metallic conduit pipes and accessories shall be of suitable material complying with IS:2509-1973 and IS:3419-1976 for rigid conduits and IS:6946-1973 for flexible conduits. The interior of the conduits shall be free from obstructions. The rigid conduit pipes shall be ISI marked.

1. The conduits shall be circular in cross-section. The conduits shall be designated by their nominal outside diameter. The dimensional details of rigid non-metallic conduits are given in **Table-III.**
2. No non-metallic conduit less than 20 mm in diameter shall be used.
3. The conduit wiring system shall be complete in all respect including accessories.
4. Rigid conduit accessories shall be normally of grip type.
5. Flexible conduit accessories shall be of threaded type.
6. Bends, couplers etc. shall be solid type in recessed type of works, and may be solid or inspection type as required, in surface type of works.
7. Saddles for fixing conduits shall be heavy gauge non-metallic type with base.
8. The maximum number of PVC insulated cables conforming to IS: 694-1990 that can be drawn in one conduit is given size wise in **Table-1.** And the number of cables per conduit shall be exceeded. Conduit sizes shall be selected accordingly in each run.
9. The erection of conduits of each sections shall be completed before the cables are drawn in.

1.5 Installation-Common aspects for both recessed and surface conduit works:-

1.5.1 Conduit Joints

1. All joints shall be sealed/cemented with approved cement. Damaged conduit pipes/ fittings shall not be used in the work. Cut ends of conduit pipes shall have no sharp edges nor any burrs left to avoid damage to the insulation of conductors while pulling them through such pipes.

2. The Engineer-in-charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc. after they have been prepared, shall be submitted for inspection before being fixed.

Bends in Conduit

1. All bends in the system may be formed either by bending the pipes by an approved method of heating, or by inserting suitable accessories such as bends, elbows or similar fittings, or by fixing non-metallic inspection boxes, whichever is most suitable. Where necessary, solid type fittings shall be used.
2. Radius of bends in conduit pipes shall not be less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet to out-let.
3. Care shall be taken while bending the pipes to ensure that the conduit pipe is not injured, and that the internal diameter is not effectively reduced.

1.6 Installation-Additional requirements for surface conduit work

- (i) Conduit pipes shall be fixed by heavy gauge non-metallic saddles with base, secured to suitable approved plugs with screws in an approved manner, at an interval of not more than 60 cm, but on either side of couplers or bends or similar fittings, saddles shall be fixed at a closer distance from the centre of such fittings. Slotted PVC saddles may also be used where the PVC pipe can be pushed in through the slots. The minimum width and thickness of the ordinary clips or the girder clips for different sizes of conduits shall be as given in **Table-II.**
1. Where the conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips as required by the Engineer-in-charge. Where it is not possible to use these for fixing, suitable clamps with bolts and nuts shall be used.
2. If the conduit pipes are liable to mechanical damage, they shall be adequately protected.

1.7 Installation-Additional requirements for recessed conduit work

1.7.1 Make Chase

1. The chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.
2. In the case of buildings under construction, the conduits shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.
3. In case of exposed brick / rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

1.7.2 Fixing Conduit in Chase

- (i) The conduit pipe shall be fixed by means of staples, or by means of non-metallic saddles, placed at not more than 60 cm apart, or shall be fixed by any other approved means of fixing.
- (ii) At either side of the bends, saddles/staples shall be fixed at a distance of 15 cm from the centre of the bends.

1.7.3 Erection in RCC work

1. The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.
2. Fixing of standard bends or elbows shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing in of conductors.
3. Location of inspection/ junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

1.7.4 Fixing of Inspection Boxes

1. Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary.
2. These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be per IS: 2667-1977.
3. Suitable ventilating holes shall be provided in the inspection box covers if directed.

1.8 Routes And Segregation:

- 1.8.1 In case the routes of conduit and ducting are not shown on the drawings, they shall be determined by the Contractor and approved by Engineer-in-Charge before work is started. This requirement shall apply where the conduit or duct is concealed within the building fabric as well as where they are on the surface.
- 1.8.2 Conduit and ducting shall be parallel with lines of building construction and properly aligned except where conduit is permitted in floor screeds. Conduit buried in wall finishes shall run vertically only, unless Engineer-in-Charge gives approval to deviate from this requirement.
- 1.8.3 A minimum clearance of 150 mm between conduits shall be allowed from any equipment/ Low current services conduit like Telephone/Computer/CCTV/ pipe work or duct work. Distance shall be measured from the external surface of any lagging. In event of difficulty in achieving this requirement, Engineer-in-Charge shall be informed.

1.9 Wires:

1. The type and size of wires shall be as indicated in the BOQ / Drawings. All the material supplied and used by the contractor shall be new. Wires shall have copper conductors unless otherwise specified, and the size shall be as per IS standards unless specified.
2. All wires shall comply with relevant IS. Type of wire to be used shall be as specified in the BOQ / Drawings.
3. The colour identification of wires shall comply with the IEE wiring regulations for all category of circuits. Core identification colours shall extend throughout the length of PVC insulated wires. Core identification for sound distribution or public address systems shall be in grey colour.
4. Wires shall be protected throughout their length by trunking, ducting, conduit and equipment enclosures. Framework or partitions may be used, but only where indicated or with the approval of Engineer-in-Charge.
5. Wires carrying direct current may, if desired, be bunched whatever their polarity, but wires carrying alternating current, if installed in metal conduit shall always be bunched so that the out going and return wires are drawn into the same conduit.
6. Where the distribution is for single phase loads only, conductors for these phases shall be drawn in one conduit.
7. In case of three phase loads, separate conduits for separate phase shall be run from the distribution boards to the load points, or outlets as the case may be.
8. Wires shall comply with relevant IS for LV & ELV circuits.
9. Where conduits cross expansion and settlement joints in the building structure, suitable provision shall be made to allow for movement of the structure. The Contractor shall submit his proposals for the approval of the Engineer-in-Charge.
10. Conduits entering voids shall terminate not less than 22 mm clear of the building fabric. Open ends of conduit shall be temporarily plugged immediately after they are installed to prevent ingress of water and solid materials.

11. Where wires pass through joints, the number and size of holes shall allow for easy withdrawal and replacement of cables. The diameter of holes shall not exceed 1/6th the depth of the joints. They shall be approximately on the centre line and shall be not less than 75 mm between centres. Joints shall not be notched.
12. The method to be used for forming fire barriers at fire resistant structural elements such as floors and walls shall be submitted for the Engineer-in-Charge's approval.
13. Where wires enter a metal enclosure, they shall be protected by grommets or secured by wires clamps.
14. Wires shall be looped between outlet points and as far as practicable, intermediate joints shall not be used.
15. Wires fixed to the surface, except in ducts, shall be protected up to a height of 1500 mm by high impact PVC channel.
16. Wires shall have identification sleeves at their terminations.
17. Identification shall be consistent with the relevant wiring diagrams.

1.10 Switches:

- 1.10.1 Switches shall be single pole unless otherwise indicated. Their current ratings shall be as indicated, allowance being made for any inductive or capacitive load.
- 1.10.2 Wall mounted switches located inside buildings shall have rocker type actuating members unless otherwise indicated. Where mounted adjacent to one another, they shall be grouped in a multi gang box with a common front plate.
- 1.10.3 Pull cord operated switches shall be fixed to white moulded plastic mounting blocks, which in turn shall be fixed to a circular conduit box. Where the conduit boxes are flush with the finish, mounting block shall overlap them. Pull cords shall be white or natural colour and the lower end shall terminate in a moulding of rubber or plastic material.

1.11 Socket Outlets:

- 1.11.1 Socket outlets shall be of type and rating as indicated. Pilot contacts shall be provided where indicated.
- 1.11.2 Socket outlets shall be switched where indicated. On socket outlets rated at 16A and located inside buildings, the switches shall be single pole and have rocker type actuating members unless otherwise indicated.
- 1.11.3 Socket outlets for wet locations shall be provided with covers, which shall be screwed on. Any cover required to achieve total enclosure and to ensure the required degree of protection against moisture shall be securely fixed to socket outlet.
- 1.11.4 Sockets/ Telephone/ Computer/ CCTV/ Socket outlets shall be of the type as mentioned in the BOQ.

1.12 Plugs:

- 1.12.1 ISI marked Plugs shall be provided as indicated. Plug bodies shall be of metal, plastic or other material as indicated.
- 1.12.2 Plugs rated at 16A shall be of a non-resilient material unless otherwise indicated.

1.13 Terminal Blocks:

- 1.13.1 Conductors shall be clamped between metal surface and no screws shall make direct contact with conductors.
- 1.13.2 The design shall be such as to maintain sufficient contact pressure to ensure connections on negligible impedance at all times.

- 1.13.3 Metal in contact with conductors shall be 85% copper alloy and any screws shall be of metal that is electrolytic ally compatible with the copper alloy. The moulded housing shall be an insulating material suitable for the maximum operating temperature of the conductor.

1.14 Mounting Heights:

- 1.14.1 Mounting heights shall be as follows unless otherwise indicated in the drawings, where decision shall be obtained by contractor before start of work.

MOUNTING HEIGHTS (for accessories and equipment)

1. Bracket Light	2250mm
2. Mirror light	1800mm
3. Switch board	1050mm
4. 5/15A light/power sockets	625mm
5. 5/15A switch for sockets	625mm
6. D Bs	1500mm
7. 15A socket in toilet	1800mm
8. 15A switch in toilet	1050mm
9. 15/5A power points in Pantry	150mm above cooking slab
10. Computer/Telephone outlet.	625mm

NOTES:

1. Heights are from finished floor level to the center of the accessory or equipment, except in the case of worktops when the measurement shall be from the worktop surface.
2. If the specified height of an accessory coincides with the top of tiling, the accessory shall be mounted above the tiling, leaving a clear gap of 50 mm.
3. Where apparatus is located underneath a worktop, the accessory shall be mounted 100 mm below the underside of the worktop.

- 1.14.2 Where difficulty in locating accessories or equipment occurs the Engineer-in-Charge shall be informed.

1.15 Supports And Fixings:

- 1.15.1 Support shall be positioned with in 300 mm of each bend and conduit box. Conduit boxes shall be fixed to fabric of building independent of the conduit. Where the conduit boxes have a minimum degree of protection of IP44, the fixing shall not reduce that protection.

- 1.15.2 Conduits shall be fixed in accordance with under mentioned Table. No shot firing shall be used and no drilling or welding of structural steel work shall be done without the approval of Engineer-in-Charge

TABLE CONDUIT FIXING

1. Fixing of Conduit

<u>Location</u>	<u>Type of fixing</u>
Floor screeds	Saddles
Buried in plaster Or render	Crampets or saddles
Above false ceilings	Spacer bar saddles
Surface	Distance Saddles

2. Fixing of Saddles, Conduit Boxes

<u>Building Fabric</u>	<u>Type of fixing</u>
Structural steelwork	Purpose made clamps (Type to be approved by Engineer-in-Charge)
Non-Structural steelwork	Sets screws and nuts.
Concrete, brick or Blocks	Fiber plugs & screws
Hollow blocks & pot Floors	Butterfly spring toggle bolts or gravity bolts.
Timber	Wood screws

1.15.3 Screws and nuts shall be cadmium or zinc electroplated or passivated.

1.16 Protective Conductor:

1.16.1 Protective conductor shall be drawn through ducting and non-screwed metallic conduit.

1.16.2 Where live conductors terminate at or loop into terminals adjacent to an appliance or accessory, the protective conductor shall be terminated. Properly using earth studs, earth terminal block etc. so the case may be.

1.16.3 A protective conductor shall be installed within each length of steel conduit and connected to an earthing terminal at each end of the conduit.

1.17 Outlet Boxes

1.17.1 16 SWG MS/G.I. boxes of the required sizes shall be provided to house the Switch/sockets/Telephone/TV/Computer outlets as may be required/ mentioned in BOQ. These shall be so designed that there is ample space at the rear and at the sides to accommodate conductors at the conduit entries. These shall be completely concealed leaving edges flush with wall surface unless mentioned otherwise.

1.18 Draw Boxes/ Inspection Boxes

1.18.1 16 SWG Mild Steel/GI draw/inspection boxes of adequate dimensions minimum size 75 mm x 75 mm shall be provided at convenient points on walls to facilitate long runs of conductors. They will be completely concealed with 3 mm Perspex/ hylam covers flush with plate work. These boxes will, as far as possible, be located where found suitable by the Engineer-in-Charge.

1.19 Protection Of Conduits

1.19.1 To safeguard against filling up with plaster etc. all the outlet and switch boxes will be provided with temporary covers and plugs within the tendered cost which shall be replaced by sheet / plate covers as required. All screwed and socketed joints shall be made fully water tight by the use of white lead for steel conduits.

1.20 Cleaning of Conduit Runs

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

1.21 Laying Of Dummy Conduit

1.21.1 The dummy conduits shall be the same as conduits for Electrical work and as specified before. The minimum size shall be 20 mm dia. Junction boxes shall be provided at distance not exceeding 10 m. The Contractor must make such modifications as the system designer / manufacturer desires in consultation with the Owners / Architects. These conduits shall be provided with steel draw boxes of at least 14 SWG.

1.22 Fish Wires

- 1.22.1 To facilitate drawing of wiring through conduits/ G.I / Steel pipes etc., G.I. fish wire of 14 SWG, wherever needed, shall be provided along with recessed conduit / pipes, without any extra cost.

