

**Vaidyaratnam P.S Varier's
ARYA VAIDYA SALA KOTTAKKAL**

TENDER DOCUMENTS

FOR THE
CONSTRUCTION OF THE PROPOSED NEW BRANCH BUILDING

AT VADAKKANTHARA, PALAKKAD

Submission of Tender - 03.03.2025 at 2.00 p.m
Opening of Tender - 03.03.2025 at 3.30 p.m
PAC - 1.50 Crore (Including GST)

Architects

MODARCHS CONSULTANTS INDIA (P) LTD

Modarchs Centre
27/935 A, Near Supplyco Flats
Panampilly Nagar
Cochin - 682 036

TENDER SUBMITTED BY

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**Viadyaratnam P.S Varier's
ARYA VAIDYA SALA
KOTTAKKAL**

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NOTICE INVITING TENDER

To

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Dear Sir,

**Sub: Tender Document for the Construction of Proposed Branch Building For
Arya Vaidya Sala Kottakkal at Vadakkanthara, Palakkad District.**

1. We enclose herewith the above Tender along with the Drawings and invite you to submit your unconditional item wise tender for the building on the enclosed Tender Form based on the documents and information referred to in the Tender form.
2. Tender Documents can be downloaded from the website www.aryavaidyasala.com from 21.02.2025 to 03.03.2025
3. When the tender form is completed, signed and dated, it must be delivered, in a sealed envelope, to the address The Arya Vaidya Sala, Kottakkal – 676 503, Malappuram District.
4. Together with the tender form you must return the Tender Schedule Specifications and Drawings duly stamped and signed by you.
5. Tenderer's special attention is further drawn to the following conditions of contract:
 - a) Clause 16.4 (a) which provides for payment of Secured Advance.
 - b) Clause 16.3 which stipulates requirements of security deposit and retention money deductions.
 - c) Clause 13 on Compensation for Delay.
 - d) Conditions Regarding Furnishing of Performance and Indemnity Bond.
6. Notices to Tenderers

The procedure of submission and opening of tenders as mentioned in the "Instructions in Regard to Submission of Tenders" attached with this tender should be read carefully and the necessary papers submitted complete in all respects.

7. Confidentiality of Tender

You must not tell anyone what your tender price is or will be, even approximately, before the time limit for delivery of tenders. The only exception is if you need any insurance quotation to calculate your tender price. You may give your insurance company or brokers any essential information they ask for, so long as you do so in strict confidence. You must not try to obtain any information about anyone else's tender or proposed tender before the time limit for delivery to tenders. You must not make any arrangement with anyone else about whether or not he should tender, or about his or your tender price.

8. Incomplete or Conditional Tenders

This is an unconditional tender and any tender accompanied by any condition is liable to be rejected.

9. The tenderers are, however, expected not to propose any alterations to any of the conditions in the Tender. The stipulated conditions embodied in the Tender shall be binding on the tenderers and we may refuse to consider any tender which is incomplete or conditional.

10. Visiting the Site.

Tenderers who wish to visit the site before tendering can visit the site along with owner's representative with prior permission. Nobody will be allowed to visit the site without prior permission from the owner. **Pre-bid meeting is schedule at M/s.MODARCHS CONSULTANTS INDIA (P) LTD, Shekharipuram, Palakkad on 27.02.2025(Thursday) AT 2:00 PM**

11. A tenderer shall be deemed to have full knowledge of the site, whether he inspects it or not and no extra charges consequent on any misunderstanding or/otherwise shall be allowed. Submission of a tender by a tenderer implies that the has made himself aware of the local conditions and other site factors bearing on the execution of the Work.

12. The acceptance of any tender shall rest with the Owners who do not bind themselves to accept the lowest or any tender received without assigning any reason whatsoever. The Owner also reserve the right to reject or accept the whole or any part of a tender.

13. All statutory levies including Sales Tax, excise duty, octroi, royalty or any other tax, duty or levy on material and works contract tax, service tax (GST) in respect of this

contract shall be payable by the contractor and the Owner will not entertain any claim whatsoever in this respect.

14. The Tenderer shall submit an Income Tax Clearance Certificate in prescribed form along with his tender or before acceptance of tender.

15. Opening of Tenders

15. Sealed tenders will be received on or before 03.03.2025 up to 2.00 P.M at the office of The Joint General Manager, Arya Vaidya Sala, Kottakkal – 676 503, Malappuram District. The tenders will be opened on the same day at **3.30 P.M** in the presence of Tenders who wish to be present.

Tenderers should ensure that their tenders are received before the date and time specified as no. consideration shall be given for postal or any kind of delays.

Yours faithfully,

The Arya Vaidya Sala,
Kottakkal – 676 503,
Malappuram District

TENDER FORM

**Tender Document for the Construction of Proposed New Branch Building For Arya
Vaidya Sala, Kottakkal at Vadakkanthara, Palakkad District.**

**To be returned by 2.00 P.M. on 03.03.2025
and to be opened at 3.30 P.M on 03.03.2025**

To

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From

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1. We have read and examined the following documents as received by us:

- (1) Notice Inviting Tender.
- (2) Instruction To Tenderer.
- (3) Conditions of Contract of the tender document.
- (4) Supplementary Condition Number 1.
- (5) Technical Specifications.
- (6) Bill of Quantities
- (7) Drawings.

We are well aware and are familiar with CPWD/KPWD Specifications, BIS publications and National Building Code which shall apply to this contract to supplement any missing details in this contract.

2. Further to the above, we have visited and examined the site of the proposed works and have acquired the requisite information relating thereto as affecting the tender invited by you.

3. We agree that any other terms or conditions of contract or any general reservation which may be printed on any correspondence emanating from us in connection with this tender or with any contract resulting from this tender shall not be applicable to this tender or to the contract.

4. We have obeyed the rules about confidentiality of tenders and will continue to do so as long as they apply.

5. Subject to and in accordance with paragraphs 3 and 4 above and the terms and conditions contained or referred to in the documents listed in paragraph 1, we agree and offer to execute all the Works referred to in the said documents upon the terms and conditions contained or referred to therein at rates as given below, and to carry out such deviations as may be ordered to be valued as per the conditions of contract:

6. We undertake to complete and deliver the whole of the works within a period as specified in the contract. Time allowed for completion of entire job or part job assigned shall be reckoned from the 7th day after the date of written order to commence work. We shall be under the obligation to pay the sum as stated in the contract for every day that the works shall remain incomplete, damages as compensation subject to the conditions of contract relating to extension of time.

In the event of the tender being accepted:-

We do agree to pay an amount of Rs..1000/ against the tender free in the form DD/ Pay order while submission of the filled Tender

We do agree to pay to M/s. Arya Vaidya Sala, Kottakkal within **SEVEN days** of the date of acceptance of the tender another sum equal to 2% of the accepted contract sum as initial security deposit by demand draft/pay order. 50% of this initial security deposit will form the part of the retention money shall be returned/refunded after issue of virtual completion certificate by the Owner/ Architect against Bank Guarantee. The balance amount will be released after satisfactory completion of defect liability period of one year from the virtual completion without interest.

We further agree to the deduction of 8% from interim payments as retention money limited to a maximum of 15 lakhs (including Initial Deposit). The release of this retention money shall also be as that laid down for initial security deposit.

Validity of Tender - Tender shall remain valid for 60 days from the date of submission. The Owner is not bound to accept the lowest or any tender, without assigning any reasons whatsoever.

Work may be split up in more parts or parts combined if so desired by the Owner without assigning any reasons whatsoever.

Signed in the capacity of duly authorised to sign tenders for and on behalf of

Address

Telephone No
Mobile No

INSTRUCTIONS IN REGARD TO SUBMISSION OF TENDERS

NOTE: Tenderers are requested to note that non-compliance of the following instructions is liable to render their tenders non-bonafide.

1. Address to which the Tender is to be submitted **Arya Vaidya Sala, Kottakkal,**
Civil Engineering Department
Post. Kottakkal – 676 503
Malappuram District.

2. Last date for receipt of tenders 03.03.2025

3. The different Schedule should be filled as follows:
 - a) The "Rate" Column wherever applicable to be legibly filled in ink in both figures and words. If any discrepancy in the rates quoted in the figures and words, the rate in words shall be accepted.

 - b) The "Amount" Column also to be legibly filled in ink in both figures and words.

 - c) All corrections to be initialled.

4. Bank Guarantee or cheques shall not be accepted for initial security deposit.

The tender shall be signed and dated at all places provided therein. Also all pages, drawings and corrections/alterations shall be initialled. The tender submitted on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract.

CONDITIONAL OFFER

5. Any tenderer who proposes alterations to any of the conditions/specifications laid down in the tender documents or proposes any new conditions, whatsoever is liable to be rejected.

6. Procedure for submission and opening of tenders:
 - a. Tenderers must be submitted on the tender documents issued by the Accepting Officer. Intimation to tender quoted by a letter, telegram or telex will not be accepted.

 - b. Tenderers are expected not to propose any alterations to any of the conditions laid down in the tender. Stipulated conditions embodied in the tender shall be binding on the tenderers.

7. Drawings must be returned along with the tender documents duly stamped and signed by the tenderer.

8. A proposed CPM (Critical Path Method) chart for the work schedule should be submitted along with the tender and detailed chart shall be submitted within 7 days of communication of acceptance of tender.

VALIDITY OF TENDERS.

9. Tenderers should note that their tenders should remain open for consideration for a minimum period of 60 days from the last date fixed for the receipt of tenders.

10. The contractors are advised to get themselves registered under scheme of GST Registration.

11. The Tenderers shall submit their Bio-data and experience in executing similar work in detail along with the tender.

SUPPLEMENTARY CONDITION NUMBER - 1

On the acceptance of his tender, the contractor will be required to execute an Indemnity Bond in favour of the Owners against third party claims, civil or criminal complaints, site mishaps and other accidents or disputes, against any damages, loss or expenses due to or resulting from any negligence or breach of duty on the part of the contractor, his sub-contractors or his employees and agents etc. as per the appropriate Indemnity Bond attached.

INDEMNITY BOND

KNOW all men by these presents that We..... do hereby execute Indemnity Bond in favour of Managing Trustee, The Arya Vaidya Sala, Kottakkal. On this day of 2025.

WHEREAS the ----- have appointed as the Contractors for their construction of **Proposed New Branch Building for Arya Vaidya Sala, Kottakkal at Vadakkanthara , Palakkad.**

THIS DEED WITNESS AS FOLLOWS:

I/We..... We hereby do Indemnify and save harmless The Arya Vaidya Sala at Kottakkal against and from:

1. Any third party claims, civil or criminal complaints/liabilities, site mishaps and other accidents or disputes and/or damages occurring or arising out of any mishaps at the site due to faulty work, negligence, faulty construction and/or for violating any law, rules and regulations in force, for the time being while executing/executed works by me/us.
2. Any damages, loss or expenses due to or resulting from any negligence or breach of duty on the part of me/us or my sub-contractor/s if any, servants or agents.
3. Any claim by an employee of mine/ours or of sub-contractor/s if any, under the Workmen's Compensation Act and Employer's Liability Act, 1939 or any other, law, rules and regulations in force for the time being and any Acts replacing and/or amending the same or any of the same as may be in force at the time and under any law in respect of injuries to persons or property arising out of and in the course of the execution of the contract work and/or arising out of and in the course of employment of any workman/employee.

4. Any act of commission or omission of mine/ours of sub-contractor/s if any. Our/their servants or agents which may involve any loss, damages, liability, civil or criminal action.

IN WITNESS WHEREOF
THE
has set his/their hands on this day of.....2025.

SIGNED AND DELIVERED BY THE
AFORESAID.....

NAME AND ADDRESS
(Contractor)

IN THE PRESENCE OF WITNESSES:

1)

2)

SAFETY CODE

The Contractor has to take all safety measures and shall be liable to compensate to the owner for not taking any safety measures.

A. CONTRACTOR'S BARRICADES:

Contractor shall erect and maintain barricades required in connection with his operation to guard or protect as per norms specified.

- a) Excavations and blasting work (if permitted by the concerned authority)
- b) Hoisting areas
- c) Area adjudged hazardous by Contractor or Owner's inspectors.
- d) Owner's existing property subject to damage by Contractor's operations.
- e) Rail road unloading spots if provided.

Contractor's employees and those of its sub-contractors shall become acquainted with Owner's barricading practice and shall respect the provisions thereof.

Barricade and hazardous areas adjacent to but not located, in normal routes of travel shall be marked by red flashed lanterns at nights.

B. SCAFFOLDING:

i. Suitable scaffoldings should be provided for workmen for all work that cannot safely be done from the ground or from solid construction except short period work as can be done safely from ladders. When a ladder is used an extra Mazdoor shall be engaged for holding the ladder and if ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1 in 4 (1 horizontal and 4 vertical).

ii. Scaffolding or staging more than 4 metres above the ground or floor swing suspended from an over-head support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise secured at least 3' high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

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

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

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

C. **EXCAVATION AND TRENCHING:**

All trenches 1.2 metres or more in depth, shall at all times be supplied with at least one ladder for each 50M length or fraction thereof.

Ladder shall be extended from bottom of the trench to at least 1M above other surface of the ground. The sides of the trenches which are 1.5M in depth shall be stepped back to give suitable slope or securely held by timber bracings, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5Mtr of the edge of the trench or half of the trench width whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

D. **DEMOLITION:**

i. Before any demolition work is commenced and also during the progress of the work, all practical steps shall be taken to prevent damages to any person including building limited to:

a) All roads and open areas adjacent to the work site shall either be closed or suitably protected by all means.

b) No electric cable or apparatus which is liable to be a source of danger shall remain electrically charged.

c) All practical steps shall be taken to prevent danger to person employed from risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

E. All necessary personal safety equipment as considered adequate by the Architect, should be kept available for the use of persons employed on the site and maintained in condition suitable for the use of the persons employed on the site and maintained in condition suitable for immediate use, and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

a) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

b) Those engaged in white washing and mixing or stacking of cement bags or any materials which are injurious to the eyes shall be provided with protective goggles.

c) Those engaged in welding and cutting works shall be provided with protective face and eye shields, hand gloves etc.

d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

e) When workers are employed in sewers and manholes, which are in use, the contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable tailing and provided with warning signals or board to prevent accident to the public.

f) The Contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the

age of 18 years are employed on the work of lead painting, the following precautions should be taken:

1. No paint containing lead or lead product shall be used except in the form of paste or ready-made paint.

2. Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scraped.

3. Coveralls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash them during and on cessation of work.

F. Use of hoisting machines and tackles including their attachments, and supports shall conform to the following standard or conditions:

a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defect and shall be kept in good working order.

b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

c) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to the operator.

d) In case of every hoisting machine and of every chain ring hook shackle swivel and pulley block used in hoisting or luring or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gears referred to above shall be plainly marked with the safe working load of the conditions under which it is applicable which shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

e) In case of departmental machine, the safe working load shall be notified by the Architect. As regards Contractor's machines, the Contractor shall notify the safe working load of the machine to the Architect whenever he brings any machinery to site of work and get it verified by the Engineer concerned.

G. Motors, gearing transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Housing appliances should be

provided with such means as to reduce to the minimum the accidental descent of the load, adequate precautions should be taken to reduce to the minimum the risk of any part or any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installation which are already energised, insulation mats, wearing apparel, such as gloves, sleeves, and boots as may be necessary should be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

H. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

J. These safety provision should be brought to the notice of all concerned by displaying on a notice board at a prominent place at the work-spot. The person responsible for compliance of the safety code shall be named therein by the Contractor.

K. To ensure effective enforcement of the rules and regulations relating to the safety precautions, the arrangements made by the Contractor shall be open to inspection by the Owner or Architect or their representatives.

L. Notwithstanding the above clauses there is nothing in these to exempt the contractor from the operations of any other Act or rules in force in the Republic of India. The works throughout including any temporary works shall be carried out in such a manner as not to interfere in any way whatsoever with the traffic on any roads or footpaths at the site or in the vicinity thereto or any existing works whether the property is of the Administration or of a third party.

In addition to the above, the Contractor shall abide by the Safety code provision as per Indian Standard Safety Code framed from time to time.

ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made at Kottakkal on this.....day of..... 2025 between The Arya Vaidya Sala., having their Head Office at Kottakkal – 676 503, Malappuram District represented by **Dr. P Madhavan Kutty Varier, Managing Trustee (hereinafter referred to as the Owner)** which expression shall include their heirs, executors administrators and assignees of the one part and M/s..... through its duly authorised (hereinafter referred to as the ("Contractor")) which expression shall include his/their heirs, principal partners, executors, administrators and assignees of the other part.

WHEREAS the Owner is desirous of construction of Proposed New Branch building with allied services at their site located at Vadakkanthara in accordance with the following documents:

AND WHEREAS the Owner is desirous of executing the works in connection with the New Branch building at -----(Full Address) includes Foundation, Superstructure Civil And Electrical works etc.and has caused drawings, specifications and conditions of contract (hereinafter referred to as said drawings ,said specification and said conditions) to be prepared by Architects employed or M/s. Modarchs Consultants India (P) Ltd.

AND WHEREAS the said drawings and specifications, priced schedules and conditions of contract have been signed by or on behalf of the parties hereto:

AND WHEREAS the contractor has agreed to execute subject to the conditions set forth herein (hereinafter referred to as the said conditions of contract) the work shown upon the said `drawings' and/or described in the said `specifications' and the said `Schedules' and as directed by the Architect/Owner from time to time, at respective rates mentioned in the schedules attached herewith.

AND WHEREAS Mr.....
S/o.....
R/o.in his/their capacity as the said contractor to sign these articles of agreement, enter into contract, execute fulfil and be responsible for the proper execution of the contract by virtue of authority vested in him vide resolution No.....
of M/s. annexed hereto.

AND WHEREAS the contractor has deposited Rs. 3,00,000/- (Rupees Three Lakhs only) as initial security deposit and deduction of 8% from each running bill limited to Rs. 15 Lakhs

which will form the part of retention money to be retained with the Owner for the performance of this agreement which shall be returned as per the clause 6 of tender form.

NOW IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES AS FOLLOWS:

1. In consideration of the payment to be made to the contractor as hereinafter provided he shall upon and subject to the said conditions execute and complete the works shown upon the said drawings and such further drawings as may be furnished to him by the said Architect and described in the said specifications and the said schedules.
2. The owner shall pay the contractor such sum as shall become payable hereunder at the times and in the manner specified in the said conditions.
3. The term "Architect/Architects" in the said conditions shall mean the said any Architect or M/s. Modarchs Consultants India Private Limited. whose Registered office Modarchs Center, 27/935A, Near Supplyco Flats, Panampilly Nagar, Cochin - 36.
4. The said drawings, schedules and conditions of contract and other documents herein mentioned shall form the basis of this contract, and the decision of the Owner and/or the Architect as mentioned in the conditions of contract in reference of the clauses of this Agreement or any other documents attached hereto shall be final and binding.
5. The said contract comprises the works above mentioned and all subsidiary works connected therewith the same site as may be ordered to be done from time to time by the said Architect even though such works may not be shown on the drawings or described in the said specifications or the schedule of quantities but may be fairly intended for successful completion & functioning of the project.
6. The Owner through the Architect reserves to himself the right of altering the drawings and nature of work and of adding to or omitting any items of work or of having portions of the same carried out departmentally or otherwise be carried out without prejudice to this contract and the contractors shall not be entitled to any remuneration or compensation of such work.
7. Time shall be the essence of this contract and the contractor hereby agrees to commence the work within **seven days** of the date of the written order from the Owner to commence work and to complete the entire and all the works connected there to or as ordered from time to time within the time period stipulated by the Owner i.e. within **Nine months** inclusive of all holidays and to execute the same diligently and consistently throughout the entire time period so specified and the contractor shall strictly adhere to the detailed programme for completion of work in time.

8. The said conditions shall be read and construed as forming part of this agreement, and the parties will respectively abide by and submit themselves to the conditions and stipulations and perform the Agreement on their part respectively as per conditions and stipulations contained therein.

9. All disputes arising out or in any way connected with this agreement shall be deemed to have arisen in Malappuram and only the courts having jurisdiction over Kottakkal, Malappuram District alone shall have jurisdiction to determine the same.

10. M/s.the contractor hereby specifically declares that the several parts of this contract have been read, fully understood and accepted by them.

As witness our hand thisday of.....2024.

Signed by the said Owner -----

In the presence of

(1) Name	-----	(2) Name	-----
Address	-----	Address	-----
	-----		-----

Signed by the said Contractor -----

In the presence of

(1) Name		(2) Name	
Address		Address	

CONDITIONS OF CONTRACT

DEFINITIONS AND REQUIREMENTS OF CONTRACT

1.1 CONTRACT DOCUMENT

The term 'Contract Document' means Safety, Conditions of Contract, Bill of Quantities, ie. Priced Schedules and Drawings, Articles of Agreement and Appendices.

Notwithstanding the sub-division of the documents into separate volumes and sections, every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

1.2.a CONTRACT

The term "Contract" means the written agreement between the Owner and Contractor, the Contract Documents, all addenda issued by the Owner and all letters exchanged between the Owner and the Contractor before after the agreement, Specifications and Drawings, modifications and amendments thereto which the Architect may furnish during the progress of the work.

This Contract shall be governed by the Indian Laws for the time being in force,

b. THIS CONTRACT Shall mean the entire document comprising Articles of Agreement, Conditions of Contract, special applications, special conditions of contract, safety code, contractors liability and insurance summary, Appendices, Specifications, Designs & other detailed drawings for the work, addenda, instructions issued by the Owner/Architect and all other documents for full execution of the 'CONTRACT'.

1.3 CONTRACT SUM

The term "Contract Sum" means: The total amount of all the items quoted by the Contractor for executing 'THIS CONTRACT'.

1.4 SITE

The term "Site" means the land and/or other places on, under, in or through which the work is to be executed under the Contract, including any adjacent lands or places which may be allotted by the Owner or used for the purpose of this contract.

1.5 PROPERTY, OWNERSHIP AND POSSESSION

The assets being created under this contract as stipulated in the schedules will be the

"Property" solely belonging to the Owner". The ownership of the site and property will solely vest with the Owner through out the performance of this contract from the beginning upto its completion or determination or termination or cancellation and beyond. The use of site or the assets under construction or part thereof by the contractor is purely to facilitate his performance under this contract and does not confer on him the right of possession or tenancy.

1.6 CONDITIONS/ SAID CONDITIONS means

All the conditions stipulated in the contract and the documents which forms part of the agreement.

1.7 WORK/ SAID WORK

The term "Work" means the work which is undertaken by the Contractor pursuant to the Contract. Work includes, unless specifically excluded, the furnishing of materials, labour, equipment, supplies, plant, tools, scaffolding, transportation, superintendence, temporary construction of every nature, taxes, work contract tax, excise, octroi, insurance, water, electricity and all other services and facilities necessary for the full performance and completion of the requirements of the Contract.

1.8 THE WORKS

"The Works" shall mean the works in the respect of which the tender by the Contractor has been accepted and which are set out in the conditions of contract, specifications, different schedules and drawings and including all additions, substitutions and variations ordered by the Architect.

The works shall not be considered as completed unless the Architect has certified that they have been accepted by the Owners, and the Defect Liability Period shall commence from the date of signing of certificate by the Architect and in accordance with clause 14 hereinafter.

1.9 "IS"

Shall mean Standards/Codes as issued by the Bureau of Indian Standards Institution. Wherever reference is made to "IS" it shall mean the relevant 'IS' code on the subject with latest edition as amended till date of submission of tender and completion of the contract.

1.10 SUB-CONTRACTOR

The term Sub-Contractor, includes those who have entered into a direct contract with the Contractor and who furnish materials worked to a special Design as called for in

the contract documents but does not include those who merely furnish materials not so worked. Sub contractor can be engaged after due permission of the owner.

1.11 DAY

The term `Day' shall mean calendar days irrespective of the number of hours worked in that day.

1.12 WORKING DAY

`Working Day' means any day from Monday to Saturday (Both days inclusive) excluding all Public holidays as notified by the Central Government/State Government.

1.13 NORMAL WORKING HOURS

Normal working Hours shall mean eight (8) hours per working day. Specific timing would vary depending upon the season.

1.14 PROJECT

The term "Project" means the total construction, of which the work performed under this contract may be the whole or a part.

1.15 WEEK

The term "Week" means seven days without regard to the working days in that week.

1.16 NOTICE IN WRITING/WRITTEN NOTICE

The term Notice In Writing: or 'WRITTEN NOTICE' means a notice in handwritten, typed or printed characters sent by registered post (unless delivered personally or proved to have been received) to the last known private or business address or address mentioned in the agreement or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.

1.17 VIRTUAL COMPLETION

The term "Virtual Completion" means that the "Works" have been completed in every respect in conformity with the contract document and are ready and fit for occupation/commissioning in the opinion of the Owner. Virtual completion certificate shall be issued as defined at clause 12, 12.2, & 12.2.1 herein after.

1.18 ACCEPTED RISKS

Shall mean risks due to riots (other than among Contractor's employees) and civil commotion (in so far as these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or usurped power, damage from aircraft, act of God, such as earthquake, lightning and unprecedented floods & other causes over which the Contractor has no control and accepted as such by the Owner or causes solely due to use or occupation by the Owner of the part of works in respect of which a certificate of completion has been issued on account of these reasons or any other reason extension has to be obtained by the contractor from the owner.

1.19 TEMPORARY WORKS

Shall mean all temporary works of every kind required in or about the execution, completion or maintenance of works.

1.20 URGENT WORKS

Shall mean any urgent measure which in the opinion of the Architect/Owner become necessary during the progress of the works to obviate any risks of accident or failure or which become necessary for security.

1.21 MANDATORY WORKS AND REQUIREMENTS

The Contractor shall conform to the provisions of any act of the legislature relating to the works, and to the Regulations and Bye-laws of any authority, and of any water, lighting and other companies and/or Authorities with whose system the structure is proposed to be connected and shall, before making any variation from the drawings or specifications that may be necessitated by so conforming, give to the Architect and Owner written notice, specifying the variation proposed to be made and the reason for making it, and apply for instructions thereon.

The Contractor shall bring to the attention of the Owner through the Architect all notices required by the said acts, regulations or bye-laws to be given to any Public Office. All fees that may be properly chargeable in respect of such works will be paid by the contractor and, he shall lodge the receipts with the Architect, and the amount shall be reimbursed by Owner.

1.22 ACT OF INSOLVENCY

The term 'Act of Insolvency' means any act of insolvency as defined by the Presidency Towns, Insolvency Act or the Provincial Insolvency act or any amending Status.

1.23 MARKET RATE

The term "Market Rate" means the rate as decided by the Architect/Owner on the basis of cost of materials inclusive of all taxes and cost of labour at the site where the work is to be executed plus overheads, supervision and profit of the Contractor.

1.24 SINGULAR OR PLURAL

Where the context so requires, words implying the singular only also includes the plural and vice versa. Words implying persons include persons and corporations.

"Approved Equal" shall mean an alternative product/service approved by the Architect/Owner as equivalent to that specified in the contract documents.

1.25 THE OWNER, THE ARCHITECT, THE PROJECT DIRECTOR, PROJECT ENGINEER AND THE CONTRACTOR.

i. OWNER

The Owner mean The Arya Vaidya Sala, Kottakkal represented by its Managing Trustee or any other duly authorised representative of the Owner empowered on his behalf to discharge all or any of its functions.

ii. ARCHITECT

The term "Architect" means Architect employed or M/s. Modarchs Consultants India (P) Ltd., Modarchs Center, 27/935A, Near Supplyco Flats, Panampilly Nagar, Cochin - 36, Kerala and it includes its designated representatives and its successors and assigns.

The entire work and all additional work required by the Owner in connection with this contract shall be carried out under the instruction of and in the manner desired by the Owner and Architects.

iii. PROJECT MANAGER

The term "Project Manager" means the person appointed by the Owner as one of their authorised representative who shall direct, supervise and be in-charge of the works for the purpose of this contract.

iv. PROJECT ENGINEER

The term Project Engineer(s) (or any other term) shall mean the person(s) appointed by the Owner for acting under the orders of the Owners' Project Manager to inspect the works.

v. CONTRACTOR

The term "Contractor" means M/s. and includes its legal representatives and its successors and assigns.

On acceptance of the tender the Contractor shall intimate the name of his accredited representative(s) who would be responsible for taking instructions from the Architect and/or the Owner and for carrying out the work. The representative(s) shall be employed on site throughout the duration of the work.

2. EXECUTION, CORRELATION, SCOPE AND INTENT

2.1 CONTRACT DOCUMENTS

2.1.1 The Contractor shall be furnished one certified true copy of the Contract Document at the beginning of the construction period.

2.1.2 Four copies of the drawings necessary for the execution of the work, will be issued to him during the progress of the work, free of charge. None of these documents and drawings shall be used by the Contractor for any other work or project or any other purpose whatsoever other than that of this contract and shall be returned to the Architect at request or at the completion of the contract.

2.1.3 Additional copies of the Drawings and other documents if so required by the Contractor will be supplied on payment of actual cost.

2.2 SCOPE OF WORK

2.2.1 The scope of work executed under the contract covers the construction of Complete Civil, Structural and allied works for the construction of proposed new branch building at Vadakkanthara as per the bill of quantities.

2.2.2 The Owners may in their absolute discretion issue further drawings, written instructions, details, detailed specifications, directions and explanation through the Architects. The Contractor shall forthwith comply with and duly execute all work comprised in such instructions, to the satisfaction of the Architect/Owner.

2.2.3 The Owner/Architect reserves the right to fix the order in which the various items of work involved in this contract is to be executed and contractor shall comply with the same. There shall be no extra claims on account of this.

2.2.4 HANDING OVER OF BUILDING TO OWNER

Owner may take over building one by one or lots after the work is completed in all respects tested and certified by Architect during the defect liability period. The Contractor shall immediately arrange to hand over the buildings to the Owner along with set of drawings showing various services, fittings, fixtures etc. as directed by the Architect. He will also prepare a detailed list of various fittings and fixtures (movable and immovable) which shall be then jointly checked along with Owner's representative. Three copies of the list jointly checked and signed shall be handed over to the Owner's representative.

2.2.5 OCCUPATION BY OWNER

The Owner reserves the right to occupy the works by section as completed, as may be considered by the Owner/Architect both practicable and reasonable and without hindrance to the Contractor's progress.

2.2.6 As desired by the Owner the Contractor shall employ and maintain sufficient number of security personnel on duty at all times at the gate and elsewhere within the site to prevent trespass, pilferage and damage etc. The Contractor shall install and maintain night lighting of sufficient illumination all around and within the site to adequately illuminate it all night. Additional illumination shall be provided around stores, offices, machinery installation, stockyards etc., and the contractor shall maintain all the illumination in proper and workable order during the entire period of the contract. Nothing extra shall be paid to the Contractor on account of any of above.

2.2.7 On completion of the contract, the contractor at his own cost shall remove from the site all the balance materials, not required by the Owner and the temporary structures erected by him for executing the work. The contractor as and when required by the Owner/Architect shall remove from site all the materials rejected by the Architect/Owner as unsuitable for use in work to be executed vide 'THIS CONTRACT'. Nothing shall become payable to the contractor on this account.

2.3 WORK TO BE CARRIED OUT

2.3.1 The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include materials, labour, equipment, supplies, plant, tools, scaffolding, transportation, superintendence, temporary construction of every nature, taxes, works contract tax, excise, octroi, insurance, water, electricity and all other services and

facilities required in preparation of and in full and entire execution and completion of the works. The quoted rates shall deem to include all above.

2.3.2 The description given in the specifications or on the Drawings shall, unless otherwise stated, be held to include wastage on materials including overlaps, carriage and cartage, hoisting, setting, fitting, cutting and fixing in position, curing and all other labour necessary in and for the full and entire execution and completion as aforesaid in accordance with good practice and recognized principles.

2.3.3 The work in general shall be carried out as per Specifications and Drawings. For items not governed under Specifications, the work shall be done as per PWD specifications, latest IS Codes of Practice and as per sound engineering practice as directed by the Architect.

2.3.4 Necessary structural or constructional provisions such as dowels, tie rods, spacers (metal, concrete, etc.), chairs, metal studs, corbells, constructional joints, bolts, bolt holes wire mesh, pipe openings, sleeves, ducting, cut-outs and the like, forming holes or any other similar features which although not specifically mentioned in the schedule of quantities or specifications or shown in the drawing, but which are obviously and fairly intended and are essential for completion of work thus making structure and services functional shall all be deemed to be included in the contract sum and provided by the Contractor without any extra cost. Any material incorporated in the works on account of the above shall not be measured for payments. The same shall however be recorded for reconciliation of theoretical consumption.

Similarly adequate slopes will be provided in areas where there is likelihood of ingress of water such as toilets, balconies, verandah kitchen, terraces, top of chajjas, window sills, plinth protection etc. though these may not be expressly shown in drawings without any extra cost. The Contractor is responsible and shall ensure that there are no leakages or seepage in roofs, ceilings, walls on floors or in the water supply, electrical or sewage system.

2.3.5 WORKMANSHIP

The work involved calls for a high standard of workmanship combined with speed and use of quality materials as specified and approved.

Any workmanship or materials not complying with the specific requirements of approved samples, or which have been damaged, contaminated or deteriorated, must be removed immediately from the site and replaced at the risk and cost of the contractor.

2.3.6 WATER PROOFING WORKS - GUARANTEE BOND

The Contractor shall guarantee through a guarantee bond to be executed in prescribed Performa and deposited with the Owner all water proofing work done by

him or his sub-contractors for 10 years from the date of virtual completion of the project and shall indemnify the Owner in a format acceptable to the owner against any defects that arise therein during the guarantee period as aforesaid. He shall immediately rectify, replace and repair any defects, leakage, seepage etc., that may occur therein and repair all other damage occurring to any part of the structure on account of defect in water proofing treatment during the guarantee period as aforesaid in accordance with the conditions of the said guarantee to the satisfaction of the Owner/Society/Resident at the time of damage.

An amount of 0.4% of the contract value shall be retained by the owner as a guarantee against water proofing works. If no defects are found to be existing within 5 years after initial completion then 0.2% of the contract sum shall be released and the remaining 0.2% shall be released after 10 years.

2.3.7 BENCHES

The Contractor is to construct and maintain proper benches to indicate the intersection of all main walls in order that the lines and levels may be accurately checked at all times. The Contractor shall provide suitable stones with flat tops and build the same in concrete for temporary or permanent bench marks. All the pegs for setting out the work and fixing the necessary levels required for the execution thereof shall, if desired by the Owner/Architect likewise be built in masonry at such places and in such manner as the Owner/Architect may determine. Contractors' rates shall include the above factors.

2.4 SUFFICIENCY OF TENDER

2.4.1 The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the different Schedules. Tenderers lump sum price shall be deemed to include for full completion of all works as described hereinafter and in accordance with good engineering practice and recognized principles. Details of construction which are obviously and fairly intended and are essential for completion of work making the structures services functional but which may not have been specifically shown on the drawings or mentioned in the document are deemed to have been included in the lump sum rates/units rates quoted by the tenderer. The detail of such work will be furnished during the execution of this work. Decision of the Architect/Owner in such matters shall be final and binding.

2.4.2 During detailed layout there may be changes in positioning of blocks for which no financial adjustment is admissible except for changes if any ordered in foundation to suit the site requirement.

2.4.4 FIRM RATES AND AMOUNTS

The rates quoted by the Tenderer in the tender shall include all charges for scaffoldings, hire of tools, plants, centring material, water and electricity meter charges, temporary plumbing, heights, leads and lifts, sheds for the materials marking out and clearing the site watering charges, carriage and all other related items works required for smooth and efficient execution of `THIS CONTRACT' and the rates quoted thus shall be deemed to be for the finished work to be measured at site in all respect.

The rates shall also be firm and shall not be subject to exchange variations, labour conditions, fluctuations in railway freights or any conditions whatsoever except as provided for vide clause 16 .Reimbursement/Recovery on variation of Prices. The Tenderers must include in their rates all taxes and levies, as applicable as on date of submission of tender. All statutory deductions form the amount payable to the contractor shall be made while making the payment to the contractor."

2.5 SITE AND LOCAL CONDITIONS

2.5.1 By executing the Contract, the Contractor represents that he has visited the site of the proposed work, fully acquainted and familiarized himself with conditions as they exist Characteristic of the soil and of the excavations and the character of the operations to be carried out under the proposed Contract and made such investigations as may be seen fit so that he shall fully understand the facilities, physical conditions hindrances and restrictions attending the execution of the work under the Contract.

2.5.2 By submitting the tender, the Contractor also agrees that he has carefully examined the drawings, specification and associated documents and the form and nature of including means of access to the site, and that from his own investigation he has satisfied himself as to the nature and location of the work, the general and local conditions, and all matters which may in any way affect the work or its performance, and that as a result of such examination and investigation he has fully understood the intent and purpose of the Contract Documents.

2.5.3 Any claims for additional compensation or extension of time because of Contractor's failure to follow the foregoing procedure and to familiarize himself with the Contract Documents and all conditions which might affect the work will not be allowed.

2.5.4 The area where the building is proposed to be built has the history of active trade union participation. It is the duty of the contractor to tackle the union problems and ensure that the work is smoothly executed without any delay. The Owner/Architect will in no way involve in any of the union matters and no hike or compensation will not be paid by the owner due increase in wages or additional claims on this account during the course of construction.

2.6 DISCREPANCIES

2.6.1 The Contract Documents are complementary and are intended to include or imply all items required for the proper execution and completion of work. What is required by any one shall be as binding as if required by all. In the event there is a discrepancy between specifications and/or Drawings the following order or preference shall be observed.

- a) Particular Specifications wherever applicable
- b) Working Drawings
- c) Other drawings
- d) General Specifications
- e) CPWD/PWD Specifications
- f) I.S.
- g) Instructions of the Owner/Architect.

2.6.2 The several documents forming the Contract are to be taken as mutually explanatory of one another working drawings in preference to any other drawings, detailed drawings being followed in preference of small scale drawings, figured dimension in preference to scaled dimensions and Special Conditions in preference to General Conditions. If there are varying or conflicting provisions made in any one document forming part of the Contract, the Architect/Owner shall be the deciding authority with regard to the intention of the document.

2.6.3 Any error, in description, quantity or rate in different schedules or any omission therefrom shall not vitiate the contract or release the Contractor from the execution of the whole or any part of the work comprised therein according to the drawings and specifications or from any of his obligations under the Contract. Details of construction which are obviously and fairly intended and are essential for completion of work making the structures services functional but which may not have been specifically shown on the drawings or mentioned are deemed to have been included in the lumpsum rates quoted by the tenderer.

2.7 ADJUSTMENT OF ERRORS

2.7.1 If on check there are found to be differences between the rates given by the Contractor in words and figures or in the amounts worked out by him in the different

schedules and General Summary, the same shall be adjusted in accordance with the following rules:

2.7.1a In the event of a discrepancy between description in words and figures quoted by a tenderer, the rate quoted by the Contractor in words shall be taken as correct.

2.7.1b In the event of an error occurring in the amount column as a result of wrong extension of the unit rates and quantity, the unit rate shall be regarded as firm and extension shall be amended on the basis of the rate.

2.7.1c. All errors in totalling in the amount column and carrying forwarded totals shall be corrected.