Table –I												
Maximum number of PVC insulated 650/1100 V Grade Aluminium/Copper conductor cable conforming to IS:694/1990												
Nominal Cross sectional area of cond. in sq. mm												
	20mm		25mm		32mm		38mm		51mm		64mm	
	S	B										
1	2	3	4	5	6	7	8	9	10	11	12	13
1.5	5	4	10	8	18	12	-	-	-	-	-	-
2.5	5	3	8	6	12	10	-	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12	8
25	-	-	-	-	3	2	5	3	8	6	9	7
35	-	-	-	-	-	-	3	2	6	5	8	6
50	-	-	-	-	-	-	-	-	5	3	6	5
70	-	-	-	-	-	-	-	-	4	3	5	4

NOTE:-

- The above table shows the maximum capacity of conduits for a simultaneous drawing in of cable.
- The columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25 m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit which deflect from The straight by an able of more than 15 degrees.
- Conduit sizes are the nominal external diameters.

<u>TABLE-II</u>			
Girder Clips or Clamps			
S.NO.	Size of conduit	Width	Thickness
1	20 mm	19mm	0.9mm (20 SWG)
2	25 mm	19mm	0.9mm (20 SWG)
3	32 mm & above	25mm	1.2mm (18 SWG)

TABLE-III**Dimensional details of rigid non-metallic conduits.** (All dimensions in mm)

S.No.	Nominal Outside Diameter (in mm.)	Maximum outside-diameter (in mm.)	Minimum inside-diameter (in mm.)	Maximum permissible eccentricity (in mm.)	Maximum permissible quality (in mm.)
1.	20	20+0.3	17.2	0.2	0.5
2.	25	25+0.3	21.6	0.2	0.5
3.	32	32+0.3	28.2	0.2	0.5
4.	40	40+0.3	35.8	0.2	0.5
5.	50	50+0.3	45.0	0.4	0.6

2.0 MCB DISTRIBUTION BOARDS:**2.1 Scope:**

2.1.1 The scope of this section covers Supply, installation, testing and commissioning of Miniature circuit breaker boards and Miniature Circuit breakers. Miniature circuit breaker boards shall comply with BS 5486 part 12 a clause 3.2 and 3.3. They shall have a fault withstand classification of class 1 unless otherwise indicated.

2.2 MCB Distribution Boards

1. These distribution boards shall be used for control of all lighting/power circuits and shall consist of single pole/ single/ double/TP & N/ triple/four pole miniature circuit breakers mounted in double cover design, dust tight, heavy gauge sheet steel enclosures preferably zinc coated with powder coating finish.
2. Distribution Boards shall be flush or surface pattern according to the requirements of their location and shall incorporate isolators/MCB and circuit switches as specified in bill of quantities.
3. All MCBs shall be connected to the electrolytic copper busbars with direct bolted connections.
4. Earthing bar and neutral bars shall be provided having sufficient ways to enable each cable to be connected to a separate terminal. Neutral connections shall be corresponding in position to phase connections.
5. Distribution boards shall have phase barriers and PVC ducts for all interior wiring. All distribution boards shall have removable end plates at top and bottom and handles with provision for locking.
6. Phase barriers shall be provided in the 3-phase distribution Boards.
7. In TP&N distribution boards, neutral busbars shall have one outgoing terminal for each outgoing circuit.
8. Size of SDB shall be selected to cater to extra space on the bus for mounting ELCBs in addition to number of outgoing MCBs specified in the BOQ / Drawings.
9. A multi-terminal bar for the circuit protective conductors shall be provided for both insulated and metal cased boards, with one terminal for each outgoing circuit. It shall be directly connected to the earthing terminal without dependence on the exposed conductive parts of the enclosure.
10. Identification of each MCB way shall be by numbering. Identification in the neutral busbar and protective conductor bar shall clearly relate each terminal to its respective MCB way.

11. Spare MCB ways shall be provided as indicated in BOQ / Drawings. Where specific ratings are indicated, MCB shall be incorporated otherwise the ways shall be left blank but suitable for future additions. Suitable number of blanking plates shall be fixed in the DB if the space for MCB is left blank.
12. A separate Junction box of min. height of 150 mm shall be provided for extra lengths of outgoing circuit wires on Top/Bottom (as required) to avoid jumbling of wires within the main section of SDB. The junction box will be properly earthed along with the SDB.

2.3 Miniature Circuit Breakers

1. Miniature circuit breakers shall be designed and tested strictly in accordance with the relevant parts of Indian standards and shall consist of spring accelerated quick-make and quick break action mechanism fitted in moulded cases of high di-electric strength plastic or urea. Fixed and moving contacts shall have silver tungsten contacts.
2. Miniature circuit breakers used shall be of "B" Series for Normal lighting circuits and Normal Power/Geyser Loads. For AC loads, Tungsten lamps fittings, Sodium/Mercury Discharge lamps "C" Series shall be used unless otherwise mentioned.
3. Miniature circuit breakers shall have a minimum breaking capacity of 10 KA at 415 V.

2.4 ELCBs

1. ELCBs shall be designed and tested strictly in accordance with the relevant parts of Indian standards. Fixed and moving contacts shall have silver tungsten contacts.
2. ELCBs used shall be of Rating and sensitivity as specified in the BOQ.
3. ELCBs shall have a breaking capacity of 10 KA at 415 V and shall be ordinarily be for Earth Leakage protection unless mentioned otherwise.

3.0 LUMINAIRES AND LAMPS:

3.1 Scope:

- 3.1.1 The scope of this section comprises of Supply, erection, testing and commissioning of lighting fixtures for internal lighting wherever required of the specified models as per IS:3646 (part-I) 1992 for interior lighting.
- 3.1.2 Without restricting to the generality of the foregoing, this section shall include luminaires, lamps and accessories necessary and required for the installation.
- 3.1.3 Whether specifically mentioned or not, the luminaires and lamps shall be provided with all fixing devices, terminal blocks, holders etc. as required.

3.2 General Requirements:

- 3.2.1 All the luminaires and lamps shall be of best quality and as per approved makes. Wherever alternative makes are specified the choice of selection shall remain with the Engineer-in-Charge.
- 3.2.2 The luminaries and lamps shall be fixed in a neat work man like manner, true to level and in accordance with manufacturer's instructions.
- 3.2.3 The luminaries and lamps shall be provided with such accessories as are required to complete the item in working condition whether specifically mentioned in the specifications, drawings or not.

3.3 Luminaires:

- 3.3.1 Luminaries shall comply with relevant IS and with clauses 3.3.2 to 3.3.7 both inclusive.

- 3.3.2 Unless otherwise indicated, enclosure of luminaires shall provide a minimum degree of protection of IP20 when located within buildings and IP 44 when located outside buildings, but luminaires mounted externally; and less than 2 M above finished ground or paved level shall be IP 46.
- 3.3.3 Unless otherwise indicated, luminaires, both with and without built-in ballast or transformers shall be suitable for direct mounting on normally flammable surface.
- 3.3.4 Where specific requirements related to flame propagation and flammability of translucent covers are indicated, certificates of tests shall be submitted to the Engineer-in-Charge. The tests shall comply with relevant IS.
- 3.3.5 Terminal blocks for connection of the supply cables shall be of adequate size for the size of conductors forming the loop in wiring unless separate tails are required. Wherever indicated, the terminal block shall incorporate a fuse of suitable type and rating.
- 3.3.6 Ballasts for tubular fluorescent lamps shall have a maximum value of harmonics complying with the colour headed "without H Marking" in Table VII of BS 288. Power factor correction shall be provided and this shall not be less than 0.85 lagging unless otherwise indicated.
- 3.3.7 Translucent covers and reflective surfaces shall be clean at the completion of the works.

3.4 Lamps:

- 3.4.1 Lamps shall be of the type and ratings as indicated.
- 3.4.2 All lamps shall be supplied and installed by the contractor unless otherwise directed.
- 3.4.3 Lamp caps shall be suitable for the lamp holders listed socket by means of a locking ring.

3.5 Support and Fixings:

- 3.5.1 Where luminaires 1200 mm or more in length are supported directly by the conduit system, they shall be fixed to two circular conduit boxes both of which shall form an integral part of the conduit system.
- 3.5.2 Where the weight of a luminaire is supported by a conduit box or cable trunking, the fixing of the conduit box or trunking shall be adequate for the purpose and approved by Engineer-in-Charge.
- 3.5.3 Luminaires fitted with tungsten filament lamps and having metal back plates shall not be fixed directly to conduit box in which thermoplastic material is the principal load bearing member.
- 3.5.4 Support of luminaires from cable trunking shall be by means of proprietary clamps or brackets.
- 3.5.5 Where luminaires are supported from the structure other than by the conduit system, the supports shall be adequate for the purpose and approved by Engineer-in-Charge.
- 3.5.6 Luminaires mounted on or recessed into suspended ceilings shall not support luminaires unless specifically shown and approved.
- 3.5.7 For wall mounted luminaires, the mounting height shall be 1900 mm above finished floor level or as mentioned in the drawing, measured to the center of the conduit box, unless otherwise indicated.

3.6 Wiring Connections:

- 3.6.1 Where luminaires, other than those covered by clause 3.6.2 are fixed direct to circular conduit boxes or are supported by pedants or chains, the final circuit wiring shall terminate at a terminal block in the conduit box.

- 3.6.2 Where luminaries having fluorescent tubes are fixed direct to circular conduit boxes, the final circuit wiring may be terminated within the luminaire unless otherwise indicated. The wiring shall enter each luminaire at the conduit entry nearest to the terminal block and where a loop in wiring system is used, leave by the same entry; wiring shall not pass through a luminaire unless the approval of the Engineer-in-Charge.
- 3.6.3 Where luminaries are mounted on or recessed into a suspended ceiling, connection shall be by flexible cord from a plug-in ceiling rose unless otherwise indicated. The plug-in ceiling rose shall be located not more than 500 mm from the access in the ceiling and shall be firmly supported, unless otherwise approved by the Engineer-in-Charge.
- 3.6.4 Cables and flexible cords for final connections to luminaries shall be suitable for the operating temperature of the luminaire.
- 3.6.5 The size of final connection cables or flexible cords shall be as indicated.
- 3.6.6 Cables and cords passing close to a ballast within a luminaire shall be suitable for the operating temperature of the ballast.
- 3.6.7 A protective conductor shall connect the earthing terminal or earthing contact of each luminaire to an earthing terminal incorporated in the adjacent conduit box. Where the final connection is by flexible cord, the protective conductor shall form part of the cord.

4.0 TELEPHONE SYSTEM WIRING & CONDUITING

4.1.0 Intent Of Specification

- 4.1.1 These specifications are intended to cover the Conduiting & Cabling and under floor raceway work for Telephone & Intercom System. It is not the intent to specify completely herein all aspects of design, constructional features of equipment and details of the work to be carried out, but nevertheless the intent of the specification is to ensure that the equipment and work shall conform in all respects to the relevant Bureau of Indian Standard Specifications, Codes of Practice, and other statutory regulations as may be applicable and to high standards of engineering, design and workmanship. The equipment and work shall perform in continuous operation in a manner acceptable to the Employer who will interpret the meaning of the specifications and drawings and shall have the right to reject or accept any equipment or work which in their assessment is not complete to meet the requirements of these specifications and / or applicable Codes and Standards.

4.2.0 Scope Of Work

- 4.2.1 The scope of work under these specifications shall include the design, manufacture, work's testing, supply, storage, erection, site testing and commissioning of the following:-
- a) All conduit work including Junction Boxes, outlet boxes and wiring & cabling of telephone & intercom system etc.
 - b) Boxes & cover plates for telephone outlets.
 - c) Supplying and laying/fixing of main Telephone cables and Tag Blocks as per line diagram.
 - d) Connecting of Electronics earthing for EPABX system.
 - e) To do the ferruling and identification of all multi core cables at both the ends of each cable.
 - f) To do the testing of existing telephone cables & tag blocks (if already existing) before the start of work and intimate the condition of the same to the employer.

The scope of work shall also include all civil works associated with erection of the equipment and making good and painting the civil works as required.

The Contractor shall include for the supply of entire materials in accordance with these specifications and the whole of the work of fixing necessary material for the complete installation as set down in these specifications and with the accompanying schedules of work and drawings. Materials and components not specifically stated in the specifications and / or bill of materials or noted on the drawings but which are necessary for satisfactory installation and operation of the system shall be deemed to have been included in the scope of work.

4.3.0 Specifications And Schedules

4.3.1 The Specifications and Schedule of quantities shall be considered as part of this contract and any work or materials shown in schedule and not called for in the specifications or vice versa, shall be executed as if specially called for in both. The drawings indicate the extent and general arrangement of telephone point outlets, Tag Block etc. and are essentially diagrammatic.

4.3.2 The work shall be installed as indicated on the drawings. However, any minor changes found essential to coordinate the installation of this work with other trades shall be made without any additional cost of the employer. The data given herein and on the drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings are for the guidance of the Contractor. Exact locations, distances and levels will be governed by the site conditions.

4.4.0 Departure From Specifications

4.4.1 Should the tendered wish to depart from the provisions in these specifications, such departure shall be listed in a separate schedule with full particulars and reasons for the same. No conditions or departures from specifications etc. will be accepted after decisions are communicated by the Engineer-in-charge.

4.5.0 Materials And Equipment

All materials and equipment shall be of the approved make and design. Only the best quality materials and equipment shall be used. The materials and equipment shall conform to relevant Standards.

4.5.1 Approved Makes of Material

Approved makes of material are indicated in the annexure to the Specifications / BOQ. Only such material shall be used. Alternative makes shall be used only with the specific written approval of the Engineer-in-charge.

4.5.2 Samples

A list of items of materials and equipment, together with a sample of each shall be submitted to the Engineer-in-charge within 15 days of the award of the Contract.

Samples and drawings of equipment shall not be departed from without the written instructions of the Engineer-in-charge. Approvals given by the Engineer-in-charge to any samples or drawings submitted by the Contractor shall not in any way exonerate the Contractor from his liability to carry out the work in accordance with the terms of the contract.

4.5.3 Substitute Materials

Any item which is proposed as a substitution, shall be accompanied by all technical data given sizes, particulars of materials and the manufacturer's name. At the time of the submission of proposed substitution the Contractor shall state the credit, if any, due to the Client. In the event the substitution is approved, changes and substitutions shall be requested in writing and approvals obtained in writing from the Engineer-in-charge.

4.5.4 Manufacturers Instructions

Where manufacturers have furnished specific instructions, relating to the materials used in this covering points not specially mentioned in these documents, manufacturers instructions shall be brought to the notice of the Engineer-in-charge for further instructions in the matter.

4.5.5 Interchangeability

All similar parts and / or equipments shall be interchangeable with one and other.

4.5.6 **Material Testing**

The Employer shall have full powers to require the materials of work to be tested by an independent agency at the Contractor's expense in order to prove their soundness and adequacy.

4.6 **Drawings**

4.6.1 Prior to the laying and fixing of the conduits, the Contractor shall submit to the Engineer-in-charge detailed shop drawings of the conduit network and get the same approved. The shop drawing shall indicate number, size and route of the conduits, location of junction/ inspection / pull boxes, location and size of outlet boxes and number and size of wires carried in each conduit.

1. The Contractor shall prepare and submit for the approval of Engineer-in-charge detailed shop drawings of all Junction Boxes, special pull boxes and any other requirement to be fabricated by the Contractor within 10 days of signing of the contract.
2. General Arrangement drawing giving details of cable, size and type of cables, number of cables, mode of installation etc.

4.7 **Cleaning, Final Painting And Marking**

4.7.1 All exposed steel work not actually embedded will be painted as instructed. All tag blocks shall be properly labeled and numbered. The scope of work shall include the same without any extra charge. The Contractor shall be required to clean all equipment under erection as well as the work area and site at regular intervals to the satisfaction of the Engineer-in-charge. In case the cleaning is not to the satisfaction of Engineer-in-charge the same will have to be done again at the Contractor's Cost.

4.8 **Completion Certificate**

4.8.1 On completion of the telephone & computer wiring & cabling, a certificate shall be furnished by the Contractor countersigned by the Licensed Supervisor, under whose direct supervision, the installation was carried out. The contractor shall get the certification of the Competent authority for the complete system after commissioning.

4.9 **Works Inspection**

4.9.1 Prior to shipment of equipment, the Engineer-in-charge reserves the right to inspect the same at the manufacturers works and the Contractor shall provide and secure for the Engineer-in-charge and his authorized representative every reasonable access and facility at the manufacturers works for inspection.

4.10 **Co-Ordination Of Work At Site**

4.10.1 The Contractor shall work in co-ordination with other agencies at site and shall arrange to place the conduits/ inserts etc. in the masonry and concrete as required, as other works proceed. Any hold up of the building or other works because of delay in placing the conduits / inserts etc. or otherwise shall be the responsibility of the Contractor and shall make him liable for damages as may be considered and levied by the Engineer-in-charge.

4.11 **Partial Occupation of Premises**

4.11.1 During progress of the work completed portions of the building/ floor may be occupied and put to use by the Client. The Contractor shall however remain fully responsible for the maintenance of the installations till the entire work covered by this Contract is satisfactorily completed by him and taken over by the Institute.

4.12 **Appointment Of Sub Contractor & Supplier For Telephone Work**

4.12.1 The main contractor shall get the name of the telephone wiring sub contractors approved from the Engineer-in-charge before the work is taken up in hand. The sub contractor shall be licensed electrical contractor and shall be registered Contractor of P&T/DOT.

The Supplier of EPABX should be an OEM authorized distributor/ dealer/ re-seller of the offered equipments. An authorization letter in this effect from the OEMs must be enclosed. The Supplier shall provide technical brochures from OEM to support the technical specification of all the offered items. The Supplier shall offer 1-year comprehensive on-site warranty and shall also quote rate for 3-year comprehensive on-site warranty.

4.13 Conduit

Conducting shall be done as per the specification mentioned in Wiring Section.

4.14.0 Technical Specifications For Cables

4.14.1 Jelly Filled Cables (Unarmoured)

1. These cables shall be manufactured in accordance with the P&T specifications No. ITD-S/WT-129 D, S/WT-143 B.
2. The constructional details, technical properties shall be governed by the Deptt. of Telecommunications specification No. G/CUG-01/02. Feb. 96 and amended upto date.

4.14.2 Unarmored Telephone Cables & Wires

All Telephone unarmoured cables & wires shall be manufactured in accordance with the relevant latest I.S specifications and ITD Specifications no. ITD-S/WS-113 C, S/WS-114 C.

5.0 COMPUTER SYSTEM CABLING & CONDUITING

5.1.0 Intent Of Specification

5.1.1 These specifications are intended to cover the Conduiting & Cabling work for Computer System. It is not the intent to specify completely herein all aspects of design, constructional features of equipment and details of the work to be carried out, but nevertheless the intent of the specification is to ensure that the equipment and work shall conform in all respects to the relevant Bureau of Indian Standard Specifications, Codes of Practice, and other statutory regulations as may be applicable and to high standards of engineering, design and workmanship. The equipment and work shall perform in continuous operation in a manner acceptable to the Engineer-in-charge who will interpret the meaning of the specifications and drawings and shall have the right to reject or accept any equipment or work which in their assessment is not complete to meet the requirements of these specifications and / or applicable Codes and Standards.

5.2 Scope Of Work

5.2.1 The scope of work under this specification shall include the design, manufacture, work's testing, supply, storage, erection, site testing and commissioning of the following :-

1. All conduit work including Junction Boxes, outlet boxes and wiring and cabling for computer system.
2. Boxes and cover plates for computer outlets.
3. Supplying and laying of main computer wire (OFC cable) as per line diagram and copper cable for point outlets.
4. Supply, installation & connecting of Patch Panel & Mounting cords, Racks and Switches etc.
5. To connect and help in commissioning of switches, back bone switch its peripheral main server and desktop etc., as and when received at the site through enhanced Cat 6 cables along with connector wherever required.
6. To do the ferruling and identification of all the Cat 6 cables for all the workstations and switches/Hubs.
7. To get the certification for 25 years of the complete system from the Competent Authorities after commissioning of the system.
8. Handing over of one tool for crimping of RJ 45 connector and cable (tool kit).

- 5.2.2 The scope of work shall also include all civil works associated with erection of the equipment and making good and painting the civil works as required.
- 5.2.3 The Contractor shall include for the supply of entire materials in accordance with these specifications and the whole of the work of fixing necessary material for the complete installation as set down in these specifications and with the accompanying schedule of work and drawings. Materials and components not specifically stated in the specifications and / or bill of materials or noted on the drawings but which are necessary for satisfactory installation and operation of the system shall be deemed to have been included in the scope of work.

5.3 Specifications And Schedules

- 5.3.1 The Specifications and Schedule of quantities shall be considered as part of this contract and any work or materials shown in schedule and not called for in the specifications or vice versa, shall be executed as if specially called for in both. The drawings indicate the extent and general arrangement of the telephone point outlet, Tag Block etc. and are essentially diagrammatic.
- 5.3.2 The work shall be installed as indicated on the drawings. However, any minor changes found essential to coordinate the installation of this work with other trades shall be made without any additional cost to the employer. The data given herein and on the drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings are for the guidance of the Contractor. Exact locations, distances and levels will be governed by the site conditions.

5.4 Departure From Specifications

- 5.4.1 Should the tendered wish to depart from the provisions in these specifications, such departure shall be listed in a separate schedule with full particulars and reasons for the same. No conditions or departures from specifications etc. will be accepted after decisions are communicated by the Engineer-in-charge.

5.5 Materials And Equipment

All materials and equipment shall be of the approved make and design. Only the best quality materials and equipment shall be used. The materials and equipment shall conform to relevant Standards.

5.5.1 Approved Makes Of Material

Approved makes of material are indicated in the annexure to the Specifications. Only such material shall be used. Alternative makes shall be used only with the specific written approval of the Engineer-in-charge.

5.5.2 Samples

A list of items of materials and equipment, together with a sample of each shall be submitted to the Engineer-in-charge within 15 days of the award of the Contract.

Samples and drawings of equipment shall not be departed from without the written instructions of the Engineer-in-charge. Approvals given by the Engineer-in-charge to any samples or drawings submitted by the Contractor shall not in any way exonerate the Contractor from his liability to carry out the work in accordance with the terms of the contract.

5.5.3 Substitute Materials

Any item which is proposed as a substitution, shall be accompanied by all technical data given sizes, particulars of materials and the manufacturer's name. At the time of the submission of proposed substitution the Contractor shall state the credit, if any, due to the Institute. In the event the substitution is approved, changes and substitutions shall be requested in writing and approvals obtained in writing from the Engineer-in-charge.

5.5.4 Manufacturers Instructions:

Where manufacturers have furnished specific instructions, relating to the materials used in this covering points not specially mentioned in these documents, manufacturers instructions shall be brought to the notice of the Engineer-in-charge for further instructions in the matter.

5.5.5 Material Testing

The Engineer-in-charge shall have full powers to require the materials of work to be tested by an independent agency at the Contractor's expense in order to prove their soundness and adequacy.

5.6 Drawings

5.6.1 Drawings Required Prior To Commencement of Work

1. Prior to the laying and fixing of the conduits, the Contractor shall submit to the Engineer-in-charge detailed shop drawings of the conduit network and get the same approved. The shop drawing shall indicate number, size and route of the conduits, location of junction/ inspection / pull boxes, location and size of outlet boxes and number and size of wires carried in each conduit.
2. The Contractor shall prepare and submit for the approval of Engineer-in-charge detailed shop drawings of all junction boxes, special pull boxes and any other requirement to be fabricated by the Contractor within 10 days of signing of the contract.
3. General Arrangement drawing giving details of cable, size and type of cables, number of cables, mode of installation etc.

5.6.2 Completion Drawings

After the completion of the work and before issuance of virtual completion, the Contractor shall submit to the Institute, completion drawings drawn at approved scale indicating the complete system as installed. These drawings shall give the following: -

1. Run and size of conduits, location of inspection, Junction and pull boxes.
2. Number and size of conductors in each conduit for computer wiring.
3. Location of outlets and patch panels.
4. Location and details of main switches and other particulars.
5. Complete schematic drawings as installed showing all connections in the complete computer system.
6. Layout and particulars of all cable runs size and type of cables, mode of installation, etc. as installed.

5.7 Cleaning, Final Painting And Marking

- 5.7.1 All exposed steel work not actually embedded will be painted as instructed. All patch panels shall be properly labeled and numbered. The scope of work shall include the same without any extra charge. The Contractor shall be required to clean all equipment under erection as well as the work area and site at regular intervals to the satisfaction of the Employer. In case the cleaning is not to Engineer-in-charge satisfaction the same will be done again at the Contractor's Cost.

5.8 Completion Certificate

- 5.8.1 On completion of the computer wiring and cabling installation, a certificate shall be furnished by the Contractor countersigned by the Licensed Supervisor, under whose direct supervision the installation was carried out. The contractor shall get the certificate of the complete system from the competent authorities after commissioning.

5.9 Works Inspection

- 5.9.1 Prior to shipment of equipment, the Engineer-in-charge reserves the right to inspect the same at the manufacturer's works and the Contractor shall provide and secure for the Engineer-in-charge and his authorized representative, every reasonable access and facility at the manufacturer's works for inspection.

5.10 Co-Ordination Of Work At Site

5.10.1 The Contractor shall work in co-ordination and co-operation with the Building Contractor and / or any other agencies at site and shall arrange to place the conduits/ inserts etc. in the masonry and concrete as required, as other works proceed. Any hold up of the building or other works because of delay in placing the conduits / inserts etc. or otherwise shall be the responsibility of the Contractor and shall make him liable for damages as may be considered and levied by the Engineer-in-charge.

5.11 Partial Occupation Of Premises

5.11.1 During progress of the work completed portions of the building/ floor may be occupied and put to use by the Client. The Contractor shall however remain fully responsible for the maintenance of the installations till the entire work covered by this Contract is satisfactorily completed by him and taken over by the Client.

5.12 Appointment Of Sub Contractor For Computer Cabling Work

The main contractor shall get the name of the computer wiring sub contractor approved from the Engineer-in-charge before the work is taken up in hand. The sub contractor shall be authorized & approved dealer for networking and shall be responsible for getting the certification of the system.

5.13 Conduit

Conducting shall be done as per the specification mentioned in Wiring Section.

5.14 Copper Components

All the items/components used for the installation shall meet the requirement of TIA/EIA T568A, T568B, ISO/IEC 11081.

5.14.1 Category 6 Unshielded Twisted Pair Cable

The category 6 UTP LAN cable shall be four pair copper cable suitable for more than 1000 Mbps speed, designed and constructed as per specifications laid down by the EIA of USA.

Cords

The patch cords/mounting cords and the category 6 UTP cables shall be as follows.

Conductor	:	24 awg. Stranded bare copper for patch/mounting cords
		24 awg. Solid bare copper for category 6 LAN cable
Insulation	:	Polyolefin for both
Jacket	:	PVC for both

5.14.3 Test Certificate

The test certificate and the EIA standards/ specifications for all above components used for the structured cabling shall be submitted along with the tender.