2.7.1d. The total of various Schedules as amended shall be carried over to the General Summary and the tendered sum amended accordingly. The tendered sum so altered, for the purpose of the tender, be substituted for the sum originally tendered and considered for acceptance instead of the original sum quoted by the tenderer.

2.8 FIELD DIMENSIONS

2.8.1 Before ordering any materials or doing any work the Contractor shall verify the pertinent field dimensions for the project and shall be responsible for the correctness of same.

2.8.2 No extra charge or compensation will be allowed on account of difference existing between actual dimensions and dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for consideration before proceeding with the work.

2.9 CONTRACTOR TO PROVIDE EVERYTHING NECESSARY

2.9.1 The Contractor shall supply, fix and maintain at his cost, during the execution of any work, all necessary centring, scaffolding, staging planking, timbering, strutting, shoring, pumping, fencing, boarding, watching and lighting by night as well as by day and all other matters or things, required not only for proper execution and protection of the said work but also for protection of the public and the safety of any adjacent buildings, walls, roads, services, drains and all other erections, matters or things.

2.9.2 The Contractor shall take down and remove any or all such above measures as work shall require or when ordered to do so, and shall fully reinstate and make good all matters and things disturbed or damaged during the execution of the work to the satisfaction of Architect/Owner.

2.10 AUTHORITIES AND NOTICES

2.10.1 The Contractor shall conform to the provisions of any Acts of the Legislature relating to the works and shall comply with all applicable Acts, law, bye-laws, ordinances, rules, regulations and/or any water, lighting and other lawful orders of any public authority and those of other authorities having jurisdiction of the safety of persons or property, and to pay any fines or penalties imposed for violation thereof. No financial compensation on above account shall be payable.

2.10.2 In particular, the Contractor shall be responsible to register themselves under the contract Labour (Regulations and abolition) Act 1970 and rules thereunder and they must comply with and carry out all the provisions and obligations under the said Act and Rules and furnish all information to Owner as and when desired by the Owner. He shall also indemnify the Owner against any penalties/claims arising from any fault, on their part including lapses in obtaining licenses/permits etc. The Contractor, shall arrange to give all notices required by the said acts, Regulations or Bye-laws to be given to any authority, and to pay to such Authority or to any public Office all fees that may be chargeable in respect of the work and lodge the proper receipts with the Architect.

2.11 PATENT RIGHTS: CLAIMS AGAINST CONTRACTOR

2.11.1 The Contractor shall fully indemnify the Owner against any action claims or proceeding relating the infringement or use of any patent of design or any alleged patent or design rights and shall pay any royalty which may be payable in respect of any article or part thereof included in the contract. In the event of any claims made under and action brought against Owner in respect of any such matters as aforesaid the contractor shall be immediately notified thereof and the contractor shall at his own expense, settle the dispute or to conduct any litigation that may arise therefrom.

Wherever any claim against the contractor for the payment of a sum of money raised out of or under the contract, Owner shall be entitled to recover such sum by appropriating in part or in whole from the running bills or the security deposit of the contractor. In the event of security being in sufficient, then the balance or the total sum recoverable as the case may be, shall be deducted from any sum then due or which at any time thereafter may become due to the contractor under this or any other contract with the Owner. Should this sum be not sufficient to cover the full amount recoverable, the contractor shall pay to Owner on demand the balance remaining due within 10 days.

2.11.2 TECHNICAL AUDIT

Owner reserves the right to carry out post payment audit technical examination of the works and final bill, including all supporting vouchers, abstracts etc., Owner further reserves the right to carry out the aforesaid examination and enforce recovery detected,

notwithstanding the fact that the amount of final bill may have been included by one of the parties as an item of dispute before an arbitrator appointed under the arbitration clause of the contract and notwithstanding the fact that the amount of the final bill figures in the Arbitrator's Award.

2.11.3 If, as a result of such audit and technical examination, over payment is discovered in respect of the work done under the contract, the contractor shall on demand make a payment of a sum equal to the amount of over payment or agree for effecting necessary adjustments from any amounts due to him by Owner. If however, he refuses, or neglects to make the payment on demand or does not agree for effecting adjustment from any amount due to him, Owner shall be entitled to take actions in sub-para 2.11.1 herein before. If as a result of such audit & technical examination an under payment is discovered, the amount of underpayment shall be duly paid to the contractor by the Owner.

2.11.4 Provided that, nothing hereinafter contained shall entitle the Owner to recover any over payment in respect of any price agreed between the Owner and the contractor under the circumstances specifically prescribed for such method of assessment and that the said right of the Owner to adjust over payment from any sum due or from any sum which may become due to the contractor or from security deposit and adjust over and under payment, shall not extend beyond a period of one year from the date of payment of the final bill or in the case of a minus bill, from the date, the net amount of the final bill is communicated to the contractor.

2.12 HINDRANCE REGISTER

A hindrance register shall be maintained at site of work showing the items of work effected, the date on which the delay occurred, the date on which the delay was cleared and full reason thereof. These entries shall be counted signed by the Project Engineer, the Contractor authorised representative and the architect time to time and request for extension of time shall only thereafter be made to Owner.

2.13 The contractor shall maintain a standard laboratory at site for testing of materials fully equipped with the testing equipment as directed by the Owner.

2.14 VISIT TO THE OFFICE OF THE ARYA VAIDYA SALA AT KOTTAKKAL.

In case the contractor during the course of negotiations or during the progress of the work pertaining to contractor during the defects liability period is required to visit the office of The Arya Vaidya Sala at Kottakkal to attend any meetings no reimbursement of cost on this account shall be paid to him irrespective of the place where he is stationed. The contractor shall be required to attend the office at Kottakkal as and when required by the Owner at his own expenses.

3.0 ADMINISTRATION OF THE CONTRACT

Architect will provide administration of the Contract as hereinafter described:

3.1 Architect and the Project Manager and Engineer(s) will be Owner's representatives for the complete execution of the works covered under this contract and until final completion of the project and settlement of final accounts & will have authority to act on their behalf to the extent provided for in the contract. Instructions of the Owner/Architect to the Contractor shall be forwarded to him through the Project Manager.

3.2 The Project Manager will determine on behalf of Architect/Owner in general if the work is being performed in accordance with the Contract documents. The Architect/Owner will have the authority to reject the Contractor's work which does not conform to the contract documents and to require necessary inspection and testing. The contractor shall be required to remove the defects and materials and nothing extra shall be payable to the contractor on this account.

3.3 The Owner, Architect and the Project Manager/Engineer(s) shall at all reasonable times have free access to the work and/or to the Workshops, factories or other work related places and also to any place where the materials are stored, tested or from which they are being obtained.

3.4 The Contractor shall give every facility to the owner and/or their representatives necessary for inspection, examination and test of the materials and workmanship. If the work is to be done at a place other than the site of the work, the Contractor shall obtain the written permission of the Architect for doing so.

3.5 Except the representative of the Public authorities, any person not connected with the Project and any other unauthorized person, shall not be allowed on the site at any time without the written permission of the Architect/Owner.

3.6 The Architect and his consultants if any will visit the site at intervals appropriate to the stage of construction and as warranted by the Construction schedule to familiarize themselves with the quality of the work and to determine in general if the work is proceeding in accordance with the drawings and the specifications.

3.7 Neither the Architect nor the Project Manager will be responsible for the acts, omissions or performance of the Contractor, it being expressly understood that neither the presence nor the absence of the Architect or the Project Director on the job shall relieve any Contractor from responsibility for compliance with the Contract Documents,

nor from responsibility for removal and replacement of work not in accordance therewith.

3.8 The Architect will check and monitor the schedule prepared by the contractor and coordinate the work of all the Contractors on the Project including their use of the site. The Architect will keep the Contractor informed of the over all Project Construction Schedule to enable the Contractor to plan and perform the work properly.

3.9 The Architect's/Owner decision in respect of the quality of work and interpretation of drawings and details will be final and binding. Whenever it is considered necessary or advisable, the Architect/Owner will have authority to require special inspection or testing of the work whether or not such work is then fabricated, installed or completed.

3.10 Architect in co-ordination with the Owner shall be the interpreter of the requirements of the Contract Documents and he will judge the performance thereunder of the Contractor.

3.11 The Contractor shall prepare and submit to the Architect comprehensive lists of the manufacturer's products proposed for the Project. Such lists shall include all information on materials, equipment and fixture as may be required for the preliminary approval of the Architect.

3.12 Materials to be incorporated in the work shall conform to latest relevant BIS marked goods where manufactured. No materials shall be brought by the Contractor to site unless samples are approved by the Architect/Owner.

3.13 The Contractor shall submit three copies of all shop Drawings, Product Data and samples to the Architect who will review and coordinate them with information contained in related documents and transmit his approval/comments.

The Project Manager/Engineer(s) will record the measurement of works carried out by the Contractor in proper measurement books, preferably jointly with the Contractor, whenever possible. The Contractor shall provide all the necessary assistance for the same. The Contractor shall submit four copies of all their bills, including final bills, to the Architect. After verification and evaluation of the Bill, Architect will determine the amount due to the Contractor and will submit a Certificate of payment to the Owners incorporating such amount. The Project ~~Director~~ Manager shall further verify the bill. Payments shall be released in accordance with clause 16.5.2 and 16.6 hereinafter.

4.0 CONTRACTOR'S ADMINISTRATION AND SUPERVISION

4.1 LAND AND LABOUR CAMPS

4.1.1 The Contractor shall examine the site and satisfy himself regarding the space available for labour camps. Workshops, cement godown, site office and storage of steel

and other building materials. Any additional space required by the Contractor shall be arranged by him at his own cost.

4.1.2 The Contractor shall prepare a plan showing location of temporary offices, stores, godowns, labour camps, material storage bins and yards, fabrication platforms, workshops, lab for testing of materials in consultation with and approval of Architect/Owner, before erecting these facilities. Nothing extra shall be payable on account of preparation of plans and construction/maintenance and removal of above on completion of the work.

4.1.3 The Contractor shall ensure that the labour camps are vacated on completion/termination of the contract. In case of his failure to vacate the area, the Owner will be at liberty to withhold his payment and initiate legal action for eviction. The legal action will be initiated against the Contractor and not the individual labourers.

4.2 MATERIALS

A schedule of approved Brand names is specified in schedule given the technical specification. All materials specified in the difference schedules and conditions of contract must conform to any one of the aforesaid brand names. Samples of all materials to be used must be submitted and got approved from Architect/Owner before procurement.

4.2.1 The Contractor shall provide, at his own expenses, all materials required for the work other than those stipulated to be supplied by the Owner in the contract Documents. All materials to be provided by the Contractor shall be new and in conformity with the specifications laid down by the Contract.

4.2.2 If requested by the Architect, the Contractor shall furnish proof along with invoices, accounts, receipts and other vouchers for his satisfaction that the materials comply with specifications. In case of materials where brand names can not be adhered to, the contractor shall furnish a test certificate of these materials at all such times and from all such samples as may be indicated by the Architect/Owner.

4.2.3 The Architect/Owner is entitled to have any tests carried out for any materials supplied by the Contractor, at the cost of the Contractor and the Contractor shall provide at his expense all facilities which the Architect/Owner may require for the purpose.

4.2.4 The Architect/Owner shall have full powers to require removal of any or all materials brought to site by the Contractor which are not in accordance with the Contract Specifications and do not conform in character or quality to samples approved by him. Samples of all approved materials shall be submitted by the Contractor at their own cost to the Architect/Owner for prior approval before any supply of the same to the site of

work begins. Samples of all approved materials shall be sealed and signed jointly by the Architect and the Contractor and retained in the Owner's project office at all times under lock and key on display boards to be provided by the Contractor. In the absence of any specification of any materials or workmanship the same shall have to be to the entire satisfaction of the Owner & other conditions of contract. All the materials rejected by the Architect/Owner shall have to be removed/replaced by the Contractor at his own risk and cost.

4.2.5 In case of default by the Contractor in removing rejected materials, the Architect/Owner shall be at liberty to have them removed by other means at the contractor's risk and cost. The Architect/Owner shall have full powers to procure other proper materials to be substituted for rejected materials.

4.2.6 In the event of the Contractor refusing to comply, the Architect may cause the same to be supplied by other means. All costs of removal and/or substitution of the rejected materials shall be deducted from the interim payments due to the contractor.

4.2.7 Materials required for the Work, whether brought by the Contractor or supplied by the Owner shall be stored by the Contractor only at places and in a manner approved by the Architect. Storage and safe custody of the materials whether brought by the contractor or supplied by the Owner shall be the responsibility of the Contractor, at his own risk and cost.

4.2.8 All materials brought to the site shall become and remain the property of the Owner and shall not be removed from the site without his prior written approval. However, if the work is finally completed and advance, if any, in respect of any such material is fully recovered, the same shall become the property of the Contractor who shall forthwith remove from the Site, at his own expense, all surplus materials originally supplied by him.

4.2.9 Subject to the provisions of the Contract, all charges on account of octroi, terminal or sales tax, excise, royalties and other duties on materials obtained for the work from any source (excluding materials supplied by the Owner) shall be borne by the Contractor.

4.3 USE OF CEMENT

During & after the completion of the work, the theoretical quantity of cement to be used on works shall be calculated on the basis of PWD cement consumption statement showing quantities of cement to be used in different items of work provided in the schedules of rates applicable to the agreement or at places where PWD schedule of rates 1989 - 90 will not be applicable in the case of agreements, it shall be calculated on the basis of standard formula as laid down by the Architect. Over this theoretical quantity of cement shall be allowed a variation upto 3% issued to the contractor and the theoretical quantity including authorized variations if not returned by the contractor shall

be recovered at twice the issue rate or market rate whichever is higher, without prejudice to the provision of the relevant conditions regarding return of materials governing the contract. In the event of it being discovered that the quantity of cement used is less than the quantity ascertained as herein before provided (allowing variations on the minus side as stipulated above), the cost of the quantity of cement not so used shall be recovered from the contractor on the basis of stipulated issue rate including storage charges and cartage to site.

4.4.1 USE OF STEEL

The provisions of the foregoing sub clause shall apply in the case of steel reinforcement or structural steel sections except that the theoretical quantity of steel shall be taken as the quantity required as per design or as authorized by the Architect/Owner, including authorized lappages, plus 3% wastage due to cutting into pieces.

4.5 WATER SUPPLY & POWER SUPPLY

4.5.1 WATER SUPPLY

Water shall be supplied free of cost for the construction purpose as well as for drinking purpose by the owner at one point. The contractor shall at his own cost lay all piping as required for use on the work, and remove the same on completion. In case of termination of contract, the contractor shall not be liable to any payment whatsoever, in lieu of the above said works and the Owner shall retain whole of the work thus executed without any compensation to the contractor on account of the same.

In case of any scarcity of the water, contractor to arrange the water for the construction purposes at own cost

4.5.2 POWER SUPPLY

Power supply will be given at one point and the contractor shall at his own cost provide cables conforming to the statutory requirement of the electrical department to draw the power. Energy charges as per the KSEB tariff to be paid to authorities by the contractor as per the electricity bills.

If no power is available at the site, contractor shall have to make his own arrangements to obtain power connections and maintain, at his own expenses, an efficient service of electric light and power and shall pay for the electricity consumed. The owner as well as the Architect/consultants shall give all possible assistance to the Contractor to obtain the requisite permission from the various authorities but the responsibility for obtaining the same shall be that of the

contractor. If power is supplied from existing connection, the necessary connection charges as well as the charges for consumption of electricity should be borne by the Contractor.

4.5.2a The Contractor shall also install and maintain at his own cost minimum one stand by Diesel Generator set of sufficient capacity to supply adequate electricity necessary for the construction work in case of power cut/break down.

4.5.3 Any delay in works due to non-availability of water & power supply will be on contractors account.

4.6 LABOUR

The Contractor shall obtain valid license under the contract labour (R&B) act 1970 and the contract labour (Regulation and Abolition) Central Rules 1971 before the commencement of the work as required and continue to have a valid license until the completion of the work as required. The contractor shall also abide by the labour laws as applicable from time to time. Any failure to fulfil this requirement shall attract the provisions of this contract arising out of the resultant non execution of the work. No labour below the age of fifteen years shall be employed on the work.

4.6.1 PAYMENT OF MINIMUM WAGES: COMPLIANCE WITH THE ACTS

a. The Contractor shall pay to labour employed by him either directly or through sub-contractors, wages not less than minimum wages defined in the latest notification of Kerala administration for labour employed in construction or maintenance of roads or in building operations or as per the provisions of the contract labour (Regulation and Abolition) Central Rules 1971, wherever applicable.

b. The Contractor shall notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged in the work, including any labour by his sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

c. In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with the Public Works Dept. contractor's labour Regulations made by Government from time to time in regard to payment of wages, wage period, deductions from wages, recovery of wages not paid and deductions unauthorisly made, maintenance of wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract labour (Regulation & Abolition Act) 1970 and the contract labour (Regulation and Abolition) Central Rules 1971

wherever applicable.

d. The Owner shall have the right to deduct from the amounts due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reasons of non-fulfilment of the conditions of the contract for the benefit of their workers non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the regulations.

e. The Contractor shall comply with the provisions of the payment of wages Act 1936, Minimum Wages Act 1948, Employed Liability Act 1938, Workmen's Compensation Act 1923, Industrial Disputes Act, 1947, Maternity Benefits Act 1961 and the Contractor's Labour (Regulation & Abolition) Act 1970 or the modification thereof or any other law relating thereto and the rules made thereunder from time to time.

f. The Contractor shall indemnify the Owner against payments to be made under and for the observance of the laws aforesaid without prejudice to his right or claim indemnify from his sub-contractors.

g. The regulations aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract. The regulations aforesaid, and all other regulations, Acts, Notifications references, etc. stated elsewhere herein shall be deemed to include their amendments, modifications, corrections, agenda etc. made upto date and any breach thereof shall be deemed to be a breach of this contract.

h. In respect of labour directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractor shall at his own expenses arrange for the safety provisions and shall at his own expense provide for all facilities in connection therewith. In case the contractor fails to make arrangement and provide necessary facilities as aforesaid he shall be liable to pay a penalty of Rs. 500/- for each default and in addition the owner shall be at liberty to have arrangement made and provide facilities as aforesaid and recover the costs incurred on that behalf from the contractor.

i. The contractor shall submit, by the 4th of every month to the owner through the architect a true statement showing in respect of the preceding month.

The Number of skilled, unskilled, technical non-technical and temporary workers employed on the work.

Their working hours

The wages paid

Over time spent and its payment made

In case the contractor fails to submit the statement as directed, he shall be liable to pay a penalty of Rs.500/- per month, in default thereof, and in addition the owner shall be at liberty to have the statements prepared and recover the costs incurred on that behalf from the contractor.

j. The contractor shall not construct or permit to be constructed or make use of any form of permanent structures for the residential occupation and use of his workmen within the site.

4.7 STAFF

4.7.1 The Contractor shall furnish qualified, competent and adequate staff as necessary for the proper administration, coordination, supervision and superintendence of the work, and for organizing the timely procurement of all materials and equipment needed for the work, and shall keep an adequate force of skilled workmen on the job to complete the work in accordance with all requirements of the Contract documents and the CPM network thus submitted.

4.7.2 The superintendent and key members of the Contractor's staff working on this project shall not be changed without the consent of the Architect/Owner. All replacements shall be subject to Architect's/Owner's approval.

4.7.3 The contractor shall on the request of the Architect immediately dismiss from the work any person employed thereon, who may in the opinion of the Architect/Owner be unsuitable or incompetent or who may misconduct himself and such person shall not be again employed or allowed on the work without the permission of the Architect.

4.8 SUPERVISION

4.8.1 The Contractor shall efficiently supervise his work using his best skill and attention. He shall carefully study and compare all drawings, specifications and other instructions and shall at once report to the Project Director and the Architect any error or omission which he may discover and shall subsequently proceed with the work in accordance with instructions from the Architect concerning such error or omission. Directions given to any Contractor's superintendent for the project shall be binding as given to the Contractor.