5.14.4 Testing of equipments/Installation

After completion of installation, the structure cabling work shall have to be tested as per EIA standards for its suitability for use at minimum 1000 Mbps, by using suitable equipment like scanner etc. in the presence of employer's engineer. The test results shall be tabulated in a format and submitted to the employer. In case any part of the work does not comply with the standards specified by EIA or fails the tests, the same has to be redone without any extra charge to the employer.

5.14.5 Fiber Optic

All the items, components for F.O cable used for the installation & commissioning shall meet the requirement of TIA 568A, IEEE 802.3Z and VL 1666. The performance specifications shall be measured in accordance with EIA fiber optic test procedure.

5.14.6 Drawing of Conductors

The drawing and jointing of insulated wires shall be executed with due regard to the following precautions:-

1. While drawing insulated wires into the conduits, care shall be taken to avoid scratches and kinks which cause breakage of conductors.
2. There shall be no sharp bends.
3. 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.
4. PVC insulated wire ends before connection shall be properly soldered (at least 15 mm length) with suitable soldering material.
5. All looped joints shall be soldered and connected through terminal block/ connector.
6. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less.
7. Conductors having nominal cross sectional area exceeding 10 Sq.mm shall always be provided with cable sockets.
8. At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used.
9. Brass nuts and bolts shall be used for all connections.
10. Only certified wiremen and cable jointers shall be employed to do jointing work.
11. All wires shall bear the manufacturer's label and shall be brought to site in new and original packages.
12. No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire.
13. Before the wires are drawn into the conduits, they shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing dry compressed air through the conduits.

6.0 FIRE ALARM SYSTEM

GENERAL

6.1 Work Included

- a) The scope of work under this head shall include design (if required) supply and installation of Analogue Addressable Fire Detection Cum Alarm System. The work under this system shall consist of furnishing all materials, equipments and appliances and labour necessary to install the said system complete with Detectors, Hooters and Manual Push Button Stations and Fire Alarm Panel etc.

The Design consists of providing Analogue Addressable Detectors, Hooters, Manual Call Points, Response Indicators and Fire Alarm Panel as per specifications.

It shall include laying of wiring and conduits etc. necessary for installation of the system with supply of detectors as indicated in the specification and schedule of quantities. Any openings/ chasing in the wall/ ceiling required to be made for the installation shall be made good in appropriate manner.

- b) **Related Work and Obligations**

The general requirements apply to work specified in this section.

To examine all the other sections of the specification for requirements which may affect work of this section.

- iii) Co-ordinate works with all other trades affecting, or affected by activities of this section. Co-operate with such other trades to assure the steady progress of all operations under the Contract.

c) **General Requirements**

This specification covers requirements for supply, erection, testing and commissioning of Analogue Addressable Fire Alarm System.

d) **Codes and Standards**

The design, supply, installation and testing of the entire fire alarm system shall conform to BS : 5839 or NFPA 72. The detectors shall conform to relevant codes for Fire Alarm Systems.

e) **Quality Assurance**

The Contractor shall ensure that all materials furnished and installed by him under the Contract shall meet the requirements of relevant International and Indian Standards. The Contractor shall also verify all test results and ensure that these are in accordance with the requirements as mentioned in the specifications.

f) **Guarantee**

Manufacturer shall provide guarantee for work under this section. However, such guarantee shall be in addition to and not in lieu of all other liabilities which manufacturer and Contractor may have by other provisions of the Contract document.

The Fire Alarm System shall be guaranteed against trouble free operation, defective workmanship and materials for a period of 12 Months from the date of supply or 12 months from the date of erection and commissioning whichever is earlier. In case of any defects during this period detectors etc. shall be replaced free of cost by the Contractor.

g) **Delivery, Handling and Storage**

All Detectors, Hooters, MCPs, RIs and Fire Alarm Panel shall be carefully handled and stored at site in a neat and orderly manner for fixing the same at a later date.

6.2 Products

a) **General Detail**

The Fire Alarm System shall conform to BS : 5839 or EN 54 or NFPA 71/ 72 or Under writer's Laboratory in respect of design and installation and it shall give Audio / Visual Alarm Signals when the temperature in case of Heat Detector or smoke density in case of Photo Electric Detector exceeds the pre-set limit. The system shall give pin point location of fire with warning system and voice communication for commands and instruction if required.

b) **Photo Electric Type Smoke Detector Combined with Class 'A1' Thermal Sensor.**

The Photo Electric Smoke Detector has an optical sensing chamber that operates on the light scattering principle and responds to those particles that exit from optically dense smoke. When Smoke enters the sensing chamber it scatters light which is received by a photo cell. The signal is amplified and digitised for reception by the Panel. The Detector shall activate on receiving smoke particles in the 0.5 to 10 micro meter range. The detector shall be completely solid state with LED indication at the base.

The Photo Electric Smoke Detector shall be combined with Class 'A1' thermal sensor. Each element shall have monitoring possible for measuring actual levels, as well as temperature rate of rise. When required it shall be possible to isolate smoke sensing while retaining thermal sensing.

The Detector shall be able to sense incipient fire by detecting the presence of visible and invisible products of combustion. The detector shall be suitable for low voltage (24 volts DC) two wire supply. The detector shall be provided with response indicator (LED) and the sensitivity of the detector shall not vary with change in ambient temperature, humidity, pressure of voltage variation.

Neither its performance shall be got affected by air circuit upto 10 Mtr. Per second. The detector shall be suitably protected against dust accumulation/ ingress and it shall be free from maintenance and functional test at intervals. All detectors shall be identical in construction design and characteristic to facilitate easy replacement. The detector housing shall be damage resistant made of polycarbonate or proprietary self extinguishing material.

The coverage per smoke detector shall be upto a minimum of 70 Sq.M. This coverage area will reduce depending upon structural configurations or partitions etc. It shall be possible to connect Smoke Detector with Heat Detector or Manual Push Button in the same circuit. The sensitivity of detector shall be set / adjusted by the supplier to suit the site requirement.

It shall have in-built safety device to monitor the removal and pilferage of the detector. The detector also must have facility for remote indication. The quiescent current flow must not exceed 50 milli amps and alarm condition current shall be maximum 60 milli amps.

The Photo Electric type Smoke Detector combined with Class 'A1' thermal sensor shall be intelligent Analogue Addressable detector with its own manually set digital code and be able to give analogue output to the Fire Alarm Panel regarding its condition. It shall be able to communicate with the Fire Alarm Panel by the pulses emitted from the Panel.

The base of the Detector shall be interchangeable with other Smoke or Heat Detectors. The enclosure shall meet IP 22 protection grade.

It shall be able to withstand temperature variation from 0 Degree Centigrade to 50 Degree Centigrade. Relative Humidity (non Condensing type) upto 95% shall not hamper its performance. The voltage rating shall be from 24 Volts DC, though the voltage may be changed depending upon the working voltages of a proprietary Fire Alarm Panel.

c) **Rate of Rise Type Heat Detector**

The Heat Detector shall be intelligent Analogue Addressable detector with its own manually set digital code and be able to give a single digitised output to the Fire Alarm Panel regarding its condition. The Detector shall employ the thermistor principle for heat sensing and the fixed temperature setting shall be at 60^o Centigrade. It shall be able to communicate with the Fire Alarm Panel by the Electrical pulses emitted from the Panel.

The Base of the Detector shall be interchangeable with other Smoke Detectors and the Construction shall be of poly carbonate or any approved proprietary flame retardant material. LEDs shall be provided to indicate locally alarm condition. The enclosure shall meet IP 22 protection grade.

It shall be able to withstand temperature variations from 0^o Centigrade to 50^o Centigrade. Further, Relative Humidity (non Condensing type) upto 95% shall not hamper its performance. The Voltage rating shall be 24 Volts DC, though the voltage may be changed depending upon the working voltages of a proprietary Fire Alarm Panel.

The detector shall meet the requirements of either EN 54/ FM/ UL and shall be specifically approved by FM/ UL/ LPCB. It shall be possible to test the Detector's working both from the Panel as well as locally by means as designed by the Bidder. The approved coverage per Detector for unhampered areas shall not be less than 30 M²

d) **Manual Call Box.**

Manual Push Button shall be of Break Glass or Pull Down type units, completely encased in cast aluminium housing or in 16 gauge MS with provision for cable or conduit coupling. The manual Push Button shall have the word prescribed in clear bold letters on facial window "In case of Fire Break Glass/ Pull Down".

The Manual Call Box station shall be fully addressable with its own set code and operated by digitized signals sent from the Panel. The voltage range shall be from 24 Volts. It shall have protection as per IP 33. The Operating temperature range shall be from 0 Degree Centigrade to 50^o Centigrade. Relative Humidity (non condensing) range for performance parameters shall be between 0 to 95%. Further it shall conform to BS 5839 or EN 54/ FM/ UL/ Vds/ LPC.

In case the manual call box is indigenous and an Input Card is connected to it then the Manual Call Box with Micro Switch shall be approved by the Consultant.

e) **Hooter**

The Hooter shall be of electronic type and shall give discontinuous / intermittent audible alarm whenever any detector or call box operates. It shall be possible to control the hooter audible alarm in case it is not required to sound the alarm except for the panel.

It shall be complete with electronic oscillations, magnetic coil (sound coil) and accessories, ready for mounting (fixing).

The sound output from the Hooter should not be less than 100 decibels at the source point. Hooter shall be 4 W each and enclosed in an acoustically lined MS box.

f) **Fault Isolator**

The Fault Isolator shall be able to detect wire short circuit/ loose wiring/ partial earth fault and similar conditions and shall be able to isolate that segment from the circuit, so that the rest of the circuit continues to operate.

Fault Isolator shall operate in pairs in any loop and whenever any short circuit occurs between any two of them, both immediately shall switch to an open circuit state and isolate the length of wiring between them. The Isolators should automatically return to the closed circuit as soon as the short circuit is corrected.

The Fault Isolator shall be addressable so as to provide indicate of its changed state. It shall also have an inbuilt LED to give local alarm.

g) **Fire Alarm Control Panel**

- 1) The fire Alarm Control Panel shall be micro processor based fully Addressable Analogue Control Unit which shall control all addressable detectors, Manual Call Stations, Interface Units and Switching Systems (for disconnecting AHU and power supply) connected to it.
- 2) All addressable units shall be connected to the Panel through the Loop Cards and shall be addressed through individualized numbers. The Panel shall be able to obtain analogue value for all detectors in the Circuit through a pulsed digitalized current data. The Panel shall be able to analyze all analogue inputs from all addressable units and through its own software and ambient level screening it shall be able to identify Fire, possible Fire or Fault conditions. The unit shall be dynamic and continuous.
- 3) The Fire Alarm Panel shall itself have all Zone Cards in it. No isolated mother board or transponder is being considered. Each Loop shall be able to access a minimum of 90 addressable units. The Design has been based on the basis of 90 units per Loop.
- 4) The Panel shall also give adequate warning signal whenever there is dust accumulation in detectors, and upto the point of its replacement it should be possible to change the level of ambient alarm calibration condition either by the use of software programme operable by the Client or by resetting the detector.
- 5) Short circuiting, loose wiring or missing units shall also be reported at the Panel with pin point location. In such cases the system through the use of Fault Isolators shall be able to isolate that segment between the two fault isolators.
- 6) The Panel shall have a Liquid Crystal Display Alpha – Numeric type on it to indicate immediately all conditions. In case of testing of the system from the Panel, the Display shall be able to give readouts of analogue value of all detectors being tested. The Panel shall also be able to carry out continuous self monitoring when in normal condition. The Mother Board shall be of Modular Construction.
- 7) The Panel shall have either an in-built or external printer coupled to the Panel which shall log all events with time. The printout shall clearly indicate the event – Fire / Pre Alarm / Fault etc. the Unit address and time.
- 8) The Panel shall also be able to discriminate between false alarms and fire conditions, as well as priority selection of alarm address in case alarm activities in tow or more remotely located units simultaneously. In such cases, the Manual Call Box shall be reported first, group of sequentially laid detectors (in one room for example) second and a detector with the greatest obscuration over a period of time third.
- 9) The Panel shall also be able to actuate Switches automatically in case of Fire condition, that of AHUs and Power Supply or other Systems such as piped pressurized gas supply. The Bidder will be required to design and install the system in operation in coordination with the relevant Contractors. The Bidder will not be allowed to charge extra on this account, and such charges shall be included in his package.