4.8.2 SITE OFFICE

The contractor shall provide at his own cost simple water tight separate office accommodation at site for the Project Manager and his site staff. The accommodation shall be well lit, ventilated and provided with windows, doors with a lock, suitable partitions, drinking water and toilet facilities. The accommodation shall be sufficiently large to accommodate the Project Engineer and his staff and shall be suitably provided &

furnished with writing tables, drawing board, chairs, steel almirahs, stools, drawers for drawing rack boards on walls for displaying drawings & programmes, electric lights, fans, coolers/heaters etc. as required. The Contractor shall also maintain at his own cost the office in good hygienic condition and provide facilities for having the office cleaned daily. Separate accommodation as stated above shall also be provided for the Architect.

4.8.3 MINIMUM REQUIREMENTS OF THE TECHNICAL STAFF

Unless otherwise stated, contractor should note that irrespective of the fact whether the proprietor himself is a qualified engineer or not, he shall deploy the following staff in addition to the junior supervisory staff and foremen, who shall be present at site at all the times.

- | | |
|--|-----|
| 1. Graduate engineer with 5 year's experience | One |
| 2. Diploma Junior Engineer with at least 3 years' experience | One |

The technical staff should be available at site constantly at all times throughout the Contract/extended duration of Contract to supervise the work and take instructions from the Owner and/or Architect/their representative, when the respective work is in progress.

4.8.4 The Architect/Owner is authorized to vary any of the above, number, qualifications/experience requirements at his discretion if so warranted by conditions prevailing and applicable to any particular aspect/stage of the work.

4.8.5 The Contractor will furnish a list of qualified technical staff, indicating their names, qualifications and experience, that will be employed at the site along with copies of certificates & experience.

4.9 HOURS OF WORK

4.9.1 Work shall normally be performed during regular working hours. In the event of emergency or when required to complete the work in accordance with job schedule, work may be performed on night shifts, overtime, Sundays, holidays, when permission to do so has been obtained from the Project Director. The Contractor will not be entitled to any compensation for work performed outside of regular working hours.

4.10 COMMENCEMENT AND COMPLETION OF WORK

4.10.1 Unless otherwise provided in the contract, the Contractor shall be allowed admittance to the site on issuing notice to him to start the work. The Contractor shall immediately mobilize his staff, equipment, plant, tools and about to the site.

4.10.2 The time is the essence of the contract. The date of Commencement of work will be

as stated in the Appendix and the Contractor shall thereupon and forthwith begin the work and proceed in accordance with the progress of the job and shall complete all work on or before the Date of Completion stated in the appendix, subject to the provision of extension of time established by the Architect and duly approved by the Owner.

i. The successful bidder is confirmed as contractor, shall within 7 days of the communication of acceptance of tender prepare and submit a detailed working integrated network programme for the execution of work including detailed charts for individual building along with the calculation for network analysis, all activities and event list & details of man power and equipment required for fulfilment of programme from start of work to completion for the approval of the Architect. The programme chart shall also indicate the scheduling of samples, shop drawing and approvals.

ii. If the Contractor fails to submit the detailed network programme within the stipulated time, the Architect will prepare themselves or can get it prepared through any other qualified agency at the risk and cost of the Contractor and this programme will be binding on the Contractor.

iii. Ancillary works should be so started that all such work is completed before the specified over all contractual period of completion.

iv. Any failure on the part of the Contractor to adhere to the Approved/agreed starting and completion dates of the individual items mentioned in the chart shall entail application of 'Compensation For Delay' clause in whole or part at the discretion of the Architect/Owner notwithstanding the overall period of completion stated in the Appendix to the Conditions of contract.

4.10.3 SCIENTIFIC AND MEASURING INSTRUMENTS

Theodolite levels, prismatic compass, chain, steel and metallic tapes and all other surveying instruments found necessary on the works shall be provided by the Contractor at his expense for the due performance of this Contract, as instructed by the Architect/Owner.

4.10.4 SCAFFOLDING

i. Suitable scaffolding should be provided for workmen for all work that cannot safely be done from the ground or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra Mazdoor shall be engaged for holding the ladder and if ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder and the ladder shall be given an

inclination not steeper than 1 in 4 (1 horizontal and 4 vertical).

ii. Working platform gangways and stairways should be so constructed that they should not sag unduly or unequally.

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

iv. Safe-means of access shall be provided to all working platforms and other working places. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any sites of work shall be so stacked or placed to cause danger or inconvenience to any person or public. The contractor shall also provide all necessary fencing and lights to protect the workers and staff from accidents, and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and pay any damages and costs which may be awarded in any such suit or action or proceedings to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.

4.11 ASSIGNMENT AND SUBLETTING

4.11.1 The whole of the work included in the contract shall be executed by the Contractor who shall not directly or indirectly transfer, assign or sublet the Contractor or any part of share of interest therein nor shall he take a new partner without the written consent of the Owner.

4.11.2 No subletting shall relieve the Contractor from the full and entire responsibility of the contract or from active superintendence of the work during its progress.

4.12 SETTING OUT WORK

4.12.1 The Contractor shall provide all labour and setting out apparatus required to set out the works. He shall set out the work and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignments of all parts thereof.

4.12.2 If any error shall arise at any stage during the progress of any part of the work due to inaccurate setting out, the contractor shall rectify and amend such error at his own cost, to the satisfaction of the Architect/Owner. The contractor shall provide all the assistance and man power as required by the Architect/owner for checking the setting out of works.

4.13 SITE DRAINAGE AND PROTECTION OF TREES

4.13.1 The Contractor shall remove all water which may accumulate on the site during the progress of the works, or in foundation trenches and excavations from any source, other than unprecedented floods, to the satisfaction of the Architect and at the Contractor's expense.

4.13.2 All soil, filth or other matter of an offensive nature taken out of any trench, sewer, drain, cesspool or other place shall not be deposited on the surface, but shall be at once carted away by the Contractor to some pit or place provided by him at his own cost.

4.13.3 Trees designated by the Owners/Architect as shall be protected during the course of the work and earth level within one meter of each such tree shall not be changed. Where necessary, such trees shall be protected by providing temporary fencing.

4.14 FOSSILS, COINS

4.14.1 Materials of any kind obtained from excavation on the site shall remain the property of Owner and shall be disposed of by the Contractor as the Architect/Owner may direct. All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site shall be absolute property of the Owner/Government.

4.14.2 The Contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal inform the Architect of such discovery and carry out his directions as to the disposal of the same at the Owner's expense.

4.15 CONSTRUCTION PRACTICES AT SITE

4.15.1 STANDARD WORKMANSHIP

i. To determine the acceptable standard of workmanship the Contractor shall execute a portion of the different items of work as sample for approval of the Architect/Owner before taking up the actual execution of the particular items of work. All the works executed thereafter should be in accordance of these approved samples.

ii. STANDARD OF WORKS AND LIQUIDATED DAMAGES

Throughout the Construction period the Contractor shall protect the work and the Owner's property, and the property of others, from damage, injury or loss arising from or

in connection with operations under the Contract. He shall make good any such damage, injury or loss at his own cost.

iii. The Contractor shall at all times provide and maintain adequate protection against weather so as to preserve the work, materials, equipment, installations and fixtures free from damage.

iv. The Contractor shall use his best efforts to prevent dust or smoke from interfering with the normal activities of others.

v. The Contractor shall provide at the site, first-aid supplies for minor injuries. All accidents and major injuries shall be immediately brought to notice of the Architect/Owner.

4.15.2 SAFETY CODE, LABOUR CAMPS, SANITARY ARRANGEMENTS

4.15.2a The Contractor shall follow the Safety Code and Model Rules for the Protection of Health and Sanitary Arrangements for Workers as prescribed by the CPWD as regards to safety code, first aid facilities, drinking water, washing facilities, latrines and urinals, provision of shelter during rest, crèches, canteens, anti-material precautions etc. The Contractor shall get the arrangement made by him for the above approved by the Architect. In case the contractor fails to make the aforesaid arrangement, the owner shall be entitled to do so and recover the cost there of from the Contractor.

Contractor's particular attention is drawn to safety practices to be adopted as per Safety Code included separately in this Volume.

4.16 OTHER CONTRACTORS ENGAGED BY OWNER

4.16.1 The Owner through the Architect and the Consultants reserves the right to execute work not included in this Contract, which they may desire to have carried out by other contractors or persons. The Contractor shall allow all reasonable facilities and the use of his scaffolding and plant for the execution of such work.

4.16.2 The Contractor shall not be required to provide any special plant or materials for the execution of such work except by special arrangement with the Owner or mutual agreement with the other contractor/person. Such work shall be carried out in a manner so as not to impede the progress of the work included in the Contract and the Contractor shall not be responsible for any damage or delay which may occur to or on account of such work.

4.17 INSPECTION AND APPROVAL

4.17.1 All works requiring more than one process shall be subject to examination and approval at each process stage. The Contractor shall give due notice to the Architect when each process stage is ready for inspection. In default of such notice, the Architect shall be entitled to appraise the quality and the extent thereof. In the event of any dispute the decision of the Architect/Owner thereof shall be final and binding.

4.17.2 No work shall be covered up or put out of view without the approval of the Architect/Owner and the Contractor shall afford full opportunity for examination and measurement of any work which is about to be covered up or put out of view and for examination of foundation preparations before permanent work is placed thereon.

4.17.3 The Contractor shall give due notice to the Architect whenever such work of foundation is ready for examination and the Architect, without unreasonable delay, shall examine and/or measure such work or such foundations, unless he considers it unnecessary and advises the contractor accordingly. In the event of failure of the Contractor to give such notice he shall, if required by the Architect, incur such work at his own expense.

4.17.4 The Architect/Owner shall have powers at any time to inspect and examine any part of the work and the Contractor shall give such facilities as may be required for such inspection and examinations at his own cost.

4.18 UNCOVERING AND MAKING GOOD

4.18.1 The Contractor shall uncover any part of the work and/or make openings in or through the same as the Architect/Owner may from time to time direct for their verification and shall reinstate and make good such part to the satisfaction of the Architect/Owner.

4.18.2 If any such part has been covered up or put out of view after being approved by the Architect and is subsequently found on uncovering to be executed in accordance with the Contract, The expenses of uncovering and/or making openings in or through, reinstating and making good the same shall be reimbursed to the Contractor. In any other case all such expenses shall be borne by the Contractor.

5.0 CONTRACTOR'S LIABILITY AND INSURANCE

5.1 Throughout the construction period, The Contractor shall take full responsibility for the care of the work and for taking precautions to prevent loss or damage and to minimize the same to the greatest extent possible.

5.2 He shall be liable for any damage or loss that may happen to the work or any part

thereof and to the Owner's equipment and plant from any cause whatsoever and shall at his own cost repair and make good the same so that at completion of the work, the Owner's equipment and plant shall be in good order and condition and in conformity in every respect with the requirements of the contract and instructions of the Architect.

5.3 The Contractor shall be responsible for all injury to persons, animals and things which may arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of the Contract.

5.4 The Contractor shall fully indemnify the Owner and hold him harmless in respect of all losses, claims and any expenses arising from such injuries or damage to any person or any property whatsoever which may arise out of or in consequence of carrying out the Contract and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto. The insurance policy for third party risk shall cover a sum of Rs.5.00 lakhs for each incidence.

5.5 Before commencing execution of the work, the Contractor shall, without in any way limiting his obligations and responsibilities under the contract, insure against any damage, loss or injury which may occur to any of the employees of the Owner, by or arising out of carrying out the Contract.

5.6 The Contractor shall at all times indemnify the Owner against all claims, damages and compensation under the provision of Payment of Wages Act 1936, Workmen's compensation act 1923, Industrial Disputes Act 1947 and Maternity Benefit act 1961 and Contract Labour Regulation and Abolition act 1970 or any modifications thereof or any other law relating thereto and rules made thereunder from time to time or as a consequence of any accident or injury to any workmen or other persons in or about the work, whether in the employment of the Contractor or not, save and except where such accident as injury has resulted from the act of Owner, and/or his representatives.

5.7 The Contractor shall also indemnify the Owner against all costs, charges, and expenses of any law suit, action or proceedings arising out of such accident or injury and against all sum or sums which may, with the consent of the Contractor be paid to compromise or compound any claim. Without limiting his obligations and liabilities as above provided, the Contractor shall insure against all claims, damages or compensation payable under the Workmen's compensation Act 1923 or any modifications thereof or any other law relating thereto.

5.8 Immediately on signing of the Contract, the Contractor shall insure the work and keep them insured throughout the Contract period at his own cost against loss or damage by fire and/or earthquake with any Nationalized General Insurance Company in the joint names of the Owner and the Contractor shall deposit the original policy and receipt for the premium with the Owner within one month of the Date of Commencement.

5.9 In the event of any fire and/or earthquake the Contractor shall as soon as the claim under the policy is settled or the work is reinstalled by the Insurance Office should they elect to do so, proceed with all due diligence with the completion of the work in the same manner as though the fire and/or earthquake had not occurred and on all respects under the same conditions of the Contract. However, in case of rebuilding or reinstatement after fire and/or earthquake, the Contractor shall be entitled to such extension of time for completion as the Architect/Owner may deem fit.

5.10 The aforesaid insurance policies shall not be cancelled till the Architect/Owner has agreed to their cancellation. The Contractor shall submit proof to the Architect from time to time that he has taken out all the insurance policies as stated above and has paid the necessary premium for keeping the policies alive till the virtual completion of the work.

5.11 The Contractor shall ensure that similar insurance policies are taken out by his Sub-Contractors, if any, and shall be responsible for any claims or losses to the Owner resulting from their failure to obtain adequate insurance protection in connection thereof. The Contractor shall produce or cause to produce by his Sub-Contractor, if any, the relevant policies and premium receipt as and when required by the Architect/Owner.

5.12 If the Contractor and/or the Sub-Contractor, if any, shall fail to effect and keep in force the insurance referred to effect under the Contract, then the Owner may effect and keep in force any such insurance and pay such premium or premiums as may be necessary or that purpose and from time to time deduct the amount so paid by the Owner from any money due or which may become due to the Contractor or recover the same as a debt due to the Contractor.

5.13 The Contractor shall in the joint names of the Owner and contractor with the owner as the first person insure against losses and damage by fire, storm, lightning, flood, earthquake, aerial objects, riot, civil commotion or malicious acts for the full value of all the work executed and all unfixed materials and goods intended for, delivered to, and placed on or adjacent to the works, but excluding temporary buildings, plant tools and equipment owned or hired by the contractor or any sub-contractor, and shall keep such works, materials and goods so insured until virtual completion of the works.

5.14 The contractor shall provide to the Owner original insurance policies and premium receipts in respect thereof and should the contractor make default in insuring or continuing to insure as aforesaid, the Owner may himself insure against any risk with respect of which the default shall have occurred and deduct a sum equivalent to the amount of premium so paid from any amount due or to become due to the contractor.

5.15 A format of appropriate Indemnity Bond has been given with supplementary Condition No. 1 in this Volume and Contractor's attention is drawn to this.

6.0 FORECLOSURE OF CONTRACT IN FULL OR IN PART

6.1 If at any time after the award of work to the Contractor, the Owner decides to abandon the work completely or reduce the scope of the work for any reason whatsoever and hence not require the whole or part of the work to be carried out, the Architect shall give notice in writing to that effect to the Contractor. 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 the foreclosure of the whole or part of the work.

6.2 The Contractor shall be paid at contract rates full amount for works actually executed at site and, in addition, a reasonable amount as certified by the Owner in consultation with the Architect for the items hereunder mentioned which could not be utilized on the work to the full extent because of the foreclosure

6.2.1 For any expenditure incurred on preliminary site work such as temporary access roads, temporary labour huts, staff quarters, site office, stores, workshops, casting yards, fabrication platforms and water storage tanks.

6.2.2 For materials taken over or to be taken over by the Owner, the Owner shall pay to the Contractor cost of such materials. The cost shall however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to materials while in the custody of the Contractor.

6.2.3 For Contractor's material not retained by the Owner reasonable cost of transporting such materials from the Site to the contractor's permanent stores or to his other works, whichever is less. If materials are not transported to either of the said places, no cost of transportation shall be payable.

6.3 If any materials supplied by the Owner remains surplus, the same except for normal wastage shall be returned by the contractor to the Owner. Any deterioration or damage which may have been caused while the materials were in the custody of the Contractor shall have to be borne by the contractor. In addition, cost of transporting such materials from the site to the Owner's store, if so required by the Owner will be borne by the contractor. However, Owner's decision as to what materials can be accepted back shall be final & binding.

6.4 The Owner shall have the option to take over the Contractor's materials or any part thereof either brought to the site or which the Contractor is legally bound to take delivery from suppliers for incorporation in or incidental to the work, which the Contractor does not desire to retain.

6.5 If required by the Architect, the Contractor shall furnish to him books of account, wage books, time sheets and other relevant documents as may be necessary to enable him to certify the reasonable amount payable to the Contractor under these circumstances.

6.6 DAMAGE TO WORKS IN CONSEQUENCE OF HOSTILITIES OR WAR LIKE OPERATIONS

6.6.1 The work (whether fully Constructed or not) and all materials, machines, tools and plants, scaffolding, temporary buildings and other things connected there with shall be at the risk of the Contractor until, the work has been delivered to the Owner and certificate from him to that effect obtained by the contractor. In the event of the work or any materials properly brought to the site for incorporation in the work being damaged or destroyed in consequence of hostilities or War - like operations, the Contractor shall, when ordered in writing by the Architect remove any debris from the site collect and properly stack or remove in store all serviceable materials, salvaged from the damaged work shall be paid at the contract rates in accordance with the provision of this agreement for the work of clearing the site of debris, stacking or removal of serviceable materials and for the construction of all works ordered by the Architect. Such payments being in addition to compensation upto the value of work, originally executed before being damaged or destroyed and not paid for. In case of works damaged or destroyed but not already measured and paid for, compensation shall be assessed by the Architect. The contractor shall be paid for the damage/destruction suffered and for restoring the material at the rates based on the analysis of rates tendered for in accordance with the provisions of this agreement.

The Certificate of the Architect regarding the quality and quantity of materials and the purpose for which they were collected shall be final and binding on all the parties to this contract.

6.6.2 Provided always that no compensation shall be payable for any loss in consequence of hostilities or War like operations (a) unless the Contractor had taken all such precautions against Air Raid as are deemed necessary by the A.R.P. officer of the Owner (b) for any materials etc. not on the site of work for any tools and Plant, Machinery, scaffolding temporary buildings and other things not intended for the work.

In the event of the Contractor having to carry out reconstruction as aforesaid, he shall be allowed such extension of time for its completion as is considered reasonable by the Architect/Owner.

7.0 TERMINATION OF CONTRACT BY OWNER

The Owner shall without prejudice to his right to proceed against the contractor in respect of any delay or inferior workmanship or otherwise or to any claims or damage in respect of any breach of the contract and without prejudice to any rights or remedies under any of the provisions of this contract or otherwise and whether the date for completion has or has not elapsed by notice in writing absolutely terminate the contract in any of the following cases:

- i. If the Contractor having been given by the Architect/Owner a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in any inefficient or otherwise improper or unworkan like manner shall omit to comply with the requirements of such notice for a period of seven days thereafter or if the contractor shall delay or suspend the execution of the work such that either in the judgment of the Owner or the Architect (which shall be final and binding) he will be unable to secure completion of the work by the date of completion or he has already failed to complete the work by the date.
- ii. If the contractor being a company shall pass resolution or the court shall make an order that the company shall be would up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the court or creditor to appoint a receiver or a manager or which entile the court to make a winding up order.
- iii. If the contractor commits gross misconduct, or engages in dishonest and/or professional misbehaviour.
- iv. If the contractor commits breach of any of the terms and conditions of this contract.
- v. Or if the contractor (whether an individual, firm or incorporated Company) shall suffer execution to be issued.
- vi. Or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor.
- vii. Or shall charge or encumber this contract or any payments due or which may become due to the contractor thereunder.

7.2 Or if the Architect shall certify in writing to the Owner that the contractor

- i. has abandoned the contract or
- ii. has failed to commence the works, or has without any lawful excuse under these

conditions suspended the progress of the works for 14 days after receiving from the Architect written notice to proceed or

iii. has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the work to be completed within the time agreed upon or

iv. has failed to remove materials from site or pull down and replace work within seven days after receiving from the Architect written notice that the said materials or work were condemned and rejected by the Architect/Owner under these conditions or

v. has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed and performed by the contractor for seven days after written notice shall have been given to the contractor requiring the contractor to observe or perform the same or

vi. has to the detriment of good workmanship or in defiance of the Architect/Owner's instructions to the contrary sub-let any part of the contract.

If the contractor could not complete the work within the stipulated time owner reserves to right to cancel the agreement and to get the work done by another contractor at his own risk and cost.

8.0 CHANGES IN CONTRACTOR'S CONSTITUTION

8.1 Where the Contractor is a partnership firm, prior approval in writing from the Owner shall be obtained before any change is made in the constitution of the firm. where the Contractor is an individual or a Hindu Undivided Family business concern, such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the work hereby undertaken by the Contractor.

8.1.1 If prior approval as aforesaid is not obtained by the Contractor, the Contract shall be deemed to have been in contravention condition 8.1 hereof and the same action may be taken and the same consequences shall ensue as provided in the said Condition 8.1

8.1.2 In case the Contractor is a corporate entity, then the Owner shall have the right to terminate the agreement, if in the opinion of the Owner, there occurs or is likely to occur any change in the shareholding or management of the contractor.

9.0 CANCELLATION OF CONTRACT DUE TO DEATH

9.1 If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies, and if the contractor is a partnership concern and a partner dies, then unless the Owner is satisfied that the legal representatives of the individual contractor or of a proprietary concern and in case of partnership concern, the surviving partners are capable of carrying out and completing the contract satisfactorily and in time, the Owner shall be entitled to cancel the uncompleted part of the Contract without the Owner being in any way liable for payment of any compensation to the estate of the deceased Contractor and/or to the surviving partners) of the Contractor's firm on account of cancellation of the Contract.

9.2 The decision of the Owner that the legal representatives of the deceased Contractor or the Surviving partner(s) of the contractor's firm cannot carry out and complete the Contract satisfactorily and in time shall be final and binding on the parties. In the event of such cancellation, the Owner shall not hold the estate of the deceased Contractor and/or surviving partner(s) of the Contractor's firm liable to damages for not completing the Contract.

10.0 VARIATIONS

10.1 The Architect/Owner shall have power:

- a. To make alterations in, omissions from, additions to, or substitution for, the original specifications, drawings, designs and instruction that may appear to him to be necessary or advisable during the progress of the work.
- b. To omit a part of the work in case of non-availability of a portion of the Site or for any other reason whatsoever.

10.2 The Contractor shall be bound to carry out and complete the Work in accordance with any instructions given to him time to time in writing by the Architect/Owner and such alterations, omissions, additions and substitutions shall form part of the Contract as if originally provided therein and any altered, additional or substituted work which the Contractor may be directed to do shall be carried out by the Contractor on the same conditions in all respects on which he agreed to do the original work. However, no work which radically changes the original nature of the Contract shall be ordered by the Architect/Owner as a deviation.

10.3 In the event of any deviation resulting in increase in the cost over the Contract sum being ordered, the Time of Completion of the Work shall not be extended under normal circumstances. However, if the deviation is ordered at a stage, or results in additional cost, which in the opinion of the Architect/Owner justifies any extension of time, it may be granted by the owner at the request of the Contractor. The decision of the owner will be final and binding.

11.0 EXTRA ITEMS, VARIATIONS, THEIR VALUATION AND CLAIMS

The Contractor shall carry out and complete the said work in every respect in accordance with the contract conditions and with the directions of and to the satisfaction of the Architect/Owner. The Architect/Owner may from time to time issue further detailed drawings and or written detailed directions/instructions and explanations within the meaning of contract agreement collectively referred to as 'ARCHITECT INSTRUCTION'/INSTRUCTION OF OWNER' in regard to and any other matter:

a) The variation or modification of the design, quality or quantity of works or the addition or omission or substitution of any work, with the prior approval of the Owner,

b) The removal and/or re-execution of any works executed by the contractor which is not to the satisfaction of the Architect/Owner and/or is not as per 'THE CONTRACT'.

c) The opening up for inspection of handy work covered up.

d) The amending and making good of any defects and rejected work.

11.1 EXTRA ITEMS

If any extra item has to be executed at site which may be absolutely necessary for the project and which are not included in BOQ shall be executed on written orders from the Owner/Architect. The contractor shall bring to the notice of the concerned official in advance the requirement of extra item to be executed. The rates shall be derived from parallel items or similar items if possible or shall be derived from the reasonable existing market price plus the cost of labour plus fifteen percent (15%) for contractor's overheads and profits. The contractor shall furnish the rate analysis which supporting statements to the Architect who shall scrutinise and forward the rate analysis for the owners approval. However the contractor shall not delay the work for finalisation of the rates of the concerned item.

11.2 VARIATIONS

No alteration, omission or variation shall vitiate this contract but in case the Architect or Owner thinks proper at any time during the progress of the works to make any alterations in or omission from the works or any alteration in the kind or quality of the materials to be used therein, the Architect, with approval of Owner, shall give notice thereof in writing well in advance to the contractor, and the contractor shall alter, add to or omit from, as the case may require, in accordance with such notice. The value of such extra alterations, additions or omissions shall in all cases be determined by the Architect in accordance with the provisions of clauses hereof and the same shall be added to or deducted from the contract amount accordingly, after obtaining approval from the Owner subject to the condition that the Contract sum will not thereby vary on the whole by more than 20% (Twenty percent).

11.3 If any work, the rate for which cannot be obtained by any of the methods, referred to has been ordered on the contractor, the rate shall be decided by the Owner on recommendations of Architect on the basis of the actual cost to the contractor at site of works (for this contractor shall produce sufficient proof) plus 15% to cover all overheads and profits of contractor.

11.4 If the Contractor considers any assigned work to be outside the scope of the Contract, he shall immediately bring it to the attention of the Architect with financial implications thereof. He shall proceed with the work only after obtaining necessary change order approval. Any claim for any compensation for any cause whatsoever, for which there is no provisions in the contract, shall be made in writing to the Architect within two weeks of the occurrence of the event due to which compensation is claimed. Any claim not made within the above period shall not be entertained.

12.0 CERTIFICATE OF VIRTUAL COMPLETION

12.1 When the work is completed as required by this contract the Contractor shall give notice of such completion to the Architect. Within 15 days of receipt of such notice, the Architect shall inspect the work and the owner's Project Manager on recommendation from the Architect and after obtaining approval from Owner shall furnish the Contractor with a certificate of virtual completion indicating:

- a) date of virtual completion
- b) defects that remain to be rectified by the Contractor
- c) items for which payment shall be made at reduced rates
- d) balance of work, if any, to be done by the Contractor

12.2 No certificate of virtual completion shall be issued, nor shall the work be considered to be completed till the Contractor has removed from the premises on which the work has been executed all scaffoldings, sheds and surplus materials, (except such as required for rectification of defects) rubbish and all huts and sanitary arrangements required for his workers on Site in connection with the execution of the work.

12.2.1 The Contractor shall have cleaned floors, gutters and drains, eased doors and windows, oiled locks and fastenings, labelled keys and handed them over to the Owner or his representative and made the whole complex functional for immediate occupation or use to the satisfaction of the Architect/Owner in accordance with clause 12.1

12.3.a The works shall not be considered as virtually completed unless the Owner's Project Director has certified in writing that they have been accepted by the Owner. The Defect Liability Period as mentioned in clause 14 shall commence from the date of issuing of virtual completion certificate, by the Owner's Project Manager

12.3.b A final completion certificate shall be issued by the owner's Project Manager on satisfactory completion of the Defect liability period only after obtaining approval of the Owner.

13.0 DELAY, COMPENSATION FOR DELAY AND EXTENSION OF TIME

13.1 Time is the essence of the contract and the Contractor shall complete the Work in all respects as per the Contract within the date/period of completion specified in the Appendix. Should the contractor feel that he will not be able to complete the work in time, he may apply for extension of Time to the Architect along with reasons and justifications there to for delays, if any.

13.2 On receipt of the recommendations from the architect if in the opinion of the Owner whose decision shall be final, conclusive and binding, the Work is delayed on account of valid reasons not within the control of the contractor, the Owner shall make a fair and reasonable Extension of Time for completion of the Contract. The Contractor shall not make any claim for compensation or damage in relation thereto.

COMPENSATION FOR DELAY/BONUS FOR EARLY COMPLETION

13.3 If the Contractor fails to complete the Work and clear the Site on or before the Contract or extended date/Period of completion, he shall, without prejudice to any other right or remedy of the Owner on account of such breach, pay as agreed compensation an amount calculated as stipulated in Appendix as "Compensation for Delay" for the period during which the said works shall remain incomplete beyond the scheduled dates of completion and the Owner may deduct such damages from any moneys due to the Contractor.

The compensation for delay shall be deducted from the contractor at a rate of 1% of contract value per week subject to a maximum of 5% of the contract sum from the scheduled date of completion mentioned in appendix. In case the extension of time is granted to the contractor and yet he fails to complete the work within the extended date of completion, the same rate mentioned here-in-before, time being reckoned from the scheduled date of completion mentioned in appendix.

13.4 Bonus for early completion will be paid to the contractor at the rate of Rs.15,000/- per week

14.0 DEFECT LIABILITY PERIOD

14.1 The Defect Liability period shall commence from the date of virtual completion as mentioned in the Certificate of Virtual Completion issue by the Architect. The duration of the Defects Liability Period shall be one year after the date of issue of virtual completion certificate to the contractor.

14.2 The Contractor shall be responsible to make good and remedy at his own expense any defect, shrinkage, settlements, or other faults which may appear within the Defects Liability Period arising in the opinion of the Architect/Owner who shall be the final authority.

14.2.1 For materials and workmanship not in accordance with the Contract, upon the directions in writing of the Architect/Owner and within such reasonable time specified therein, the Contractor shall amend and make good these at his own cost to the satisfaction of the Architect/Owner.

14.2.2 In case of default, the Owner may employ and pay other persons to amend and make good such defects, shrinkage, settlement or other faults, and all damages, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the Contractor and shall be recoverable from him by the Owner or may be deducted by the Owner from any moneys due or that may become due to the Contractor.

15.0 GUARANTEE

a. Beside guarantees required elsewhere, the Contractor shall guarantee the work in general for **one year** from the date of virtual completion as noted in above para 14.

b. All required guarantees shall be submitted to the Architect when requesting certification of account for payments by the Owner.

c. All required guarantee shall be submitted to the Architect in the prescribed forms

as a pre-requisite to acceptance and payment.

15.1 MATERIALS, TOOLS AND PLANT

All materials required for the execution of the works shall conform to the Approved Makes Of Materials as mentioned in Annexure I other than those mentioned in the Special Conditions shall be supplied by the Contractor. Materials so supplied shall have the approval of the Consultant before using on the works. All the rejected materials shall be removed at once from the site of work at the Contractor's own cost.

Original purchase bill, warrantee/guarantee card given/obtained at the time of with all requisite details purchase of all material shall be made out in the Owners name.

- Contractor shall obtain at his cost and Annual Maintenance Contract where available in his name for the period up to defective liability period (12 months after certification of completion)
- AMC contract to be transferred in the name of APPL after defect liability period.
- Additional /spares /consumables that may be required in the defect liability period shall be obtained and handed over to the owner by the contractor.

15.2 Tollages etc.

The contractor shall pay all tollages and other royalties, rent and other payments or compensation, if any for getting all the materials required for the works.

Supplying requisite agency with necessary equipments for setting out and of facilitate checking of accuracy as and when necessary should be the contractors responsibility and no extra cost will be paid for that.

15.2.1 Temporary fences, shelters, watchman, danger signals and such other precautions as are necessary for the protection of materials and to protect the public and properties of public as well will include in the rates quoted by the contractor.

15.2.2 The work site should be always kept clean of unwanted materials, rubbish etc., and all necessary safety precautions should be taken by the contractor as safety rules.

15.2.3 The final clearing will include dismantling and removing all the temporary structures put up by the contractor from the premises and cleaning off the area of work so as to make it neat and tidy to the full satisfaction of the Owner.

15.2.4 REJECTION OF DEFECTIVE EQUIPMENT & MATERIALS

15.2.5 If the equipment or any portion of materials do not conform to approved makes of material thereof before it is taken over, is found to be defective or fails to fulfill the extent of the requirements, the contractor on receipt of a written notice from the Owner, shall forthwith make good the defective materials within the stipulated period mentioned in the written notice or replace the equipment at no extra cost. Any damage caused during the transit testing etc. shall be made good by the Contractor without any extra charges.

15.2.6 MAINTENANCE

15.2.7 Contractor For a period of twelve months commencing immediately after taking over of the work by the "Owner" Contractor's liability shall be to replace the defective parts, rectify/reconstruct the defective work that may develop of his own construction or those of his sub-contractors approved by the "Owner" arising solely from faulty materials or workmanship.

15.2.8

15.2.9 If it is necessary for the Contractor to rectify/reconstruct any defective portions of the work under the contract, the provision of this condition shall apply to the portions of work so replaced or renewed until the expiration of three months from the date of such replacement or renewal until the end of the above mentioned period of twelve months, whichever may be later. If any defects be not remedied within a reasonable time the "Owner" may proceed to do the work at Contractor's risk and expense, but without prejudice to any other rights which the "Owner" may have against the contractor in respect of such defects.

16.0 VALUATION AND PAYMENT

The Architect/Project Engineer will measure the work and keep record as under:

i) All alterations, additions and or omission ordered on the contractor by the Architect with prior approval of the Owner in the kind or quality and actually executed, to determine the financial liability for payment/recovery.

ii) All such items of variation including changes in foundation, provisional items under measurable schedules and other variations ordered shall be recorded in measurement books in duplicate aided by diagrams and sketches as required. These entries will be jointly signed by the contractor/his agent, the Architect, countersigned by the Project Manager. The MBs will be in the custody of the Owner which may be loaned out against proper receipt to the Architect/Contractor for the purpose of record measurement only. All entries not signed as mentioned above shall not be considered for payment towards works executed.

16.1 MODE OF MEASUREMENT

The measurement of works carried out by the Contractor shall be taken in accordance with procedure set forth in the Specifications of CPWD/PWD amended up to date and notwithstanding any provision in the relevant standard Method of Measurement. In case of items not covered by the Schedule of Quantities/Specifications, measurements shall be taken in accordance with the relevant BIS Mode of Measurement.

16.2 MEASUREMENT OF WORKS

The Architect/Project Engineer may from time to time advise the Contractor that they require the work to be measured and the Contractor shall forthwith attend or send a qualified representative to assist the Architect/Project Engineer in taking such measurements and calculations and shall furnish all particulars or give all assistance required at no extra cost.

16.2a If the Contractor not attend or neglect or omit to send such representative then the measurements taken by the Architect/Project Engineer shall be taken to be correct measurements of the work and the contractor shall not be liable for any claim arising therefrom.

16.2b The Contractor's representative may note joint measurements along with the Architect's representative.

16.2c All authorized extra work, omissions and all variations made without the Architect's knowledge, if subsequently sanctioned by him after approval of the Owner in writing shall be included in such measurements.

16.2d On completion of measurements of certain work up to a particular stage, these shall be signed and dated by both the Architect, Contractor and the Project Director as a token of their acceptance. If the Contractor objects to any of the measurements recorded by the Architect/Project Engineer, a note to that effect shall be made in the Measurement Book against the item objected to and such note shall be signed and dated by Architect, Contractor and Project Director.

16.3 SECURITY DEPOSIT

The value of security deposit for faithful performance of the contract as per the Terms and Conditions of the Work Order shall be calculated as under:

2% of PAC. (Initial security deposit)

The security deposit will either be submitted in the form of Demand Draft favouring Arya Vaidya Sala, Kottakkal payable at Kottakkal.

In addition to the money held by the Owner as Initial security deposit. Retention Money as specified above will be deducted from each payment made to the Contractor. The Retention Money will be deducted 8% percentage of the gross value of work done, from each interim bill of the Contractor in the manner specified above proportionate to the gross value of work done, to include the cost of all work done at site whether extra or otherwise including all escalations paid, irrespective of the estimated cost of the work put to Tender.

The Retention Money deducted from each interim bills of the Contractor in the manner specified above, shall continue to be retained with Owner for due fulfilment of the work, and will be refundable after the virtual completion of the work as specified herein. No interest shall be payable to the contractor on the initial security Deposit and/or Retention Money retained with the Owner.

In addition to the money held by the owner and as further security for the due fulfilment of the contract 8% Retention & 2% Initial Security Deposit of the value of work/ done will be deducted from each payment made to the contractor limited to Rs.15,00,000/-. No interest will be paid for this security deposit. On completion of the work, 50% of the security deposit (EMD + Retention money) shall be paid after issuing the Architect's / consultants certificate of the completion of the building, against submission of bank guarantee for the same amount valid up to the defect liability period. The remaining 50% of security deposit will be retained for a further period of 12 months without interest and released after certificate is issued by the Architects / consultants.

16.4 PAYMENT OF INTERIM BILLS TO BE REGARDED AS ADVANCE

16.4.1 The Contractor shall on submitting the bill be entitled to receive a monthly payment proportionate to the part thereof then executed to the satisfaction of the Architect/Owner whose certificate of the sum so payable shall be final and conclusive against the contractor. But all such intermediate payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance for the contract or any part thereof in any respect or the occurring of any claim nor shall it conclude, determine, or affect in any way the powers of the Architect under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract.

16.4.2 PERIOD OF HONOURING INTERIM CERTIFICATE

a A sum equivalent to 75% of the bill amount, to be paid within 20 days from the date of receipt of bill by the Project Manager duly certified by the Architect/Project Engineer.

b Balance amount shall generally be paid within one month's after receipt of bill along with Architect's certificate.

16.5 FINAL BILL

The final bill shall be submitted by the contractor in duplicate within three months after obtaining the virtual completion certificate.

It shall be accompanied by all abstracts, vouchers M.Bs. etc., supporting it and shall be prepared in the manner prescribed by the Owner as per norms of CPWD/PWD including consumption of material etc.

No charges shall be allowed to the contractor on account of the preparation of the final bill.

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

The Architect shall check and forward the final bill along with all the measurement books in original to the Owner.

The contractor shall be entitled to be paid the full measured value of the work subject to deduction as mentioned below, less the value of payment made on account of any charges properly preferred under the conditions of contract, for stores supplied by the Owner subject to the certifications of the final bill by the Architect.

Payment of these items of the final bill in respect of which there is any dispute shall be made within 90 days of receipt of bill from the Architect. After the payment of the amount of the final bill payable as aforesaid has been made, the contractor may, if he so desires, reconsider his position in respect of the disputed portion of the final bill and take step for settlement and if he fails to do so within 30 days of making payment on account of undisputed items of final bill, his disputed claim shall be deemed to have been waived and abandoned by the contractor.

The performance guarantee may be returned by the Owner to the Contractor after the payment of final bill and the performance guarantee deposit or any amount remaining the expiration of the defect liability period if there is nothing against the contractor and provided that the works shall have been finally completed and all defects made good accordingly to the true intent and meaning and also provided that there was no case of fraud, dishonestly or fraudulent concealment relating to works or materials or any matter dealt with in the certificate and in case of any defects and insufficiencies in the work or materials which a reasonable examination would not have disclosed and provided always that the contractor shall have been paid the final bill and has rendered a "NO DEMAND CERTIFICATE".