- 10) In this respect the Bidder is required to take note of the specifications mentioned above. The Bidder shall indicate in his Bid what facilities shall need to be provided by the Client for completion of this mechanism.
- 11) The System should be fully safe and adequate safe guards should be under taken that in the event of a failure of a part of the System it shall not handicap the complete system.
- 12) The Bidder shall undertake the responsibility of the complete installation, commissioning, user trials, training and maintenance of the system as required. The Bidder shall take all responsibility for preparation and installation of system Software into the Panel. The Software shall be such so as to be easily operated by the Client's Personnel, is secured against Software errors, ability to be upgradable so as to incorporate more Detector units or replacement/ changing of Detector units, can incorporate more features at a later date such as Illumination Control, Security etc.
- 13) The Panel shall be able to address individual Interface Cards which shall be connected to conventional detectors.
- 14) The Panel shall have its own Battery Back up of a minimum of 12 hours run. The Battery shall be of Nickel Cadmium or as per Manufacturers Standard of capacity as required and accepted by the Client.
- 15) The Panel shall also have its own Annunciation System either inbuilt or by external source. The Microphone shall have a selector switch to tune onto the required speaker / speakers and give the necessary voice announcement.
- 16) It shall be able to withstand temperature variations from 0 Degree Centigrade to 50^o Centigrade. Further, Relative Humidity (Non Condensing type) upto 95% shall not hamper its performance. The Voltage rating shall be 24 V DC, though the voltage may be changed depending upon the working voltages of a proprietary Fire Alarm Panel.
- 17) The Panel shall be totally enclosed dust and vermin proof type made of minimum 16 gauge dust inhibited sheet with even baked finish. The panel shall be of completely solid state design.
- 18) The logic circuits shall be based on high noise immunity solid tasted hardware employing modular construction. Logic cards shall be of epoxy fibre glass construction.
- 19) The System shall meet the BS 5839/ EN 54/ NFPA 71 & 72 standards and all equipments excluding cabling and wiring shall be listed with Under writers Laboratory or Factory Mutual.
- 20) Further, the system shall be expandable and be able to add atleast 200 more units in the Panel through additional Loops.
- 21) The Panel shall have an extra Zone/ Loop Card to serve as Standby in case of burn out of or malfunctioning of any operating Zone/ Loop Card. If the Bidder envisages two numbers of 2 Loop cards to serve the 4 Loops of the proposed System, then the extra Loop Card shall also be a 2 Loop Card.
- 22) The Panel shall have software to cater to the change over of any of the operating Loop Cards to the extra Loop Card. Other Software necessary to actually change the terminals of a Loop from an existing Loop Card to the extra Loop card shall be carried out at site as and when required. Charges for such software, loading, test run etc. shall be indicated when required.

6.3 Exit Sign

- 1) Exit Sign : Photo Luminescent Type
- 2) Size : As per site requirements
- 3) Indications : As per site requirement

6.3.1 Cable / Wire & Conduit

This shall be as per the detailed specifications in Wiring Sub head.

6.4 Installation

6.4.1 Manual Stations

Manual Stations shall be mounted with the base of 1.50 m above the finished floor level unless otherwise noted.

6.4.2 Evacuation Alarm Bells

Evacuation Alarm Bells shall be mounted at least 2.30 m above the floor level unless limited by ceiling height or otherwise noted.

6.4.3 Detectors

Detectors shall be mounted at the underside of ceilings or roof decks.

6.4.4 Main Fire Alarm Panel

It shall be installed in the Main Security Room

6.5 Examination of Work

Upon completion of the installation, the Contractor shall test the entire Fire Alarm System to the satisfaction of the Engineer-in-charge. The Contractor and Fire Alarm Technician shall be in attendance to make necessary adjustments and perform electrical work related to the test. The installation shall be got approved from the competent Government authorities after testing & commissioning if required.

7.0 EARTHING

7.1 Scope:

7.1.1 The scope of this section covers supply installation and testing of earthing system for all non-current carrying metal parts of electrical installation.

7.1.2 The type and number of earth electrodes shall be as indicated and shall comply with clauses as appropriate.

7.1.3 Dedicated earthing shall be provided for the Server Room equipments.

7.2 Earthing System & Equipment Bonding:

7.2.1 Unless otherwise indicated, earth plates shall be 600 mm x 600 mm minimum, of solid or lattice copper not less than 3.15 mm thick and of GI not less than 6.3 mm.

7.2.2 Earthing system shall comprise of earth electrode near sub-station. Test link boxes shall be provided at each electrode for periodical resistance measurement. All such earth electrodes shall be interconnected forming a main grid.

7.2.3 Where the earth electrodes are formed with tape, the tape shall be to relevant IS, of the size, length, depth below ground level and layout as indicated.

7.3 Conductors:

7.3.1 Earthing conductors, main earthing bars and main equi-potential bonding conductors shall be of the type, size and conductor material as indicated and shall comply with clauses 15.3.2 to 15.3.5.

7.3.2 Tapes shall comply with relevant IS. Where used to interconnect copper electrodes the tape may be bare, but for interconnecting pipe electrodes and for all other purposes the tap shall have an extruded PVC sheath.

7.3.3 Main earthing bars shall comply with IS 3043 and shall be bare.

7.3.4 Cables shall comply with IS 3043, without sheath, unless otherwise indicated.

7.4 Joints And Connections:

- 7.4.1 Joints in conductors shall be kept to a minimum.
- 7.4.2 All contact surfaces shall be thoroughly cleaned and coated with an anti-corrosive electrical jointing compound suitable for the conductor materials. For bi-metalllic joints, a separate abrasive shall be used to clean each metal.
- 7.4.3 Connections shall be made as follows:
to main earthing bars by phosphor bronze set screws and nuts;
to earth rods by bronze, gunmetal or copper clamps with phosphor bronze. Edges of clamps shall be rounded;
to earth pipes by phosphor bronze bolts and nuts, direct to the flange of the pipe;
to earth plates by bolting, rivetting or welding.
- 7.4.4 Termination of cables shall be by connectors jointed to the cable conductor by the thermit welding process or by compression joints complying with BS 4579.
- 7.4.5 Joints which are indicated as test points shall be bolted or clamped. Joints in tape, other than at test points shall be made by the reventing and sweating. Overlap of conductors shall be not less than 100 mm.
- 7.4.6 Joints and connections shall be protected by a coating which will form a seal and exclude moisture in all weather conditions. At connections to earth electrodes, the coating shall cover all exposed conductors and in the case of earth pipes, to top surface of the flanges. Protective coatings shall be of a waterproof, inert, tenacious material and of one of the following forms:
- solvent cutback thixotropic corrosion preventative forming a film of resilient matt petroleum wax;
 - a fast drying durable rubberised sprayed coating;
 - a heat shrink clear sheathing
- 7.4.7 Screws, nuts, washers and rivets for copper conductors shall be of phosphor bronze, naval brass or copper silicon; for aluminium conductors, they shall be of stainless steel. The minimum provision shall be
- for flat strip--- two M8 bolts or four 5 mm diameter rivets;
 - for sheet metal--two M8 bolts; where the sheet metal is less than 2 mm thick, it shall be backed for an area of at least 1000 mm².

7.5 Inspection Pits:

- 7.5.1 Unless otherwise indicated, connection between an earth conductor and its associated earth electrode system shall be in an enclosure.
- 7.5.2 The enclosure shall have a removable top cover which shall be flush with finished ground level. The enclosure shall be a purpose made concrete inspection pit, a galvanized steel inspection pit embedded in concrete, an earthenware pipe or similar, as indicated. The earth electrode connection shall be just below the lid of the inspection pit with adequate access for testing purposes.

7.6 Supports And Fixings:

- 7.6.1 Cables shall be supported and fixed in accordance with Section Cable laying.

- 7.6.2 Tapes and bars shall be fixed by spacer bar saddles which shall be of non-metallic material or corrosion resistant alloy compatible with the conductors. Fixing of saddles shall comply with relevant clauses in Cable Laying section. The maximum spacing off fixings shall not exceed 600 mm unless otherwise indicated.
- 7.6.3 Main earthing bars shall be supported on insulators; they shall be not less than 25 mm clear of the building fabric.
- 7.6.4 For general areas inside buildings, screws and nuts shall be of cadmium electroplated steel or stainless steel; outside buildings, in plant rooms or other locations as indicated, they shall be of stainless steel.
- 7.6.5 No shot firing shall be used and no drilling or welding structural steelwork shall be done without the approval of the Engineer-in-Charge.

7.7 Installation:

- 7.7.1 Electrodes shall be installed in undisturbed ground. The distance between any two electrodes shall be not less than 1.25 times the depth of the longer electrode.
- 7.7.2 Excavations shall be carried out in accordance with BS 6031 and shall comply with the construction (General Provisions) Regulations, 1961. Excavations shall be kept free of water and protected against damage or collapse. The safety of persons and the protection of structures, buildings, roads, sewers and services from damage shall be ensured; all necessary sheeting, timbering, strutting and shoring shall be supplied, erected and subsequently removed.
- 7.7.3 Trenches shall be backfilled in layers and each layer shall be rammed. The first two layers shall be 100 mm deep and rammed by hand the remaining layers shall be not more than 200 mm deep and power ramming may be used. Warning tapes and covers shall be included as specified in relevant clauses in Cable laying section. Where applicable, top soil and turf shall be replaced and the final level shall be level with or not more than 25 mm above the adjacent ground level.
- 7.7.4 The earth resistance should be less than 5 Ohms. Earth Pits shall be treated with salt, charcoal /chemicals to be achieve the required result.

8.0 INSPECTION AND TESTING:

8.1 General:

- 8.1.1 Inspection and testing shall be done in accordance with the IEE Wiring Regulations, the requirements of this Section and as indicated.
- 8.1.2 Inspection shall include a physical check that all equipment has been securely fixed and that all electrical connections are mechanically sound.
- 8.1.3 In addition to the test at the completion of each installation, certain tests shall be done during the progress of the Works as required by clauses 17.4 to 17.7 both inclusive.

8.2 Information:

- 8.2.1 For equipment supplied under the contract, the Contractor shall obtain from manufacturers the time/current characteristics of all protective devices for automatic disconnection of supply and provide copies to the Engineer-in-Charge and to the person or persons carrying out the inspection and testing, in addition to meeting the requirements of clause.

8.3 Testing Methods:

- 8.3.1 The Engineer-in-Charge shall be notified of the method to be used for each type of test and the notification shall be given not less than 28 days before the final tests are to be made. The tests shall be carried out in accordance with the methods set out in the IEE Wiring Regulations, subject to the requirements of clauses 17.3.2 to 17.3.6 inclusive.
- 8.3.2 For testing, continuity of protective conductors and equi-potential bonding AC source shall be used unless the Engineer-in-Charge agrees otherwise.
- 8.3.3 The method used to verify the effectiveness of the protection afforded by a residual current-operated device shall give the operating time and the current used shall not exceed 100% of the nominal setting of the device. For a fault voltage operated device, the test voltage between the exposed conductive part and earth shall not exceed 50 volts. In addition to the tests simulating an appropriate fault condition, any test facility incorporated in the device shall be operated to test its effectiveness.
- 8.3.4 High Voltage tests on LV cables and factor assemblies shall comply with the requirements for site testing in the appropriate British Standards.
- 8.3.5 Alternative methods to those set out in the IEE Wiring Regulations may be proposed for the approval of the Engineer-in-Charge, but they shall be not less effective than those in the Regulations.
- 8.3.6 Where necessary to prevent damage to components of equipment, the equipment shall be disconnected for the duration of the relevant tests.

8.4 Power Cables:

- 8.4.1 Tests shall be made immediately on completion of the installation of power cables to demonstrate that the phase sequence is correct at all end connections.
- 8.4.2 Where indicated, LV cables shall be tested at high voltage in accordance with clause 17.3.4 as soon as their installation is complete.
- 8.4.3 LV cables not required to be high voltage tested, shall be tested for insulation resistance as soon as their installation is complete. The test voltage shall be 500V DC for installations rated up to 500V and 1000V Dc for installations rated up to 1000V. Tests shall cover all permutations between each conductor, screen, metallic sheath, armour and earth.
- 8.4.4 The over sheaths of cables laid under ground shall be given a voltage withstand test after backfilling of the trenches is complete but before termination.

8.5 Control And Communication Cables:

- 8.5.1 Cables shall be tested as soon as their installation is complete to ensure that the cores are continuous and they have not been crossed and the insulation resistance is satisfactory. Insulation tests shall cover all permutations between each conductor, screen, metallic sheath, armour and earth.
- 8.5.2 For polyethylene and dry paper-insulated communications cables, the insulation resistance for each conductor shall be not less than 1500 L mega ohms, where L is the cable length in Kilometres. The measured resistance of each conductor shall not exceed the calculated resistance by more than 5%; the calculated value will be made available by the Engineer-in-Charge.

8.6 Conduit And Trunking:

- 8.6.1 Where conduit is cast in situ in reinforced concrete, it shall be checked for freedom from blockage and steel conduit shall be tested for electrical continuity as soon as the shuttering has been removed.

8.6.2 Steel conduit and bus duct systems shall be inspected and tested before any wiring is installed; under floor ducting shall be inspected and tested before screeding.

8.7 Earth Electrodes:

8.7.1 The resistance of each earth electrode, whether for earthing of protective conductors, lightning protection or an electrical system, shall be checked immediately after installation of the electrodes and the results submitted to the Engineer-in-Charge.

8.8 Earth Fault loop impedances:

8.8.1 The measured earth fault loop impedance for each circuit shall be checked against the maximum value as indicated.

8.8.2 Where the maximum value is exceeded the Engineer-in-Charge shall be informed.

8.9 Records and Certificates:

8.9.1 Inspection and test results shall be recorded on the forms provided by the Authority. Two copies shall be submitted to the Engineer-in-Charge within 7 days of each test.

8.9.2 When all inspections and tests results are satisfactory, a Completion Certificate and an Inspection certificate shall be given to the Engineer-in-Charge not later than the date of completion of the works. The certificates shall be given in the form laid down in the IEE Wiring Regulations for electrical installations and BS 5266 for emergency lighting systems.

8.9.3 The values of prospective short-circuit current and earth fault loop impedance at the origin of the installation shall be recorded on the Inspection certificates.

9.0 DRAWINGS AND DOCUMENTS BY CONTRACTOR:

9.1 Extent of Provision:

9.1.1 Unless otherwise indicated, the Contractor shall provide the shop drawings and documents specified in following clauses.

9.1.2 The numbers of sets of drawings and documents to be supplied shall be as indicated.

9.2 Shop Drawings And Documents:

9.2.1 Shop drawings and documents including diagrams and schedules shall show the details of the Contractor's proposals for the execution of the works and shall include everything necessary for the following purposes:

- a. To illustrate in details, the arrangement of the various sections of the works and to identify the various components;
- b. To integrate the works with the detail of the building and other installations.

9.2.2 Shop drawings shall include:

- a. General layout drawings showing the location of all equipment including cable; cable tray, conduit ducting and earth electrodes;
- b. Detailed layout drawings showing the location of all equipment including cable, cable tray, conduit and ducting in switch rooms and plant rooms;
- c. Assembly drawings of factory Built equipment and site built assemblies;
- d. Detailed layout drawings showing the connection of cable and conduit to equipment;

- e. Detailed layout drawings showing the connections through ceiling voids and vertical shafts;
 - f. System diagrams, circuit diagrams and wiring diagrams for all installations and equipment.
- 9.2.3 Diagrams shall comply with relevant IS. Interconnection diagrams shall indicate the type of cable, conductor size and terminal numbering.

9.4 As Built Drawings:

- 9.4.1 As-built drawings, including diagrams and schedules shall show all the information necessary so that each installation can be operated, maintained, inspected and tested so as to prevent danger, as far as is reasonably practicable. They shall incorporate the information necessary for the identification of the devices performing the functions of protection, isolation and switching, and their locations. The value of prospective short-circuit current and earth fault loop impedance at the origin of the installation shall be recorded on the appropriate system diagram.
- 9.4.2 Circuit details including loading, route, destination and where buried, the depth below finished ground level shall be shown for each cable, conduit, and ducting. Conductor size and material and the type of insulation of all cables shall be shown together with the number of cores in each cable, the number of cables in each conduit, trunking or ducting. Where identification is by colour of insulation or sheath, this shall be shown. Joints and draw boxes shall be shown.
- 9.4.3 Where incoming supply cables are installed by others, they shall also be shown as described in clause 17.4.2.
- 9.4.4 Drawings shall indicate whether conduit or ducting is surface mounted, concealed in ceiling, spaces in wall chases, in floor screeds or cast in situ.
- 9.4.5 All earthing conductors, main equip-potential bonding conductors, main earthing terminal or protective conductors and supplementary equip-potential bonding conductor shall be identified with function, origin route, destination, conductor size and material, type of insulation and where buried, the depth below finished ground level test points shall be indicated.
- 9.4.6 Earth electrodes shall be identified to their types, dimensions, material and depth below finished ground level. The nature of the soil and any treatment that has been given to it or special fill that has been used in the installation shall be identified
- 9.4.7 Details of each item of equipment including luminaires shall include electrical characteristics, classification, degree of protection against ingress of solids and liquids, class of protection against corrosion and manufacturer's name and reference.
- 9.4.8 Diagrams shall comply with 17.2.3 and they shall be supplemented with physical arrangement drawings to assist the location and identification of component parts of equipment.
- 9.4.9 During the course of the works, the contractor shall maintain a fully detailed record of all changes to ensure that the as-installed drawings are in all respects accurate.
- 9.4.10 Each drawing shall be in accordance with relevant IS to ensure suitability for micro-filming and shall be on durable translucent material, other than paper, of a standard size AO to A4 in accordance with relevant IS. The words 'AS-BUILT' shall be placed in 19 mm block letters adjacent to the title block of each drawing together with the name of the site and the section of the works, the title of the installation, the date of completion of the works, the Authority's contract number and the name of the Contractor.

9.4.11 A draft of each as built drawing shall be submitted to the Engineer-in-Charge before final issue is made.

9.5 Maintenance And Operating Instructions:

9.5.1 For each electrical installation, system and individual equipment forming part of the works, the maintenance and operating instructions shall include:

- a) A description of the extent and manner of operation, including duration periods of standby systems;
- b) A description of the method used for compliance with Regulation 413-3 of the IEE wiring Regulations together with time/current characteristics for all protective devices or automatic disconnection of supply.
- c) Copy of the inspection certificate and all the test records.
- d) A copy of any certificates of compliance with relevant standards or schemes as may be required.
- e) Comprehensive instructions for the switching on, operation, switching off and isolation, and for dealing with emergency conditions.
- f) Instructions for any precautionary measures necessary.
- g) Instructions for servicing, including frequency and materials to be used, to maintain the equipment in good and safe condition.
- h) The names and addresses of suppliers of all major components together with the type and model reference, serial number, duty rating and the order number and date.

9.5.2 Maintenance and operating instructions shall be indexed and contained in ring binders with stiff covers. The name of the site and the Authority's contract number shall be printed on the front and spine with, where more than one volume is necessary, a suitable identification title. The date of completion of the works shall be included on a flyleaf.

9.5.3 Copies of manufacturer's data may be incorporated to supplement the descriptions and instructions required in clause 17.5.1 but shall not replace them. Only data relevant to the works shall be included. Where non relevant data appears on the same sheet, it shall be clearly marked to show that it is not applicable. The data shall be cross referenced within the text and included in the index; if possible, it shall be contained in the ring binders, but where this is not possible, suitably protected box files or folder shall be provided, identified in accordance with clause 17.5.1.

9.5.4 A draft of the maintenance and operating instruction shall be submitted to the Engineer-in-Charge before the final documents are issued.

10.0 SAFETY REQUIREMENTS:

10.1 Scope:

10.1.1 Safety procedures as laid down in Indian Standards shall be strictly followed during erection and commissioning.

10.1.2 The safety provisions required under the IEE Rules shall be provided for which no extra payment shall be made.

SECTION – 9

TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

9.1 General

Work under this subhead is time-bound and has to be completed within the time limit set in the tender. Work shall be executed in accordance with an agreed schedule which shall be submitted by the tenderers along with offer and agreed to by owners.

9.2 Scope of Work

The scope of work in this subhead shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely do all work relating to the supply, installation, testing & commissioning of Fire Fighting Systems for Existing School Building at Delhi as described herein after and shown on the drawings. The scope of work in general shall include the following.

- i) Fire Fighting Pumps & Accessories and related electrical works
- ii) External & Internal Fire Hydrant System.
- iii) Hand Appliances

Without restricting to the generality of the foregoing, the work shall include the following:

A. Hydrant System Covering the entire complex and consisting of the following:

- i. Terrace Fire electric Pump of 450 LPM at 35 M pump for Dn. comer Internal Hydrant Systems
- ii. Other piping system ancillaries such as Suction and Delivery Headers, Air Vessel, Pressure Gauges, Pressure Switches, Pump Panel etc. as required.
- iii. Internal Hydrant system where required with single headed landing valves on each floor accompanied by 1 number swinging type Hose Reel, 2 numbers RRL Hoses, 1 numbers of Branch Pipe etc. all housed in the Hose Cabinet.

B. Hand appliance as per Bill of Quantities.

Approval of Drawings

To obtain the approval of the relevant schemes drawings before actual installation at site and to get the complete installation inspected and passed by the concerned authorities, as may be necessary as per local bye laws. (Any fee payable to the local bodies for such activities shall be reimbursed by the AAI on production of receipt).

9.3 Contractor's Experience

9.3.1 Contractors shall engaged specialist agency only for this work of Fire Fighting systems.

9.3.2 The selected specialist agency must have sufficient experience in the execution of turn-key projects as specified.

9.3.3 Contractor must submit with the tender a list of similar jobs carried out by him as required along with the name of works, name and address of clients, year of execution, capacity of plant and value of work.

9.4 Technical Information

9.4.1 Contractor shall submit along with the tender copies of detailed specifications, cuts, leaflets, and other technical literature of equipment and accessories offered by him.

- 9.4.2 Contractor's attention is specially invited to the special conditions and other clauses in the agreement which required the contractor to :-
- a. Submit detailed shop drawings.
 - b. Use material of specific makes and brands.
 - c. Obtain all approvals from Fire Fighting authorities.
 - d. Execute the entire work on a turn-key basis so as to provide a totally operating plant.

9.5 Exclusions

Work under this contract does not include the following work:-

- 9.5.1 Electrical cables up to incoming motor control centre.

9.6 Site Accessibility

- 9.6.1 The equipments are to be located in pump house located within the Plant room. On terrace Level
- 9.6.2 The equipment must be carried from the goods receiving station to the site in an extremely careful manner to prevent damage to the equipment building or existing services.
- 9.6.3 Contractor must visit the site and familiarize himself with above problems to ensure that the equipment offered by him are of dimensions that they can be carried and placed in position without any difficulty.

9.7 Approvals

The contractor shall prepare all submission drawings and obtain all approvals of fire fighting works from fire fighting authorities.

9.8 System Description

- 9.8.1 The Hydrant System shall comprise of AC motor driven pump set, for pressurisation with all required accessories including valves, special fittings, instrumentation, control panels and any other components required to complete the system in all respects.
- 9.8.2 The Hydrant System shall be automatic in action and shall be laid covering the entire area externally and all the floors internally with independent piping system.
- 9.8.3 The Hydrant System shall be kept pressurised at all times. The proposed Pump shall take care of the leakages in the system, pipe lines and valve glands.
- 9.8.4 The pressure in the hydrant pipe work shall be kept constant at 3. Kg/cm². In the event of fire when any of the hydrant valve in the network is opened, the resultant fall in header pressure shall start the AC motor driven fire pump through pressure switches automatically.
- 9.8.5 However, shutting down of the pump set shall be manual except for the Terrace Pump which shall start and stop automatically through pressure switches. In addition to auto start arrangements,
- 9.8.6 The piping for the hydrant system in the yard shall be laid in soil 1 Metre deep or in rectangular Trench. The pipe laid in soil shall be protected as specified in para 1.9.3 below. The scope of work includes necessary excavation of trench and back filling the same. The scope of work also includes necessary watering, ramming, removing the surplus earth from the site and construction of brick masonry pedestal at 3 Mtrs intervals. Pipes shall be cleaned before wrapping and coating.

9.8.7 The hydrants shall be placed at a regular spacing of 45m centre to centre. The following accessories are proposed near each yard hydrant.

- i) One no. gunmetal single headed hydrant valve.
- ii) Two nos. RRL Hoses of size 63mm dia x 15m long.
- iii) One no. gunmetal Branch pipe.

Gun metal hydrant valve, RRL hose and gunmetal branch pipe will be accommodated in a MS hose box mounted on brick pedestals.

9.8.8 The Internal Hydrant System (Dn. comer) shall be provided at points as indicated on the drawing on each floor.

9.8.9 The hydrant point shall be directly tapped from the Dn. take pipes, and shall be furnished with required accessories such as

- i) One no. gunmetal single headed hydrant valve.
- ii) Two nos. RRL Hoses of size 63mm dia x 15m long.
- iii) One no. first aid hose reel full swinging type 20mm dia x 30m long.
- iv) One no. gunmetal Branch pipe.

The hydrant dn. comer shall be terminated with air release valve at the highest points to release the trapped air in the pipe work.

9.8.10 To compensate for slight losses of pressure in the system and to provide an air cushion for counteracting pressure surges/water hammer in the underground pipe work Air Vessels shall be furnished in the pump room near fire pumps. The air vessel shall be normally partly full of water and the remaining being filled with air which shall be under compression when the system is in normal operation.

9.8.11 The entire Dn. comer System shall be fed from the water supply (Static O.H.Water Tank). The Bidder shall note that the Pump House is located adjacent to the Fire Water Tank.

9.9 GENERAL SPECIFICATIONS

9.9.1 Pipes and Fittings

Pipes for Dn. comer system shall be of black steel and heavy class. Pipes upto 150mm dia shall conform to IS-1239. Pipes with dia 200mm and above (6mm thick) shall conform to IS-3589. All pipes shall be **as per approved makes (C-class)**. Fittings for black steel pipes shall be malleable iron suitable for welding or approved type cast iron fittings with tapered screwed threads.

9.9.2 Jointing

Joint for black steel pipes and fittings shall be metal-to-metal tapered thread or welded joints. A small amount of red lead may be used for lubrication and rust prevention in threaded joints.

Joints between C.I. or black steel pipes, valves and other apparatus, pumps etc. shall be made with C.I. or M.S. flanges with appropriate number of bolts. Flanged joints shall be made with 3mm thick insertion rubber gasket.

Note: Joints for pipes and fittings upto 50mm diameter shall be threaded joints using Teflon Tape or equivalent bonding tape on the threads. Joints for pipe and fittings above 50mm diameter shall be welded joints.

9.9.3 Pipe Protection

- i. All pipes in under ground masonry trenches/service tunnels, above ground and in exposed locations shall be painted with one coat of red oxide primer and two or more coats of synthetic enamel paint of approved shade.
- ii. Pipes in wall chases shall be protected from corrosion by 2 coats of bituminous paints.

- iii. Protection of Underground Pipes: Corrosion protection tape shall be wrapped on M.S. Pipes to be buried in ground. This corrosion protection tape shall comprise of coal tar/asphalt component supported on fabric of organic or inorganic fibre and minimum 4 mm. thick and conform to requirement of IS : 10221 – code of practice for coating and wrapping of under ground mild steel pipe line. Before application of corrosion protection tape all foreign matter on pipe shall be removed with the help of wire brush and suitable primer shall be applied over the pipe thereafter. The primer shall be allowed to dry until the solvent evaporates and the surface becomes tacky. Both primer and tape shall be furnished by the same manufacturer. Corrosion protection tape shall then be wound around the pipe in spiral fashion and bounded completely to the pipe. There shall be no air pocket or bubble beneath the tape. The overlaps shall be 15 mm and 250 mm shall be left uncoated on either end of pipe to permit installation and welding. This area shall be wrapped in accordance with the manufacturer's recommendations. If applications is done in cold weather, the surface of the pipe shall be pre-heated until it is warm to touch and traces of moisture are removed and then primer shall be applied and allowed to dry.