All payments due under this contract shall be made by means of a crossed cheque/bank draft "A/c Payee" on a Nationalised Bank to the contractor or Electronic transfer

16.6 INCOME TAX DEDUCTIONS

Appropriate deduction as per relevant Income Tax Rules applicable at the time shall be made on the bills submitted by the Contractor.

17.1 WORK TO BE UNDER DIRECTION OF ARCHITECTS, TO BE FINALLY DETERMINED BY THE ARCHITECT/OWNERS

All works to be executed under the Contract shall be executed under the direction and subject to the approval in all respect of the Architect/Owner who shall be entitled to direct at what point or points and in what manner they are to be commenced, and from time to time carried on. The decision, opinion, direction, certificate (except for payment) with respect to all of any of the matters under clause Nos.2.2.2, 2.2.3, 2.3.1, 2.3.4, 2.5.3, 2.6.2, 2.10, 3.9, 3.10,4.12, 7, 10.2, 11.1 and 13 (which matters are herein referred to as the expected matters) shall be final and conclusive and binding on the Contractor hereto and shall be without appeal. Any other decision, opinion, direction,

certificate or valuation of the Architect or any refusal of the Architect to give of the same shall be subject to the right of Arbitration.

17.2 ARBITRATION

All disputes or differences arising between the parties hereto touching the subject matter of this agreement or the respective rights and duties of the parties under this agreement except those the decision whereof is specially provided for in the agreement to be final, shall be referred to the sole arbitration of an arbitrator, to be only nominated by the Managing Trustee, The Arya Vaidya Sala, Kottakkal whose decision thereon shall be final and binding on both the parties.

It shall hereby expressly agreed that the sole arbitrator shall not be disqualified by reason of the fact that he had on and earlier occasion dealt with the matter in dispute on the administrative side or his expressed views on all or any of the matter in dispute or difference.. In case the person nominated as the sole arbitrator is not available due to certain reason, the Managing Trustee, The Arya Vaidya Sala, Kottakkal shall nominate another person in his place, who shall proceed with the arbitration from the stage the arbitration proceedings were last left.

The arbitrator shall have power to open up, review and revise any certificate, opinion, decision, requisition or notice and shall determine all matters in dispute, which shall be submitted to him.

It is expressly agreed to by and between the parties that the arbitration proceedings shall be held in Malappuram and only courts having jurisdiction over Kottakkal, Malappuram District alone shall have jurisdiction.

17.3 PROCEEDINGS

17.3a The arbitrator may open up, review and revise any certificate, opinion, decision, requisition or notice, save in matters referred to in 18.1 with respect to which the decision of the Architect/Owner is by the Contract expressed to be final and may determine all matters in dispute which shall be submitted to him/them of which notice have been given as aforesaid.

17.3b The provisions of the Arbitration Act 1940, or any statutory modification or re-enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceeding under this clause.

17.3c The venue of the Arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion. The Arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties fixing the date of the first hearings.

17.3d The Arbitrator shall give a separate award in respect to each dispute or difference referred to him. The award of the Arbitrator shall be final, conclusive and binding on all the parties to this Contract.

17.4 WORK AND PAYMENT DURING ARBITRATION

17.4a The work under the Contract shall, if reasonably possible, continue during the Arbitration proceedings and no payment due or payable to the Contractor shall be withheld on account of such proceedings.

17.4b The contractor shall proceed with the work with all due diligence and no award of the Arbitrator, Arbitrators or the Umpire shall relieve the Contractor of his obligations under the Contract. Contractor shall adhere strictly to the Architect/Consultant's instructions with regard to actual carrying out the work.

17.5 LAW GOVERNING THE CONTRACT

The Indian Laws shall govern this contract for the time being in force.

17.6. AS BUILT DRAWINGS

The Contractor shall submit all as built drawings (Civil, Electrical and Plumbing) before submitting the final bill.

APPENDIX

SCHEDULE OF FISCAL ASPECTS (REFERENCE TO CONDITIONS OF CONTRACT ETC)

Sl.No.	Particulars	Requirements
1.	Date of commencement	:Within seven days from the date of work order.
2.	Period of completion. commencement.	; Nine months from the date of
3.	Contractor gross percentage to cover profit & Over heads etc.	: 15%
4.	Initial Security Deposit	:2% of the accepted contract sum by way of Demand Draft/ Bankers cheque
5.	Retention money as additional security deposit from interim and final bill	: 8 % (Eight Percent) of each payment limited to a maximum 15 Lakhs
6.	Refund of Initial Security deposit Retention Money.	: 50% of the Total Retention Money including Initial Security Deposit
	shall	be refunded against Bank gurantee after virtual completion and remaining 50% after expiry of Defect Liability period., of one year with out intrest
7.	Defect Liability Period	: One year after issue of virtual completion certificate
8.	Compensation For Delay	: 1% per week for the balance amount subject to a maximum of 5% of the total contract value
9.	Periods of Honouring Interim bills	: Once in 30 days or as decided by the Architect/Owner
10.	Period of Final bill/ measuremnts	: One month from the date of completion of the

work

GENERAL TECHNICAL SPECIFICATIONS

A. CIVIL WORKS

SECTION - I EARTH WORK

SITE CLEARANCE:

1.0 Before the start of the work the area where the structures are to be erected shall be cleared of all shrubs, vegetation, grass, bush, trees wood etc. and the structure shall be laid out to ensure that the layout plan fits the site. After entire completion of the work, the entire area of the plot shall be cleared of all debris, unwanted materials and levelled to the required slope/grade as shown in relevant drawings and to the entire satisfaction of the Project Engineer/Architect.

SITE LEVELS:

2.0 After clearing the site and before commencement of excavation or filling the contractor shall take point initial spot levels at every 3.0 metre intervals along with the authorised representatives of Employer/Architect. A record of these levels shall be signed jointly by the Project Manager, Architect and the contractor and a copy of the signed level chart may be forwarded to the Architect within 30 days from date of commencement of the work.

EXCAVATION IN TRENCHES:

3.0 Earth excavation in any type of soil for foundation of walls, columns and rafts or for piping of any size has to be carried out in strict accordance with the drawings specified for the work. In any case no extra payment shall be admissible on account of type of soil, sub soil strata, or due to encounter of sub soil water or depth of excavation unless or otherwise specified.

EXCAVATION IN EXCESS:

4.0 Trenches or foundations which are excavated beyond the specified dimensions shown in drawings due to bad workmanship of the contractor, the extra excavation shall be made good using lean concrete PCC 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate of 40mm nominal size) without any payment.

EARTH FILLING:

5.0 Approved Red earth from outside or good selected approved excavated earth free from roots, vegetations, debris boulders etc. shall be used for filling. The earth shall be laid in layers of thickness not excluding more than 15 cm at a time, spread, levelled, watered and well consolidated till a proctor density of 95% is achieved. The proctor density test shall be carried out by the contractor with out any extra cost to the employer at the rate of one test per 500 sq.metre. The test shall conform to relevant I.S.

BACK FILLING:

6.0 Good selected approved excavated earth shall be used for back filling around the structures. The specifications for back filling is same as that of the clause 5.0 earth filling. Any excavated part shall not be left open any where and shall be back filled to the entire satisfaction of Project Manager/ Architect.

7.0 PRE CONSTRUCTIONAL ANTI-TERMITE TREATMENT:- The preconstruction anti-termite treatment shall be done as per the following specifications.

a) Backfill treatment: After the masonry foundations and the retaining wall of the basements come up, the backfill immediate contact with the foundations structure shall be treated at the rate of 7.5 litres per square metre of the vertical surface of the sub-structure for each side.

b) Floor treatment: The top surface of the consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 litres per square metre.

c) Treatment of Soil Along External Perimetre of Building: After the building is complete, the earth along the external perimetre of the building should be rodded at intervals of 150mm and to depth of 300mm. The rods should be moved backward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 litres per square metre of vertical surfaces.

The above treatment shall be carried out as per IS 6313 (Part-II) 1981. The specified chemical for the above treatment shall be CHLORPYRIFOS 20%EC at 1% concentration.

7.1. Relevant Standards: The work shall conform to IS:6313 (Part II) - 1981.

7.2 Mode of Measurement: For payment purpose the area of plinth will be measured in square metre.

SECTION - II :

CONCRETE (PLAIN AND REINFORCED)

1.0 MATERIALS

1.1 Cement: Cement used shall be ordinary portland cement conforming to IS and shall be stored in a dry waterproof godown which shall be provided by Contractor. The cement shall be stacked in dry place covered all round and no stack shall be more than 12 bags high. Caked or cement containing clods shall not be used for any purpose.

1.2 Fine Aggregate: For all concrete work, it shall be coarse river sand/crushed stone dust conforming to the grading given below (Zone I of II of III duly applicable to concrete). Silt content not to exceed 4% by weight. The grading of fine aggregate shall be within the limit as given in the table and shall be described as fine aggregate grading zone I, II and III:-

IS Sieve Designation	Percentage passing for Grading Zone		
	I	II	III
10mm	100	100	100
4.75 mm	90-100	90-100	90-100
2.36 mm	60-95	75-100	85-100
1.18 mm	30-70	55-100	75-100
600 micron	15-34	35-59	60-79
300 micron	5-20	8-30	12-40
150 micron	0-10	0-10	0-10

1.3 Coarse Aggregate: For concrete, it shall be broken/crushed stone (granite) locally best available graded coarse aggregate, grading shall be within limits as given in the table.

IS Sieve Designation	Percentage passing for Grading Aggregate Nominal Size			
	40 mm	20 mm	16 mm	12.5 mm
80 mm	100	-	-	-

63 mm	-	-	-	-
40 mm	95-100	100	-	-
20 mm	30-100	95-100	100	100
12.5 mm	-	-	-	90-100
10 mm	10-35	25-55	30-70	40-85
4.75 mm	0- 5	0-10	0-10	0-10
2.36 mm	-	-	-	-

1.3.1 Grading of Coarse Aggregate:-

Graded aggregate of nominal sizes given hereunder, shall be used, unless specified otherwise.

a) Reinforced Cement Concrete

- i) For structural elements of depth/thickness more than and including 100 mm = 20mm.
- ii) For structural elements of depth/thickness less than 100 mm = 12.5 mm.

b) Plain Cement Concrete

- i) Under 30 mm thickness : 12.5 mm
- ii) 30 to 80 mm thickness : 20 mm
- iii) Exceeding 80 mm thickness : 40 mm

Note:-

In selecting coarse as well as fine aggregate, the contractor shall satisfy him self that the source is suitable and adequate for regular supply and a watch shall be maintained that the particle shape and grading remain reasonably uniform throughout the Progress of work. If directed by Project Engineer/Architect, the aggregate shall be washed at contractor's expense.

1.4 Water

1.4.1 Water used in concrete, brickwork, plasters and the like works etc. shall be clean, fresh and non saline according to 456 - 1978.

2.0 TESTING

2.1 The contractor shall provide all facilities and equipments for casting and conveyance of test cubes of cement concrete of Grade as specified (M-15/M-20/Design mix). The

testing shall be carried out in any approved testing laboratories and, all charges including testing shall be borne by the contractor. Proper record shall be maintained of tests results duly signed by the representative of Contractors, Architect and the Project Manager. A compression testing machine as to be installed at the site by the contractor for the purpose.

3.0 **MIXING**

3.1 All cement concrete, both plain and reinforced shall be mixed in mechanical mixer of approved type. However in case of small quantity (i.e the quantity of concrete required being less than one batch of mix), the contractor may, after obtaining written permission of the Architect, which shall be exceptional, adopt hand mix for small quantities of work such as bed blocks and sills subject to addition of 10% extra cement without any price adjustment. Where hand mixing is permitted, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

4.0 **CONSOLIDATION**

4.1 Concrete for all reinforced concrete works in column footings, columns, beams, lintels and slabs and the like shall be poured and well consolidated by vibrating, using portable mechanical vibrators. The rest of the concrete such as chajjas and shelves etc shall be poured and well consolidated by rodding and tamping. Care shall be taken to ensure that concrete is not over vibrated so as to cause segregation. In the event of breakdown of mechanical mixer and vibrator, the contractor must make arrangement for standby mechanical mixer and vibrators.

5.0. **FORM WORK**

5.1 The Steel/Plywood form work shall be designed and constructed to the shapes, lines and dimensions shown on the drawings. All forms shall ;be sufficiently water tight to prevent leakage of mortar. Forms shall be so constructed as to be removable in sections. Form work shall be rigid and shall retain shape and dimensions of the member being cast. Pre moulded cement cubes (cover blocks) shall be placed between form work and reinforcement to achieve uniform cover for reinforcement.

6.0 **COLUMNS**

6.1 In case of columns, maximum height of columns for which concrete can be placed at a time shall not be more than 2 metres. A key is to be made at the end of each casting in concrete column of appropriate size as per size of column in the rectangular/square shape to give proper bonding to column as per relevant IS/directions of the Architect.

7.0 PROPS AND CENTERING

7.1 These shall consist of ballies/steel sections. It shall be placed @ 1 to 1.2 metres centers bothways and shall rest squarely on wooden plates. Wedges shall be provided between sole plate and props. Sufficient bracing shall be provided horizontally. Beyond 3.5 metres, props shall be provided in multistages.

8.0 CLEANING AND TREATMENT OF FORMS

8.1 All rubbish, particularly chippings, shavings and saw dust shall be removed from the interior of the forms before the concrete is placed. The form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with approved composition to prevent adhesion between form work and concrete. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

9.0 VERTICALITY OF FRAME STRUCTURE AND CAMBER IN SHUTTERING

9.1 All the outer columns of the frame will be checked for plumb by plumb bobs as well as by the Theodolite as the work proceeds to upper floors. Internal columns will be checked by taking measurements from outer row of columns for their exact position. Shuttering for beams and slabs shall have a camber of 1:500 and for cantilevers it shall be 1:100 at the free end.

10.0 STRIPPING TIME

10.1 Forms shall not be struck until the concrete has attained a strength at least twice the stress to which the concrete may be subjected at the time of removal of form work. The strength referred to shall be that of concrete using the same cement and aggregate with the same proportions and cured under conditions of temperature and moisture similar to those existing on the work. Where so required form work shall be left longer. In normal circumstances and where ordinary portland cement is used, form may generally be removed after the expiry of the following periods:-

- | | |
|--|--------------|
| (a) Walls, columns and vertical faces of all structural members. | - 2 days |
| (b) Slabs (Props left under) | - 7 days |
| (c) Beam soffits (Props left under) | - 7 days |
| (d) Removal of props under slabs | } |
| (i) Spanning upto 4.5 m | { - 7 days } |

- | | |
|---|---|
| | { Single separate support be |
| (ii) Spanning over 4.5 m | - 14 days } provided in the centre for same |
| | { period. |
| (e) Removal of props under beams and arches | } |
| | { |
| (i) Spanning upto 6 m | - 14 days } |
| | { |
| (ii)Spanning over 6 m | - 21 days } |

10.2 In the case of bad/cold weather, these periods may be increased at the discretion of the Architect. For other cements (like pozzolana etc..) stripping time recommended for ordinary portland cement may be suitably modified. The number of props left under, their sizes and disposition shall safely carry full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during placing of concrete, curing or further construction.

10.3 Form work shall be removed in such a manner as would not cause any shock or vibration that would damage the concrete. Before removal of soffits and props, concrete surface shall be exposed to ascertain that the concrete has sufficiently hardened.

10.4 Where the shape of the element is such that form work has re-entrant angles, the form work shall be removed as soon as possible after the concrete has set to avoid shrinkage, cracking occurring due to the restraint imposed.

11.0 **FINISH TO CONCRETE WORK**

Finish to concrete work shall be described here-in-after.

11.1 All concrete while being poured against form work shall be worked with vibrators, rods and trowels as required so that good quantity compacted concrete is obtained.

11.2 All exposed surface of RCC lintels, beams, walls, columns, hangers, mullions and the like shall be plastered to match with adjoining plastered face of walls after suitably hacking and applying cement slurry water over the concrete surface.

11.3 All soffits of RCC slabs, loft slab, shelves and table tops on kitchen etc. and other exposed surfaces of RCC work not continuous to brick work shall be plastered (6 mm thick) with cement mortar 1:3 (1 cement : 3 fine sand) to give an even smooth surface. Neeru finish then shall be applied on soffits.

11.4 The top of the loft slabs and shelves shall be self finished while the concrete is green with a floating coat of neat cement to give a smooth and even surface. The exposed front face shall be finished in cement mortar 1:2 (1 cement :2 Coarse sand) to bring it in

line and level and finished with a floating coat of neat cement. Such thin slab shall be carefully cast so that they can be finished within their specified thickness. Additional thickness of plaster which makes these elements look unnecessarily heavy will not be allowed.

11.5 Chicken wire mesh 24 gauge and 20mm mesh, will be provided all along RCC surface adjoining brick work giving 150 mm lapping on either side using nails etc. for fixing jali before plastering.

11.6 The rates shall be deemed to include for small and incidental labour such as chamfers, splays, rounded or covered angles, grooves, rebate and drip moulds/courses.

12.0 **EXPOSED SURFACE** :

12.1 Exposed surfaces of all cement works viz: cement concrete, brickwork, flooring plastering, pointing and the like shall be cured by keeping the surfaces adequately and continuously damp or wet for atleast ten(10) days from the date of completion of stage. Approved curing compound may be used in lieu of moist curing with the permission of the Architect/Owner. Such compounds shall be applied to all exposed surfaces of the concrete as soon as possible, after the concrete has set. This shall be without extra cost.

13.0 **SAMPLES AND TESTING OF CONCRETE**

13.1 Samples from fresh concrete shall be taken as per IS: 1199-1959 (method of sampling of concrete) and cubes shall be made, cured and tested at 7 days and 28 days in accordance with IS: 516-1959 (method of test for strength of concrete). For testing cement concrete the contractor shall arrange for all the tools/moulds for making necessary cubes and shall bear all the charges for making the cubes, curing and testing through an approved laboratory. A temporary room of adequate size not less than 10 sqm to house these facilities shall also be constructed by the contractor at his expense. After completion of the work, the contractor shall remove the equipment, dismantle the room and clear the site. The contractor shall make available laboratory equipment for above tests as listed here-in-after.

13.2 Sieve set for aggregate 20 mm down

40 mm : dia 45 cms

20mm : dia 45 cms

16 mm : dia 45 cms

12.5 mm : dia 45 cms

10 mm : dia 45 cms
4.75 mm : dia 45 cms
600 micron : dia 20 cms
300 micron : dia 20 cms
150 micron : dia 20 cms
75 micron : dia 20 cms

13.3 Equipment for Weighing

- a) Physical balance cap - 200 gms with weight box (accuracy 0.5 gm)
- b) Counter scale cap 20 kg.
- c) Weights

5 kg : 1 No.
2 kg : 2 Nos
500gms : 2 Nos
200 gms : 1 No.
100 gms : 2 Nos
50 gms : 1 No.
20 gms : 1 No.
10 gms : 1 No

13.4 Slump Cones : 2 Nos

13.5 15 cm Moulds : 36 Nos

13.6 Electric/Kerosene heater : 1 No

13.7 Pans etc as directed by the Project Engineer/Architect.

13.8 Vicat apparatus with needles, test tubes, beakers, thick glass plate etc.

13.9 Measuring cylinders

- i) cap 1000 ml : 2 Nos
- ii) Cap 500 ml : 2 Nos

13.10 Wash bottles Cap 500 ml : 2 Nos

13.11 Sink : 1 No

13.12 Litre Measures

a) 2 Litre : 2 Nos

b) 1 litre : 1 No

c) 1/2 litre: 1 No

13.13 Compressive Test Machine of Suitable Capacity: 1 No

14.0. **TEST STRENGTH OF SAMPLES**

14.1 The test strength of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than -, + 15 percent of the average. The strength of the respective concrete grades shall be as per IS 456-1978.