9.9.4 Installation of Pipes

All pipes shall be adequately supported from ceiling or walls by structural clamps fabricated from M.S. structural e.g. rods, channels, angles and flats. All clamps shall be painted with one coat of primer and two coats of black enamel paint. The contractor shall provide inserts at the time of slab casting or provide suitable anchor fasteners.

The pipe supports or hangers shall be designed to withstand combined weight of pipe, pipes fittings, fluid in pipe and insulation. Pipe supports shall be of steel and coated with rust preventing paint and finished with two coats black enamel paint. The maximum spacing for pipes supports shall be as below:

Pipe (MM)	Spacing (MTR)	Size of support
Up to 25	2.0	6mm
32 to 65	2.4	8mm
75 to 125	2.7	10mm
150 & above	3.0	12mm

Pipes supports shall be spaced at maximum interval of 1.5 mtrs. on either side of heavy fitting and valves. Wherever piping passes through walls, pipes sleeves of diameter larger than that of piping shall be provided. Pipe sleeves shall be of steel or cast iron pipe.

The underground piping shall be supported with **brick masonry pedestral** blocks of suitable size and strength provided at an interval of 3.0 mtrs. The pipes shall be laid at 1 mtr depth (top of the pipe) and trench excavated for sufficient width. The rate for pipe shall include the scope of excavation/refilling the trench. 1:2:4 concrete thrust blocks are also to be provided at turning of pipe. The cost of installation includes concrete pedestals etc. as required and to be included in the item rate.

9.9.5 Orifice Flanges

Contractor shall provide orifice flanges fabricated from 6mm thick stainless steel plates on the branch lines feeding different zones/floors so as to allow required flow of water at a pressure of 3.5 kg/sq.cm. for each hydrants. The contractor shall design the orifices to ensure the required pressure.

9.9.6 Air release valve

The air release valve shall be in brass construction with nylon ball with in-built non-return valve. The valve shall be automatic type.

9.9.7 Valves & Other Accessories

9.9.7.1 General

Each valve body shall be marked with cast or stamped lettering giving the following information's:

- a) The manufacturer's name or trade mark
- b) The size of the valve
- c) The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters upto 50mm. For 65mm dia and above these shall be butterfly valves.

9.9.8 Full Way Ball Valve

The valves shall be of full bore type and of quality approved by the Engineer-in-charge. The body and ball shall be of copper alloy and stem seat shall be of Teflon.

9.9.9 Butterfly Valves

The valve shall be of cast iron conforming to relevant IS:13095. The valve shall be of quality approved by Engineer-in-charge.

9.9.10 Non-Return Valves

Non-return valves are to be IS:5318 manufactured from gun-metal or dezincification resistant brass.

9.9.11 Drain Valve

Drain Valves are to be provided at all low points in the system for draining the water. These shall be 40mm dia full way ball valve fixed on 40mm dia black steel pipe.

9.9.12 Inspection & Testing Assembly

Inspection and testing of the Hydrants system shall be done by providing an assembly consisting of gunmetal valves, gunmetal sight glass, bye-pass valve.

9.9.13 Pressure Switches

Pressure switches shall be differential type for operation of all pumps and for the various duties and settings required. Pressure switches shall be for heavy duty operation and of approved make. All pressure switches shall be factory calibrated.

9.10 External Fire Hydrants

Yard Hydrant valves shall be single headed as per IS : 5290. The valve shall be complete with hand wheel, quick coupling connection spring loaded type and gun metal blank cap. The Yard Hydrant shall be laid on 100mm dia Hydrant Ring Main, / down Comer branched off to 80 mm dia and Stand Post of 80mm dia.

9.11 Internal Landing Valves

The internal landing valves shall be double-headed made of gun metal and conforming to IS:5290. It shall be complete with hand -wheel, quick coupling connection spring loaded type and blank cap.

9.12 Hose pipes, Branch Pipes and Nozzles

Hose Pipe: Hose pipe shall be rubber lined woven jacketed and 63mm in diameter. They shall conform to type-2 (Reinforced rubber lined) of IS:639-1979. The hose shall be sufficiently flexible and capable of being rolled.

Each run of hose pipe shall be complete with necessary coupling at the ends to match with the landing valve or with another run hose pipe or with Branch pipe. The couplings shall be of instantaneous spring lock type.

Branch Pipe: Branch pipe shall be of gunmetal 63mm dia and be complete with male instantaneous spring lock type coupling for connection to the hose pipe. The branch pipe shall be externally threaded to receive the nozzle.

Nozzle : The nozzle shall be of gunmetal, 20mm in internal diameter. The screw threads at the inlet connection shall match with the threading on the branch pipe, the inlet end shall have a hexagonal head to facilitate screwing of the nozzle on to the branch pipe with nozzle spanner.

End couplings, branch pipes, and nozzles shall conform to IS:903-1985. two hoses of 15 mtr. Lengths with couplings shall be provided with each external (yard) hydrant. One nozzle and one branch pipe with coupling shall be provided with each yard hydrant.

9.13.1 External Fire Hose Cabinet

The external fire hose cabinet to accommodate the hose pipes, branch pipe nozzle and the hydrant outlets shall be fabricated from 1.5mm thick steel sheet. This shall be lockable and provided with center opening glazed doors.

The support for hose cabinet shall be of brick work up to a height of 0.5m above ground level. The depth of footing for this support shall be minimum 50cm below ground level, resting on leveling course of minimum 10cm of PCC (1:5:6). The brickwork shall be plastered in cement mortar (1:6). The hose cabinet shall be painted red and stove enameled.

9.13.2 Internal Fire Hose Cabinet

Each internal fire hydrant valve shall be housed in a cabinet of size indicated on drawings. Each internal fire hose Cabinet shall hold double headed hydrant, 2 Hoses and 1 Branch pipes and 1 no. first aid hose reel mounted on a drum.

- i. The cabinet shutters & frames shall be fabricated from boxed steel sections and MS plate 2mm thick.
- ii. The front glass of shutters shall be 5.0 mm thick clear glass and shall be held by means of rubber. Locking arrangement shall also be made with one number of mortice lock of approved make. A separate Key Box of 16 mm thick MS sheet with glass facing shall be provided.
- iii. The Shutter shall be given a powder coat finish in post office red colour.

9.14 Hose Reel

The hose reel shall be directly tapped from the riser through a 25 mm dia pipe, the drum and the reel being firmly held against the wall by use of dash fasteners. The Hose Reel shall be swinging type (180 degrees) and the entire Drum, Reel etc shall be as per IS:884. The rubber tubing shall be of approved quality and the nozzle shall be 6 mm dia shut off type.

9.15 Fire Brigade inlet Connections

One set of 2 ways collecting head Fire Brigade connection shall be provided at the location indicated in the drawing.

The inlet to the riser shall be with 100mm dia sluice valve and non-return valve. The scope shall include providing necessary reducers, tees bends and special fittings as required. Necessary enclosure made of 2mm thick sheet metal with support shall be provided, as in the case of hose cabinets.

9.16 AUXILIARY PUMPING EQUIPMENT (Terrace Pump)

9.16.1 Scope

This section covers the details of requirements of the auxiliary equipment necessary for the operation of the fire pumps and the wet-riser system.

9.16.2 Drive

The pump shall be directly driven from the electric motor. Flexible coupling and coupling guard shall be provided.

9.16.3 Capacity

The discharge and head of the Terrace pump shall be as mentioned in Bill of Quantities.

Terrace pump shall be Horizontal mono block/coupled type. The pump casing shall be of cast iron and parts like impeller, sleeve, wearing ring etc. shall be of non-corrosive metal like bronze, brass or gunmetal. The shaft shall be of stainless steel.

Bearings of the pump shall be effectively sealed to prevent loss of lubricant or entry of the dust or water. The pump casing shall be designed to withstand 1.5 times the working pressure.

9.16.4 Motor

The motor shall be squirrel cage A.C. induction type suitable for operation on 415 volts 3 phase 50 Hz, system. The motor shall be totally enclosed fan cooled type conforming to protection clause IP 21 of IS 4691. The class of insulation shall be B, synchronous speed shall be 2900 RPM The motor shall conform IS 325-1978 and rated for continuous duty.

9.16.5 Motor Starter

The motor starter shall be automatic star delta type with overload trip, but without under voltage/no volt trip. Starter shall conform to IS 1822-1967.

9.17 Pipe Work

The piping for exhaust outlet as well as fuel piping between fuel tank and the engine shall be with Medium class M.S.

9.18 Anti Vibration Mounting

Suitable vibration mounting duly approved by engineer-in-charge shall be employed for mounting the unit so as to minimize transmission of vibration to the structure. The isolation efficiency achievable shall be clearly indicated in the report, which will be submitted to engineer-in-charge before installation.

9.19.1 Incomer Section & outgoing section

Incomer section:

1 no. 63 amps TPN MCCB unit complete. One set of 96 mm square digital Ammeter (0-200 Amps) complete with built in selector switch and CTS. One set of 96 mm square digital Voltmeter with built in selector switch (0 - 500 V) complete with control fuses and selector switch. One set of phase LED indicating lights with control fuses. One set of 4 strips of 63 Amps aluminium busbars.

Outgoing feeder

One number of 63 Amps rated TPN MCCB (25 KA, Ics = Icu) unit- complete, ML 1.5 type Contactor for D O L starting with overload relay, start and stop button, digital Ammeter, CTS and selector switch, phase indicating lights, Auxillary contacts for interlocking/sequence of operation, control terminals complete in all respect for Terrace Fire Pump Pump.

- i. Control Wiring from Pressure Switches of different settings in Terrace Fire Pumps, for sequence of operation shall be included to complete the system.
- ii. Colour code with ferrule marking shall also be made.
- iii. The cabling shall be PVC insulated FRLS and aluminium / copper conductor cable of 1100 volts grade conforming to IS as required from Fire Pump Board to motor and cable of suitable size as per BOQ.

9.19.2 Electric Fire Pump Section

This section shall incorporate the following facilities.

- a. Suitable capacity MCCBS
- b. Control system components and equipment such as relays, contractors, timers etc. for automatic operation.

- c. Starter Unit, Current Transformer and digital ammeter.
- d. LED Indication lamps, their fuses, terminal block, push buttons, control and selector switches etc. are as required.
- e. Pump lock out devices due to faults or abnormalities as specified in operating sequence.
- f. **Visual/audio alarms, indications and communications facility as specified in operating sequence.**
- g. **Necessary inter-connection and control wiring etc.**

9.19.3 Engine Section

The engine section shall incorporate the following facilities:

- i. Control system components and equipment such as relays, contractors, timers etc. for automatic operation.
- ii. Instruments, indicator lamps, fuses terminal blocks, push buttons, control and selector switches etc. as are required.
- iii. Engine shut down and block out devices due to faults or abnormalities as specified.
- iv. Visual/audio alarms and indications as specified.
- v. Inter-connection and control wiring etc.

9.19.4 Auxiliary Pump Section

The auxiliary pump section for jockey pump shall incorporate the following:

- a. TP&N MCBS.
- b. Control system components such as relays, times, contractors, etc. as are necessary for functional requirements.
- c. Starter unit, current transformer and ammeter.
- d. Indication lamps, fuses, terminal blocks, push buttons selector, switch etc. as required.
- e. Inter-connections and control wirings etc.

9.19.5 Control Section

This section shall incorporate the following:-

- a. Control components integrating the various sections, so as to satisfy the functional requirements.
- c. Visual/audio alarms, not covered in individual sections.
- d. Lamps healthy test facility.
- e. Instruments, indicating lamps, push buttons, fuse terminal blocks etc. as are required.
- f. **Test facility to simulate operation of hydrants.**

9.19.6 Other Control Components

9.19.6.1 Pressure Switches

Pressure switches shall be provided for switching on and off the pressurization pump at preset pressures and also for switching off the fire pump at preset pressure. Being the main component for initiating the signal for the operation of the pumps, the pressure settings shall be totally reliable, sturdy in construction and of long life. The pressure settings shall be adjustable.

9.19.6.2 Power Supply for Controls

In order to ensure that the control systems remains co-operational at all times the control system shall be designed for 24 VDC operation fed from the battery. This shall be independent of the starting battery for the engine i.e. battery shall remain trickle charged at all times from the separate battery charger at the control section.

9.19.7 Electrical Work and Earthing

Scope

This section covers the detailed requirements of electrical works including earthing, for the materials installation.

Electric power supply shall be terminated in the incoming switch gear of the power and control panel by the Department. All further connections to the various components of the system shall be the responsibility of the contractor, for a complete and working system, satisfying all the functional requirements.

The scope shall particularly include the following :

Power and Control Panel(s) as given in relevant section.

All inter-connections with multi-core armoured copper cables of size suitable between various control units and control panel(s).

All power cable connections with multi-core armoured aluminium cables of size as specified in BOQ, between panels, motors etc.

Necessary earthing with 2 Nos. G.I. plate electrodes and loop earthing.

The work shall be carried out conforming to CPWD General Specifications for electrical works part-I (Internal) amended up to date and part-II (External) amended upto date.

9.19.8 Operating Sequence for the Fire Fighting System

- 1 The operating pressure in the mains is to be maintained at 3.5kg/cm².
- 2 The Terrace pump shall start automatically the moment pressure drops to 3.5 kg/cm² because any leakage or minor draw-off from the system and stop when the pressure reaches 3.5 kg/cm² again.
- 3 The control panel shall have status selection for the pumps for “automatic” as well as “manual” operation.
- 4 Pumps when under “manual” status shall be operated manually through relevant push buttons.
- 5 The fire pumps once started shall not be stopped automatically.
- 6 The fire pumps shall be locked out for operation both for “manual” and “automatic” operations, once the low water controls operates and furnish an audio and visual alarm on the panel the audio alarm can be silenced by accepting the alarm. The visual alarm shall be individual for each equipment. It shall be flashing type and on acceptance remain steady. A reset button shall be provided for each pump for returning the pump for fire duty.
- 7 Over load or under voltage/no volt trip devices for electric fire pump shall not be provided in the starter. LED type indication lamps to indicate the availability of power shall be provided.
- 8 Once tripped the electric fire pump shall remain locked out for operation irrespective of the position of its operational status selection switch. Look out indication shall be available on the panel.

- 9 Return to normal operational availability shall be feasible only by manual re-set of locked out units by operation of appropriate push buttons.
- 10 When fire pumps are brought into operation an audible tone from turbine type alarm operated by water flow in the mains shall be provided to indicate the healthiness of the system. The healthy running alarm shall not be silenced till the fire pump is shut down, but the tone may be mellowed by the operation, if required.
- 11 Alarm for failure and lock out of any pump shall distinct from "healthy" alarm. Failure alarms shall be loud and can be silenced on acceptance.
- 12 Repeat indication of various audio and visual indications on a slave remote panel in fire control room in terminal building shall be available. The slave Remote panel shall have indication lamps to show the status of :

- a) Power healthy in fire pump on terrace
- b) Terrace pump 'ON'

The slave Remote panel shall also have a hooter, which shall sound in case, any pump is 'ON'. The slave Remote panel shall have a provision to reset the hooter with the help of a push button.

13. Testing

Initial Testing

- i. During laying of pipes, the same shall be subjected to 3.5 kg./cm² hydraulic pressure for a period of 24 hours, in sections.
- ii. After completion of the work, all valves/fittings shall be installed in position and entire systems shall be tested for 24 hours at a pressure of 3.5 kg/ cm². The drop of pressure up to 0.5 KG/cm² shall be accepted.

Final Testing

- i. After completion, all operation checks as per para 2.4.1.14 shall be carried out for automatic operation of the systems. For this purpose, landing valves may be opened at different locations. The exercise shall be repeated couple of times to ensure trouble free operation of the system.
- ii. Flow Test :- The design flow of pumps shall be checked. The pump shall be operated after opening a number of landing valves at different locations. Design pressure is to be maintained in the Terrace . Water discharge is to be measured by drop in level in O.H. tank for a certain period. All pumps shall be tested one by one. The flow rate shall be not less than as specified while maintaining the design pressure in pump house.
- iii. Inspection by Local Fire Officer

After completion of the work and testing to the entire satisfaction of Engineer-in-Charge, the installation shall be offered for inspection by Chief Fire Officer or his representative. Testing as desired by the Fire Officer shall be carried out. The contractor will extend all help including manpower during testing. The observation of Chief Fire Officer which are a part of agreement shall be attended by the contractor. Noting extra is to be paid for testing as above.

14. Commissioning:

- i. Flushing the System :- Before commissioning, the entire system shall be flushed to ensure that any earth/foreign matters which might have entered during installation are taken out. For this, pump may be operated and valves opened at different locations.
- ii. As soon as the work is complete, the system shall be commissioned and made available for use. Requirement of fire fighting installations is equally important during occupation of the building. If the building is to be occupied in part, fire fighting system of building completed shall be commissioned by isolating the system of under construction portion of the building.
- iii. The fire fighting system shall be maintained and manned from the very first day of its commissioning.
- iv. Any defects noticed during the warranty period shall be promptly attended by the contractor and availability of the system at all time is to be ensured.

9.20 Battery Charger

Necessary float and boost charger shall be incorporated in the control section of the power and control panel to keep the battery under trickle condition. Ammeter to indicate the state of charge of the batteries shall be provided.

9.21 POWER AND CONTROL PANEL AND OTHER CONTROL COMPONENTS

9.21.1 Scope

This section covers the detailed requirements of the power and the control panel for the wet riser system, and also for the various control components in the system.

9.21.2 Power and Control Panel

- i **Constructional Requirements:** General Features The power and control panel shall be totally enclosed, free standing floor mounted cubicle type, fabricated out of sheet steel not less than 2mm thick. Where necessary, additional stiffening shall be provided by angle iron framework. General construction shall be of compartmentalization and sectionalisation such as mains incomers, electric fire pump, diesel fire pump, pressurization pump, and control, so that there is no mix up of power and control wiring and connections in the same sections as far as possible. The panel shall also have the space for cable alleys. The space for cable alleys shall be at least 200mm wide to the entire depth of panel. The panel shall be front operated type with all connections accessible from the front. Front doors shall be hinged type. Back doors shall be hinged type or removable type for inspection. The door hinges shall be of concealed type. The doors for busbar chamber shall be of removable type with the help of bolts. The doors shall be provided with quick fixing doors knobs with indication. The general arrangement of the panel shall be got approved before fabrication the cubicle construction shall be to IP 21 as per IS:2147.
- ii **Cable entries and gland plates**
All cable entries shall be through gland plates which are removable and sectionalized. Where heavy cables are brought in and terminated, suitable clamps shall be incorporated to relieve the stress on the glands due to the weight of the cable. Cable entries may be from top or bottom depending on the equipment layout and cable scheme as approved.
- iii **Busbar and Connections**
The busbars shall be air insulated, and of aluminium of high conductivity electrolytic quality (grade E 91 E to IS: 5082) and of adequate cross section. Current density shall not exceed 1.3 amps. Per sq.cm. All connections to individual circuits from the busbars shall preferably be with solid connections. The busbars and the connections shall be suitable covered with PVC sleeves or in an approved manner. Busbars shall be suitably supported using non-hygroscopic insulated supports. High tensile bolts and spring washers shall be provided at busbar joints.

iv Earthing Arrangement

GI strip 25mm x 5mm shall be run at the rear of the board. 2 nos. earth terminals shall be provided at the ends of the GI strip for connection to earth system.

v Terminal Blocks and Small Wiring

Terminal blocks shall be of heavy duty type and generally not less than 15 amps 250V grade upto 100V, and 600V grade for the rest of the functions. They shall be easily accessible for maintenance. All control wiring inside the panel shall be with PVC insulated copper conductor of 2.5 sq.mm. size and 600V grade conforming to IS:694-1977. Suitable colour-coding may be adopted. Wiring harness shall be neatly formed and run preferably function wise, and as far as possible segregated voltage wise. Identification ferrules shall be used at both ends of the wires.

vi Instruments and Lamps

All indication lamps and instruments shall be flush mounted type in front of the panel. The voltmeter and ammeter shall be of size 100mm nominal (dial size) conforming to clause 1.5 of IS 1248 for accuracy.

Current transformers shall be provided with ammeters.

Indicating lamps to indicate the availability of electric supply shall be provided at the incoming section. Necessary indicating lamps for alarm indications and battery charging shall be provided in the respective sections.

All indicating lamps and meters shall be protected with HRC cartridge type fuses.

vii Labels

All internal components shall be provided with suitable identification labels. Suitably engraved labels shall be fixed at the panel for all switches, instrument push buttons, indicating lamps etc.

viii Painting

The entire panel shall be given a primer coat of red lead after degreasing and phosphating treatment and 2 coat of final paint of approved shade before assembly of various items.

9.21.3 Equipment Requirements

The power and control panel shall comprises individual section for the various equipment's of the system and controls, in a combined cubicle type design. All switches, MCCBS, MCBS and fuse/fuse switch units shall be conforming to relevant IS.

9.22 Standards and Codes

1.	IS – 1648 – 1961	Code of Practice for fire safety of building (general) firefighting equipment and maintenance.
2.	IS – 3844 – 1966	Code of practice for installation of internal fire hydrant in multi-stores building.
3.	IS – 2217 – 1963	Recommendation for providing first aid and fire fighting arrangement in public buildings.
4.	IS – 2190 – 971	Code of practice for selection, installation and maintenance of portable first fire appliance.
5.	IS – 3589	Electrically Welded Steel pipes
6.	IS – 1239	Mild steel tubes, Tubules and other wrought steel fittings
7.	IS – 780	C.I. Double flanges sluice valve.
8.	IS – 778	Gun Metal Valves
9.	IS – 909 – 1965	External fire hydrant (underground)
10.	IS – 5290 – 1969	Internal Landing Valve
11.	IS – 884 – 1969	First and hose reel
12.	IS – 934 – 1976	Specification for portable chemical fire extinguisher soda acid type.
13.	IS – 2878 – 1969	Specification for fire extinguisher for carbon dioxide
14.	IS – 2189 & 2109	Automatic fire alarm system or BSS 3116.
15.	NBC	National Building Code.-2016 (Part-IV)
16.	CPWD Specifications	CPWD Specification - 2018

Items Technical Specification are specified for the entire fire fighting system. However if some items specifications are not mentioned same shall be dealt in conjunction with NBC-2016 & CPWD Specification – 2018 whichever is superior.

9.23 LIST OF APPROVED MAKES OF MATERIAL

<u>S.No</u>	<u>Description</u>	<u>Make of Material</u>
1.	MS Pipes	Tata/Jindal Hissar/Prakash Surya
2.	Malleable M.S. fittings	Jansons/V.K./DRP
3.	Butterfly Valve	Audco / Zoloto /Sant
4.	CP GM Ball Valve	Zoloto / Audco / Sant
5.	Air Release Valve	Sukan /Leader/Sant
6.	Fire Hydrant Valve	Padmini / Minimax /Newage
7.	RRL Hose	Padmini / Minimax /Newage
8.	Branch Pipe	Padmini / Minimax /Newage
9.	GM Coupling	Padmini / Minimax /Newage
10.	Pumps	Mather Platt/ Kirloskar /KSB
11.	Fire Extinguishers	Padmini / Minimax /Newage
12.	Rubber Tube for Hose reel	Padmini / Minimax /Newage
13.	Paint	J&N / Nerolak / Asian
14.	Welding rods	Victor / Maruti / Advani
15.	Fasteners (Galvanised)	Chilly/Canon / Fishers / Hilti
16.	Dash fastners/clamps	Cannon/Chilly / Fishers / Hilti
17.	Hose Box/Hose reel drum	Padmini / Minimax /Newage
18.	Anti vibration pads	Kanwal / Dunlop
19.	Mechanical Seal	As per OEM Cert./ Duramat
20.	GM Siemese Connection	Geetach / Minimax / Pandmini
21.	Draw out Connection	Padmini / Minimax /Newage
22.	Pressure switch	Indfoss
23.	Pressure Gauge	H.Guru / Fiebig
24.	Cables/wire	Kalinga / National / Polycab
25.	PVC conduit	AKG/BEC /Polycab
26.	Switch Gear	L&T / Siemens
27.	Non-Return Valve	Audco / Zoloto /Sant
28.	GI Hangers	Chilly/GMGR
29.	Flow Switch	Wika/Approved equal
30.	Sprinklers	Tyco/Grinnel/HD
31.	Flexible Rubber Expansion Joint	Kanwal Easyflex/Resistoflex
32.	`Y' strainer	Emerald Enterprises / Zoloto/Kartar
33.	Level Controller & Indicator (Water)	Advance Auto/Technika / Minilec

Notes:

1. The Contractor shall endeavour to supply ISI marked material of the first/preferred make/brand listed above. If for any reason the first/preferred make/brand is not available then the contractor may choose any of the makes or brands indicated above after taking approval of the Engineer in charge / Architect. In case ISI marked material for any of the brands is not being manufactured by the firm(s), first quality material shall be accepted. The samples of the material in either case must be approved by the Architect/Engineer.
2. Material where no make/brand has been mentioned, ISI marked samples shall be submitted by the Contractor for approval of Architect/Engineer. For those classes of materials, where no firm exists with ISI approval, sample of first quality material of the firm shall be submitted for the approval of the Engineer.
3. Any variation from the above-mentioned makes / brands will require specific approval of Architect/Engineer.

APPENDIX SHOWING IMPORTANT SCHEDULES		
1.	Signing Of Agreement	Within 7 days of issue of letter of intent / order (clause 1.8)
2.	Commencement Of Work	Immediately within seven days of issue of letter of intent / order (clause 5.3.1)
3.	Period Of Completion	12 Months from date of issue of letter of intent / order (clause 1.1)
4.	Liquidated Damages	0.5% of Contract value per week subject to a maximum of 5% of the contract value (clause 5.2.26)
5.	Period Of Value Of Running/ On Account Bill	Monthly if not less than Rs.30.00 Lakhs (Clause 5.5.2 (i-v))
6.	Security Deposit	10% of the contract value. Recoveries will be made @ 10% from each Running Account / On Account Bill (Clause 5.2.18)
7.	Refund Of Security Deposit	1 st installment equal to 50% of the security deposit after 180 days of the virtual completion of the entire work. (clause 5.2.19(i)) 2 nd installment equal to 50% viz., balance of the security deposit after thirty days of expiry of defects liability period. (clause 5.2.19 (ii))
8.	Secured Advance	75% of the material brought to site for the express consumption in this project.
9.	Income Tax And Work Tax & Sales Tax Deduction	At prevailing rate from each bill.
10.	Defects Liability Period	12 months after completion of work (clause 5.5.5)
11.	Period Of Final Measurement	Three months after virtual completion of work. (clause 5.5.3)
12.	Rate for Extra, Additional or Altered or Substituted work	If the rates for altered, additional or substituted work cannot be determined in the manner specified in sub-clause 5.4.2 (i) and (ii), the rates for such items will be worked out on the basis of rates given in BSR 2013 Ajmer. The rates for additional, altered and substituted work shall be paid as per BSR 2022 Jaipur as applicable to Ajmer @ % above/below.