14.2 Compressive strength tests at 7 days may be carried out in addition to 28 days. In all cases the 28 days, compressive strength alone shall be the criteria for acceptance or rejection of the concrete. Three specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for such purposes as to determining the strength of concrete at 7 days or to check the testing error.

15.0. Mix of cement concrete/reinforced cement concrete required to be used in various location/situation shall be described here-in-after.

15.1 Cement concrete in floors (self finished), ramps and concrete as under layer for terrazzo floor cast in situ shall be PCC 1:2:4 (1 cement:2 coarse sand : 4 graded stone aggregate 12.5 mm nominal size).

15.2 Cement concrete for mat PCC work in column footings, it shall be of mix 1:4:8 (1 cement : 4 coarse sand: 8 graded stone aggregate 40 mm nominal size) and for load bearing wall footing, it shall be of mix 1:4:8 (1 cement :4 coarse sand :8 graded stone aggregate 40mm nominal size).

15.3 Cement concrete for RCC work lintel bands and lintels, chajja, shelve, balcony, loftsab, suspended floor, and in any other situation shall be of mix 1:2:4 (1 cement : 2 coarse sand: 4 graded stone aggregate 20mm nominal size) with reinforcement and shuttering.

15.4 Cement concrete in plinth protection, PCC filling for rain water pipe (concealed), holdfast blocks shall be 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 12.5 nominal size).

15.5 PCC 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate : 12.5 nominal size) shall be used for RCC hand rails.

16.0 **THROATING AND WEATHERING:**

16.1 Throating to projections of RCC/PCC beyond external faces of the walls where shown on drawings, and where RCC chajjas are not provided with downward facia shall be formed in the concrete while casting by planting a fillet/bar of 12 mm diameter in the form work and finished smooth.

17.0 **P.C.C. CILLS:-**

17.1 P.C.C. Cills shall be provided below all windows and shall be provided with a minimum bearing of 5 cm at non continuous ends. However, bearing of cills shall not be provided at ends where cills are abutting in RCC structures.

18.0 Drip course

18.1 Drip course shall be provided to chajjas, balconies and the like places in cement mortar 1:3 (1 cement : 3 fine sand) whether shown on drawing or not as per direction given by Architect.

SECTION III

BRICK WORK.

MATERIAL

1.0 **SAND FOR MASONRY MORTAR**

1.1 Unless otherwise indicated, sand for masonry mortar shall consist of natural river sand (generally termed as coarse sand), conforming to IS:2116-1965 specification sand for masonry mortars. Sand shall be hard, durable, clean and free from adherent coating and impurities such as iron pyrites, alkalies, salts, coal, mica, shale or similar laminated or other materials exceeding the specified limits. Grading of sand shall be given in table below.

IS Sieve	PERCENTAGE PASSING BY WEIGHT	
	Unreinforced masonry	Reinforced masonry
4.75 mm	100	100
2.36 mm	90-100	90-100
1.18 mm	70-100	70-100
600 micron	40-100	40-100
300 micron	5-70	5-70
150 micron	0-75	0-10

1.2 The maximum quantities of clay, fine silt and fine dust in sand shall not be more than 4 percent by weight. Organic impurities shall be below that obtained by comparison with the standard solution as specified in 6.2.2 of IS: 2386-1983 (part - II).

2.0 **BRICKS**

2.1 Test checks on random samples from each lot of bricks brought at site shall be carried out for compressive strength efflorescence test and water absorption test. Result of these test duly signed by Contractor, Architect shall be recorded in a separate register which shall be kept with the Project Engineer.

2.2 Bricks shall be kiln burnt, locally available, best quality. Bricks shall have minimum crushing strength of 35 Kg/Cm². Water absorption of bricks shall not exceed 20% when tested in accordance with IS 3495 of 1966. Sampling and testing of bricks shall be carried out as per IS 5454 (1978) and IS 3495 (1966). The bricks shall be well burnt (NOT OVER BURNT) having plane rectangular faces and parallel sides, having uniform texture. The bricks shall be table moulded as per local practice of moulds.

PREPARATION OF CEMENT MORTAR

3.0 Mortar shall be of mix as indicated. The mixing specified are by volume. Mixing shall be done in a mechanical mixer. The mortar shall be mixed for atleast three minutes after adding of water. Cement mortar shall be freshly mixed for immediate use. Any mortar which has commenced to set shall be discarded and removed from the site.

BOND

4.0 All works shall be build in English bond unless otherwise indicated. Half brick walls shall be built in stretcher bond. Header bond shall be used for walls curved on plan for better alignment. Header bond shall also be used in foundation. Stretchers may be used when the thickness of wall renders use of headers impracticable. Where the thickness of footings is uniform for a number of courses, the top course of the footings will be of

headers. Brick courses at DPC level and at all slab levels below the bearings of slab shall be as brick on edges.

5.0 Half or cut brick shall not be used except where it is necessary to complete the bond.

6.0 Overlap in stretcher bond is usually half brick and is obtained by commencing each alternate course with a half brick. The overlap in header bond which is equally half width of the brick is obtained by introducing a three quarter brick in each alternate course at quoins. In general, the cross joints in any course of brick work shall not be nearer than a quarter of brick length from those in the course below or above it.

CURING

7.0 The brick work shall be constantly kept wet for at least ten (10) days for curing.

HALF BRICK WALLS REINFORCED

8.0 The brick work with common burnt clay bricks shall be laid in stretcher bond in cement and sand mortar 1:4 (1 cement : 4 coarse sand) or as indicated. The reinforcement shall be 2 nos. MS round bars or as indicated in drawings. The diameter of bars shall be 6mm. The first layer of reinforcement shall be used at second course and then at every fourth course of brick work. The bars shall be properly anchored at their ends where the portions where these walls join with other walls. The inlaid steel reinforcement, shall be completely embedded in mortar. Overlap in reinforcement, if any, shall not be less than 30 cm. The cover i.e., the mortar inter posed between the reinforcement bar and brick shall not be less than 5mm. The mortar covering in direction of joints shall not be less than 15 mm.

Note: Reinforcement will only be use where necessary as directed by the Architect/Owner and shall be paid separately in the item of reinforcement.

CONCRETE BLOCK

The solid concrete blocks are used as load bearing units and shall have a block density not less than 1 800 kg/m³. These shall be manufactured for minimum average compressive strength of **4.0 and 5.0 N/mm²**

BRICK WORK IN SUPERSTRUCTURE

9.0 Brick work in superstructure shall be with bricks of minimum crushing strength of 35 kg/cm². The mortar used shall be of mix 1:5 (1 cement : 5 coarse sand).

10.0 Half brick walls shall be with bricks of minimum crushing strength of 35 kg/cm² in cement mortar 1:4 (1 cement :4 coarse same) for all floor including reinforcement (2 number of 6 mm dia MS bar at every fourth course).

11.0 All brick joints shall be raked out at the end of days work. When below beams, when the gap between top layer and soffit becomes less than one brick thickness +10mm joint space, the same shall be filled with PCC 1:3:6 with 12.5 mm graded aggregate. The gap shall be filled from both faces and tamped and compacted thoroughly. The brick work shall be kept wet for atleast 7 days.

SECTION - IV

JOINERY

ALUMINIUM DOORS, WINDOWS, VENTILATORS AND FIXED PARTITIONS

1.0 The aluminium sections shall be of Indal make or equivalent. The outer frame shall be made out of rectangular tubular sections. The shutters shall be made out of specially extruded tubular sections where provision for weather- stripping shall be made in the vertical jambs.

2.0 The cleats for mechanical horizontal/vertical joints of the fixed frame and shutters shall be of specially extruded aluminium sections so as to avoid any play between jointed members.

3.0 Shutters shall be provided with PVC/Neoprenes weather stripping. The glazing beads, both on shutter as well as fixed glazing, shall be of screwless type.

4.0 The aluminium sections shall be anodized in natural matt finish. Thickness of anodic film shall be minimum 15 microns.(+/- 3 microns). The section shall be of INDAL or Equivalent make conforming to IS standards.

5.0 Fittings,

5.1 Fittings shall be as follows :

- (a) Aluminium tower bolt - 150 mm long (2 Nos. per shutter)
- (b) Locking arrangement and handle - for doors.
- (c) 1 No. handle, 2 Nos. tower bolts, 1 No. stay per shutter for windows.

6.0 Glazing

6.1 Unless otherwise specified or directed, glazing shall be good quality glass sheets free from flaws, scratches, cracks and any bubbles.

7.0 Glazing to door, windows and ventilators shall be as follows and of quality as approved by Architect.

- | | |
|---|--|
| (a) Door/Window/Ventilator shutter
(openable and fixed) except for toilets | : 4 mm thick clear
plain glass sheet. |
| (b) Ventilator of toilet | : 4 mm Thick grounded glass sheet. |
| (c) Fixed Door/Partition | : 6mm thick clear plain glass sheet. |

NOTE

The contractor shall provide one sample piece of each type of door/window/ventilators for approval of the Architect before mass production.

SECTION - V :

STEEL AND IRON WORK

1.0 Steel and iron work shall be executed as indicated in drawing and as per standard practice.

2.0 Quality of steel shall conform to the following specifications:-

- | | |
|--------------------------------|--------------------------|
| 2.1 Mild steel (miscellaneous) | - IS:432-1982 (Part - I) |
| 2.2 MS reinforcement bars | - IS:432-1987 (part-II) |
| 2.3 Steel deformed bars | - IS:1786 -1985 |
| 2.4 Structural steel works | - IS: 226 - 1975 |

2.5 STRUCTURAL STEEL WORKS:

(a) *General* : The contractor shall provide all items, arts materials, operations mentioned or scheduled on drawings including all labour, materials, fixing devices handing and erecting equipment and other incidents necessary for their completion.

All steel work shall conform to IS 800 : 1962 and shall be from defects impairing strength, durability or appearance and shall be of the best tested commercial quality for purposes specified, and possessing structural properties to withstand safely the stresses to which these shall be normally subjected. The contractor shall bear the costs of all tests.

(b) *Shop Drawings* : The contractor shall submit shop drawings to the Architects / Consultants for approval. These shall show full size sections of all joints and connections, thickness of materials used and details of welds, bolts, rivets etc. Shop drawings shall clearly distinguish between shop and field rivets, bolts and welds, shop drawings shall be made in conformity with I.S. Code for shop drawings and with due regard to speed and economy in fabrication and erection. A marking diagram allotting distinct identification marks to each separate piece of steel work shall be prepared. The diagram shall be sufficient to ensure convenient assembly and erection at site. All shops drawing shall show temporary bracings and connection required during fabrication and erection. All shop drawings shall show temporary bracings and connections required during fabrication and erection. All shop drawings shall be prepared in advance of the actual fabrication.

(c) *Unloading and Stacking* : All structural steel members brought by / handed over to the contractor shall be handled with care, stacked on edge and supported evenly.

(d) *Welding* : Welding wherever indicated on the drawings shall be conforming to IS 814 - 1963. Unless otherwise specified, all welds shall be 6mm single fillet welds.

Welds should be made in the flat position wherever possible.

Adequate steps shall be taken to maintain the correct arc length rate of travel, current and polarity for the type of electrode and nature of work.

Structural steel shall not be painted or oiled on any areas where welding is to be performed and shall be well cleaned to remove any paint, scale or rust immediately before welding for a distance of at least 2 cm on either side.

The work shall be securely held in position by means of track welds, service bolts, clamps or jigs before commencing welding so as to prevent any relative movement due to distortion, wind or other causes. When welding is liable to cause distortion the work shall be securely held in approved frames or jigs.

Freedom of movement of one member of the joint shall be allowed wherever possible. No joint shall be welded without allowing one component freedom of movement of order of 1/16" (2mm).

The sequence of welding shall be such that when possible the members which offer the greatest resistance to compression are welded. The welding of a joint shall be arranged so that the resulting tensile and compressive stresses produced by each portion of the weld tend to balance each other. The step back method of welding shall be adopted for continuous runs.

Fusion faces may be cut by shearing, chipping, machining or machine gas cutting. Hand cutting by gas may be substituted for machine gas cutting only if the layer is impracticable, and the cutter shall be adequately guided so that the cut edge is clean and uniform. If the fusion face is rough, it shall be dressed by chipping, filing or grinding in a satisfactory manner.

Welds showing slag inclusion, porosity or lack of proper penetration shall be cut and rewelded. Overlap of the toe of the weld and under-cutting of the parent metal should be avoided and where present to a serious extent shall be rectified.

All slag shall be removed from each run before another run is superimposed and from the final run. When cold, the final run shall be protected with clean boiled linseed oil and shall not be painted until approved by the Architects/Consultant or his representative at site.

Grinding of finished weld is permitted provided the weld is not reduced below the prescribed section. All exposed welds shall be ground smooth.

All welds which have not been ground shall be scrubbed, with a ten per cent solution of hydrochloric acid which shall be washed off with water before paint is applied unless an alkali resisting paint is used.

The contractor shall employ a competent welding supervisor or charge hand to ensure that the standard of workmanship and the quality of the materials comply with the general requirements.

The Architects / Consultants and his representative shall have free access to the work being carried out by the contractor at all reasonable times, and facilities shall be provided so that during the course of welding he may be able to inspect any layer of weld metal. He shall be at liberty to reject any defective welds to be cut and rewelded.

Parts to be fillet welded shall be brought in as close contact as practicable and in no event shall be separated more than 3/16 inch. If the separation is 1/16 inch or greater, the size of the fillet welds shall be increased by the amount of the separation.

The separation between facing surfaces of lap joint shall not exceed 1/16 inch. The fit of joints at contact surfaces which are not completely sealed by welds, shall be close enough to exclude water after painting.

Abutting parts to be but welded shall be carefully aligned. Mis-alignment greater than 1/8" shall be corrected and in making the correction, the parts shall not be drawn into a sharper slope than two degree (7/16" inch in 12 inches).

- (e) *Fabrication and Erection* : In order to facilitate handling, transportation and execution the contractor may fabricate the structural members in suitable sections. The details of the site connections and their location shall be approved by the site organiser.

Frame or lattice sections intended for use as parts of composite construction which are likely to deflect considerable during handling, shall be suitable stiffened by means of steel angles.

Road and other structures shall be supported at close intervals during the welding / bolting of site connections.

- (f) *Bracing* : The frame of steel skeleton buildings shall be carried up true and plump, and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including equipment, and the operation of same. Such bracing shall be left in place as long as may be required for safety.

- (g) *Adequacy of Temporary Connections* : As erection progresses, the work shall be securely bolted up, or welded, to take care of all dead load, wind and erection stresses.
- (h) *Alignment* : No riveting or welding shall be done until as much of the structure as will be stiffened thereby has been properly aligned.
- (i) *Erection* : Required camber of trusses shall be shown on the erection diagram. If camber involves the erection of any member under a straining force, this shall be noted on the erection diagram.
- (j) *Cambering* : Cambering if any, of trusses, beams or girders shall be shown on the drawing.
- (k) *Straightening Bends.*: Slight bends in the members of fabricated structures shall not be straightened unless strictly necessary on account of the danger of overstraining connections and rivets welds or bolts. Connection plates if slightly bent or twisted, shall be straightened colder if bent so sharply as to require heating, the whole piece thus heated shall be subsequently annealed. No straightening whatsoever shall be carried out without the previous sanction of the Architect / Consultant
- (l) *Damaged Parts* : Any material found damaged or defective shall be stacked separately and the damaged or defective portions shall be painted in distinctive colour.

Such material is to be dealt with expeditiously under the orders of the Architects / Consultants.

- (m) *Expansion Gaps* : Particular care must be taken to ensure free expansion and contractions, wherever provided for in drawings or special specifications.
- (n) *Paint* : All structural iron work in buildings, tank staging etc. shall be thoroughly scrapped, cleaned and given the first coat of red lead paint before erection.

Final painting of the structure shall not be done till such time as the Architects / Consultant has satisfied himself that the rivetting, welding

and bolting has been completed in a workman like manner and all defective joints have been replaced.

(o) *Painting joints* : The surface of all joints must be thoroughly scrapped and then painted with a thick coat of red lead before jointing up, which should be done while the paint is still wet. This procedure shall not apply to welded joints.

Care must be taken to see that all the component parts fit, correctly and according to the distinguishing joint or match marks. No interchange of pieces shall be made, unless absolutely necessary to avoid chipping and filling, or serious delay. For such interchange of piece specific prior approval for the Architects / Consultant is necessary.

(p) *Measurements* : All fabricated trusses, frames gantry girders, crane rolls fish plates, clamps, square or round bars etc. stanchions, built up Girders and purlines shall be measured as per standard net weight of various members.

The standard rolled section members fixed in place by bolts etc. shall be priced under separate head by weight.

The net weight of cleats, brackets, packing pieces rivet head, bolts, distance pieces, separators, gussets and fish plates etc. shall be added to the weight of the respective items. The holding down bolts i.e. nuts and washers shall be measured by weight and paid under the item of structural steel unless otherwise specified.

In case of rivetted work the weight of rivets shall be paid without any deduction for rivet and bolt holes in case of welded work the weight of welds is not to be allowed.

The weight of steel members shall be taken as per I.S.I. Standard and no allowances shall be made for rolling margins in steel work.

The rate and mode of measurement shall be as per the BOQ.

3.0 **REINFORCEMENT**

3.1 Reinforcement bars 6 mm dia shall be MS bars.

3.2 All reinforcement bars 8 mm and above shall be deformed/cold twisted steel bars.

3.3 Laps and crossing shall be tied with mild steel drawn wire of size not less than 0.9 mm dia.

3.4 The contractor shall be responsible for accurate fixing and placing of reinforcement shown in drawing and shall not place the concrete until reinforcement has been checked by the Architect.

3.5 Reinforcement shall be bent and fixed as per IS: 2502-1963

3.6 Laps in reinforcement for columns, beams and slabs etc., shall be as stipulated in IS: 456-1978 and in the structural drawings.

4.0. Holdfasts shall be made of MS flats of size as specified with split fish tail ends coated with antirust paint/tar. Holdfast shall be joined to door/windows/ventilators frame as specified.

5.0 Grills fabricated out of; mild steel square bars 10*10 mm and of pattern as shown on drawings. shall be provided to all fixed and openable windows/ventilators. Grills shall be welded, painted as per specifications. All grills shall be fabricated and fixed to wooden frames in the factory where the frames are manufactured and shall be brought to site as welded.

6.0 Railing above RCC hand rail wall of main staircase has to be of 32mm G.I. pipe fixed with 15mm M.S. square legs at 500 mm c/c as shown in drawings. The pipe and lugs has to be painted with one coat of zinc chromate primer and two quotes of approved enamel.

7.0 **TRUSS/STRUCTURAL WORK**

Truss work shall be with standard sections as per the detailed working drawings. The joint shall be provided with required number of splicing and welded as per relevant IS specifications. All members shall be cleaned to the entire satisfaction of the Owner/Architect and painted with two or more coats of approved enamel paint over a coat of primer.

8.0 **ROLLING SHUTTERS**

8.1 General

8.1.1 Rolling shutters shall be self rolling type (push pull manual type) obtained from a reputed manufacturer. These shall include necessary locking arrangement and handles etc. and shall conform to IS 6248.

8.2. Shutters

8.2.1 These shall consists of M.S. laths 12.5mm thick and 80mm wide or as specified. The laths shall be of machine rolled and straightened with an effective bridge depth of 16mm.

8.3 Spring

8.3.1 The springs shall be preferably of coiled type. The spring shall be manufactured from high tensile steel wire or strip of adequate strength to balance the shutters in all positions.

8.4 Cover Spring Assembly shall be with M.S sheets 18 gauge thickness.

8.4.1 Guide Channels

8.4.2 The guide channels shall be of mild steel deep channel section and of rolled, pressed or built up construction. The thickness of the sheet used shall not be less than 3.15mm.

8.4.3 The minimum depths for guide channel shall be as follows:

(a) For width upto 3.50m - 60mm.

(b) 3.5m and above - 75mm.

10.5. Fixing

8.5.1 Brackets shall be fixed on the lintel or under the lintel as specified. The shaft along with the spring shall then be fixed on the brackets.

8.5.2 The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with it with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and the cover frame shall then be fixed to the walls through the plate, welded to the guides. The plates and screw bolts shall be concealed in cement plaster to make their location invisible. Fixing shall be done accurately in a workmen like manner that the operations of the shutter is easy and smooth.

8.5.3 Rolling shutters shall be painted with two or more coats of synthetic paint over a coat of zinc chromate primer oxide primer.

9.0 **WELDING**

9.1 This shall be done by electric process with precautions for health and safety. The places to be welded be cut angularly so that the welding material does not protrude and the member to be welded join properly. The welds shall be ground clean to give a one piece appearance. The welds shall run continuously around the contact surfaces of two meeting sections. Throat thickness not less than 4 mm.

10.0 **PAINTING** :

10.1 Reference shall be made to the following Indian Standards:

IS 2524, IS 1447

10.2 Preparation of surface

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

10.2.2 In case of GI surfaces, surface so prepared shall be treated with Mordant solution (5 litres for about 100 sq.m) by rubbing the solution generously with brush. After about half an hour, the surface if required shall be re touched and washed down thoroughly with clean cold water and allowed to dry.

10.3 Application of priming and paints.

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

SECTION - VI

FLOORING

1.0 GRANOLITHIC FLOORING

1.1 Plain cement concrete flooring (Granolithic) 52mm thick, cement concrete floor 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) with 6mm thick 40 mm wide asbestos cement sheet Or 4mm thick and 40mm wide glass strips dividing strips. This shall be laid in bays not exceeding 1200 x 1200 mm. These strips shall be placed in position to form bays and border. The top surface shall be broom finished. To match the concrete floor, 52mm high, 15 mm thick skirting where required shall be laid in cement mortar of mix 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement to make it even and smooth.

1.2 Top layer of 12mm thick hardened concrete topping consisting of metallic hardner of mix 1:2 (1 cement hardener mix : 2 stone aggregate 6mm) by volume. Cement hardner mix shall be prepared by adding approved quality hardening compound (metallic) in the ratio 4:1 (4 - cement and 1 - metallic hardner).

2.0. WHITE GLAZED TILES IN DADOING FOR TOILETS

2.1. Vitrified / Glazed tiles of first quality shall be provided in Dado of kitchen and toilets. The tiles shall be set over screed/plaster 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) to wall surface, set and jointed with neat white cement slurry. The joints shall be neat and fine. Tile face shall be kept flush with the skirting below.

2.2. Size and make of glazed tiles both for toilets, baths, WC and kitchen shall be approved size by the Architect/Owner irrespective of what is shown on drawings.

2.3. The colour of tiles shall be white or as directed by the Architect/Owner.

2.4 . Height of Vitrified/glazed tiles dado above floor finish level in WC/toilets and all-round hand wash basin shall be as shown on the drawings or as directed. In kitchen, glazed tiles shall be done above kitchen platform on the entire wall perimeter covered by the platform, sink and drain board. Height of the glazed tiles shall be 450 mm for portion above the platform.

3.0 VITRIFIED FLOOR TILES

The toilet shall be provided with approved quality anti-skid VITRIFIED flooring having approved colour. The tiles shall be laid over a bed of CM 1:6 and the joint shall be grouted with CM 1:3 having colour matching with the colour of the tiles.

SECTION - VII :

WALL FINISHES

GENERAL

1.0 It should be ensured that brick masonry joints are raked out (at least on even surfaces) to a depth of 12 mm and all concrete surface are rough enough for proper adhesion of plaster. If not, they shall be made rough by hacking or bush hammering at intervals of 50 mm. Efflorescence, if any, dust/dirt shall be removed. The surface shall be wetted adequately before plastering.

2.0 Sand used in plaster shall be within the grading zones as stipulated in the IS. Silt contents shall not exceed 4% by weight. Brick surface shall be raked out at the end of dry brick work to afford key to plaster, mortar plaster surface shall be hard and even without patchy appearance. If they flake or show scratch marks if rubbed by pointed nail the plaster shall be rejected, dislodged and redone.

CLEANLINESS

3.0 All dirt, dust and other foreign matter on masonry and laitance on the concrete surface shall be removed by watering and brushing as required. If the background contains soluble salts particularly sulphates, the application of plaster shall be done only after complete efflorescence is removed from the surface.

ROUGHNESS

4.0 Smooth surfaces of in-situ concrete walls and ceiling etc. shall be roughened by wire brushing, if it is not hard, and by hacking or bush hammering, if it is hard to provide for proper adhesion. Projection burrs of mortar because of gaps at joints in shuttering shall be removed. The surface shall be scrubbed clean with wire brushes. In addition concrete surface shall be pock marked with a pointed tool at spacing of about 50mm, the pocks made to be not less than 3 mm deep.

SUCTION ADJUSTMENTS

5.0 Adequate drying of intervals shall be allowed between the erection and plastering to bring the surface suitable for suction adjustment. High rate of suction makes the plaster weak, porous and friable. The wall shall not be soaked out only damper evenly before applying the plaster soaked out only damper evenly before applying the plaster. If the surface becomes dry in spots, such areas shall not be soaked but only damper evenly before applying the plaster. If the surface becomes dry in spots, such areas shall be moistened again to restore uniform suction. Excessive water leads to failure of bond between the plaster and the background.

EVENNESS

6.0 Any local unevenness must be levelled and projections removed to avoid variance in the thickness of plaster.

PRECAUTION AGAINST DISCONTINUITY IN BACKGROUND

7.0 A straight out groove through the plaster of the junction of wall to ceiling may be provided where directed.

8.0 Holes left in the wall after removing scaffolding shall be filled up with the respective masonry and mortar and the patch plastered up to and in conformity with rest of the wall so that no sign of patch work shows out.

9.0 Plastering operations shall not be started until all necessary fixture such as door and window frames, mantle and the like are completed and all pipes and conduits to be embedded have been installed and surfaces to be plastered have been passed by the Architect.

PROTECTION

10.0 All existing work and fittings that are likely to be damaged in the application of plastering shall be protected.

Care shall be taken to avoid splashes on paint work and glazing as far as possible. If any splashes on paint work or glazing, the same shall be cleaned immediately.

11.0 Screed 15 x 15 cm shall be laid vertically and horizontally not more than 2 m apart to serve as guides in bringing the work to uneven surface.

12.0 Plastering shall be done from top to bottom and care shall be taken to avoid joints in continuous surface.

MAINTENANCE OF PROPER TIME INTERVALS

13.0 To avoid breakdown in adhesion between successive coats of plaster, drying shrinkage of first coat shall be allowed to be materially completed before a subsequent coat is applied.

14.0 All corners, arises, angles, junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering of corners, arises and junctions shall be carried out with proper templates to the required size. Plastering of cornices, decorative features, etc. shall normally be completed before the finishing coat is applied.

15.0 In suspending the work at the end of the day, the plastering shall be cut clean to the line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scraped cleaned and wetted with lime putty or cement slurry before plaster is applied to the adjacent area.

16.0 Partially set and dried mortar shall not be re-tamped for use.

ONE COAT PLASTER WORK

17.0 Mortar shall be firmly applied to the masonry walls and well pressed into the joints and forcing it into surface depressions to obtain a permanent bond. The plaster shall be laid in a little more than the required thickness and levelled with a wooden/aluminium straight edge and wooden float. For concrete surfaces, rendering shall be dashed on to roughened surface to ensure adequate bond. The dashing of rendering coat shall be done using a strong whipping motion at right angles to the face of walls. The surface shall be finished even and fair unless indicated to be finished even and smooth.

CURING

18.0 Each coat shall be kept damp continuously for at least two days. Moistening shall commence as soon as the plaster has hardened sufficiently and is not susceptible to injury. The water shall be applied preferably by using a fine fog spray. Soaking of wall shall be done. Excessive evaporation on the sunny or windward sides of buildings in hot dry weather shall be prevented by hanging matting or gunny on the outside of the plaster and keeping them wet.

INTERNAL SURFACE

19.0 Cement plaster internally on all internal surfaces including soffits of RCC slabs, chajjas, lintels, all-round shelves, all-round columns, inner side of parapets/railing and all around of pergolas etc. shall be as under:-

- a) 15mm thick plaster in cement mortar 1:5 (1 cement : 5 parts of 75% of fine sand and 25% coarse sand). Dubbing out (i.e. bringing up the undulation on the rough face of brick work in level with prouddest points) shall also be executed in the same mix along with rendering coat.
- b) 6mm thick plaster in cement mortar 1:4 (1 cement : 4 fine sand) on soffits of RCC slabs, chajjas and lintels, shelves and pergolas.
- c) 10 x 6mm grooves shall be provided in ceiling plaster at junction of wall and ceiling.
- d) GI chicken wire mesh 24 gauge and 20mm mesh shall be fixed all along RCC and brick joints in a width of 150mm with cement slurry pegs before plastering were directed by the Architect/Owner.

EXTERNAL SURFACE

20.0 Cement plaster in 1:5, 15mm thick, in one layers (on rough face of brick wall) shall be provided to all external surface of walls jambs of doors and windows opening.

21.0 The joints on the surface shall be raked out. Dust and loose mortar shall be brushed out. The surface shall be thoroughly washed with water, cleaned and kept wet before plastering is commenced. Mortar of specified mix using the type of sand described in the item shall be used. Where coarse sand is to be used, the fineness modules of the sand shall not be less than 2.5mm.

22.0 12mm thick under layer in cement mortar 1:5 (1 cement : 5 coarse sand) shall be applied in the same manner as described above and as per direction of Architect/Owner.

23.0 6mm thick, top layer shall be applied a day or two after the under layer has taken initial set. The latter shall not be allowed to dryout, before the top layer is laid on. The mortar used for applying top layer shall be sufficiently plastic and of mix 1:6 (1 cement : 6 fine sand) or as otherwise specified so that the mix of sand and gravel sets well pitched with the plaster surface. In order to make the base plastic, about 10% finely grouted hydrated lime by volume of cement shall be added.

GROOVES ON EXTERNAL SURFACE

24.0 Grooves shall be 10mm x 6mm size and pattern of grooves shall be as per approval of the Architect/Owner at the junctions and where required.

SECTION - VIII :

WHITE WASHING, DISTEMPER AND PAINTING

GENERAL

1.0 White wash shall be provided to all ceiling and internal surface of toilets and godown area etc.

2.0 Before application of white wash the surfaces shall be prepared to a clean and even surface including necessary repairs.

3.0 Cement Base Paint (Sandtax Mat or equivalent) shall be provided on external walls/surfaces as directed by the Architect/Owner.

WHITEWASHING

4.0 White wash (lime wash) shall be carried out in three coats or more as required for proper completion of work.

5.0 White wash shall be prepared from lime slacked on site, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for 24 hours and shall be screened through clean cloth. 4 kg. of gum dissolved in hot water shall be added to each cubic metre of the cream (115 gm/cft). Blue shall be added to give required whiteness. The approximate quantity of water to be added in making cream shall be five litres per kg. of lime 10% zinc oxide shall also be added to obtain a desired shining in the white wash or the material may be prepared with the help of adhesive currently being used.

6.0 CEMENT BASE PAINT (SANDTEX MATT OR EQUIVALENT): Two or more coat of water proofing cement base paint shall be applied to give even shade on all external surfaces inside and top of parapets. Soffits of chajjas, lintels, beams, and cills of external doors & windows, external walls on floors etc. The shade of the paint shall be used as approved by Project Engineer/Architect. Each coat shall be cured well by wetting surfaces for atleast three days.

7.0 PAINT TO STEEL SURFACES: All exposed steel surfaces shall be prepared, cleaned with sand paper to completely remove scales and rusts and shall be painted with two or more coats of synthetic enamel paint to an even shade over one coat of steel primer. The shade of synthetic enamel paint shall be as approved by Project Engineer/Architect.

9.0 Galvanised Iron Sheet Roofing : Shall be of the gauge specified in the schedule of quantities and shall be laid on purlins to a true plane, with corrugations truly parallel to the sides of the surface to be covered with minimum end laps of 15 cms and side laps of 2 corrugations and laps with ridges, hips and valleys shall be 23 cms. measured at right angle to the ridge etc.

The fixing shall be in the same manner and with the same specifications as for A.C. Sheets and also the sheets shall be stitched with 25 mm long and 6 mm. dia. G.I. Stitching bolts with G.I. and bitumen washers. The stitching bolts shall be provided on the side lap of two corrugations in a zigzag manner with a spacing not exceeding 60 cms. long each of the staggered row.

The holes for "J" or L" hooks and stitching bolts shall be drilled and not punched from beneath and shall be of the exact diameter of the `J' or `L' hooks and stitching bolts.

The junctions of C.G.I sheet roofing with parapets shall either be protected with proper flashing or by at least 112 mm. projected course filled with cement concrete 1 : 2 : 4 : and finished with cement plaster and neat of cement.

SECTION - IX :

CEMENT CONSUMPTION

1.0 The cement consumption shall be as per the PWD specifications. If any items are not available for calculating the cement consumption it shall be derived from the actual consumption at site or as decided by the Architect.

PERMISSIBLE WASTAGE

- | | | |
|------------------------|---|----|
| 1. Cement | - | 3% |
| 2. Reinforcement steel | - | 3% |
| 3. Structural Steel | - | 5% |

B - GENERAL TECHNICAL SPECIFICATION

0.1 CONSTRUCTION OF PILES

1.1 The control of pile construction shall generally be accordance with IS: 2911.

1.2 The construction of pile shall be carried out in accordance with pile layout drawings.

1.3 The boring of the pile shall be done by rotary or percussion or grabbing equipments using direct or reverse mud circulation method.

1.4 The founding level for the piles as shown in the drawings are only approximate and may vary based on the existing soil condition. The pile should penetrate 40cm to the solid rock. The decision of the engineer in this regard shall be final and no claim in this regard will be entertained. In order to ascertain the suitability of the bearing stratum. Standard Penetration Test shall be done in the piles borehole in atleast 10% of the job piles randomly identified by the engineer at founding level.

1.5 For tremie concrete piles, the density of bentonite slurry shall generally be 1170Kg/m. Concreting shall not proceed if the density of drilling fluid exceeds 1200Kg/m. The sand content in the fluid shall not exceed 7%.

1.6 After reaching the founding level and completion of the boring, care shall be taken to ensure that the inside of the bore hole is free from sludge of foreign matter. The borehole shall be thoroughly flushed with bentonite until clear bentonite comes at the top.

1.7 Pre-measured reinforcement cage fabricated as per approved drawings shall be lowered in to the bore, circular concrete cover blocks should be provided at suitable intervals to maintain the required cover. A clear cover of 75mm shall be provided. In case the reinforcement cage is made up of more than one segment, the same shall be assembled by lap welding only as per IS:456 by providing requisite laps. The reinforcement rods should be tack welded to spiral and rings to provide rigidity.

1.8 After placing the reinforcement cage inside the bore, borehole shall once again be flushed with fresh bentonite slurry through the tremie until clear bentonite comes to the top.

1.9 Concrete of required consistency shall be placed continuously by using tremie pipes so as to avoid segregation. The tremie pipe shall be clean, water tight and of adequate diameter to allow free flow of concrete. The tremie shall extend to bottom of the bore hole prior to commencement of concrete pouring. Care should be taken to ensure that all bentonite slurry is expelled from the tremie pipe during the initial changing process. The tremie pipe shall always remain embedded with in the concrete by a minimum of 1.0 m.

1.10 In all cases it shall be ensured that the concrete fills the entire column of the borehole with out formation of voids, care shall be exercised to preserve correct cover and alignment of reinforcement and avoid damage to it throughout the entire operation of placing the concrete.

1.11 To achieve the effective trimmed final level of concrete, the concrete while placing should be allowed to overflow sufficiently. Then top of the pile shall be brought or even flown up atleast 1m above the cut-off or payment level so as to permit all laitance and weak concrete to be removed and to ensure that it can be properly keyed in to the pile cap. However, no extra payment shall be made for this and the quoted rates shall be inclusive of this. Any defective concrete in the head of the completed pile shall be cut away and made good with new concrete.

2.0 CONTROL OF ALIGNMENT

2.1 The borehole shall be made as accurately as possible to the vertical. As a general rule, the permissible positional deviation for piles shall not be permissible positional deviation for piles shall not be greater than 45mm at the cut-off level, and shall not exceed 2% (about 1 degree) from vertically.

2.2 In case of pile deviating beyond the tolerance limits specified and to such an extent that the resulting eccentricity cannot be taken care of by redesign of the pile cap the said piles shall be taken care or by redesign of the pile cap, the said piles shall be rejected and replaced or supplemented by one or more additional piles at the cost of the contractor as directed by the engineer.

2.3 If any obstructions to installation are encountered, the installation shall be stopped and the contractor shall notify the engineer and submit for his approval, proposals for overcoming the difficulties. Notwithstanding any such approval, the contractor will be entirely responsible for ensuring that the piles are to be in required line, position and depth.

3.0 PILE RECORDS

1. A competent supervisor shall be present to recode the necessary information when the pile is being cast. The contractor shall supply in quadruplicate, complete records of all piling operations in the form and manner approved by the engineer.

2. The data recorder shall include:

- a) Dimensions of the pile.
- b) Type of boring employed.
- c) Type of soil in which pile is being cast.
- d) Depth of boring.
- e) Sequence of construction.
- f) Depth of water table in the vicinity.

3. Typical data sheets of recording pile data shall be as given in appendix G of IS 2911 (part I). Any deviations in the designed location, alignment etc. shall be noted and promptly reported to the engineer.

4.0 PILE TESTING

Two number of routing vertical load tests shall also be carried out up to one and half times the design load for the respective piles. The piles for such tests shall be selected by the engineer.

4.1 Records

A full record of pile load test results shall be submitted to the engineer immediately on completion of each test. The records shall also include the plots of load-settlement and time settlement (for various stage of loads) characteristics of the pile and also the interpretation of pile load test curve as per criteria for safe loads as mentioned. Any special observation shall be duly explained by the contractor.

4.2 Cost of delay

The contractor will be deemed to have allowed in the construction programmed for the time required for testing of piles. No claim shall be entertained for any delay caused to the progress of work due to testing.

5.0 Defective pile shall be removed or left in place and replaced by additional pile or piles as directed by the engineer at no extra cost.

6.0 BORING

Boring may be carried out by mechanically operated by a sand bailer or by grabbing or by any other suitable approved method. While boring in cohesion less deposits water level in the bore hole shall be maintained at or slightly above the standing water table. In cohesive soils use of water for boring shall be to a minimum.

7.0 PROVISION OF CASING

7.1 In stable soils which can stand unsupported, use of casing may be omitted with the approval of the engineer in charge. However in weak soils and soils liable to clog, care shall be taken to ensure the stability of the sides of the bore hole either by use of drilling mud or by the provision of casings. The drilling mud shall be of a suitable consistency and shall be effective in maintaining the stability of the hole to the satisfaction of the engineer in charge, failing which, use of casing pipes shall be mandatory.

7.2 The bottom of the casing pipe shall be kept for enough in advance of the boring tool in weak soil, so as to prevent the entry of soil in the casing pipe and avoid formation of cavities and settlement of the adjoining ground.

7.3 The joints in the casing shall be made tight enough so as to prevent in flow of water or leakage of air where compressed air is employed.

8.0 REINFORCEMENT

8.1 Any reinforcement used need not normally exceed 0.8% of the cross-sectional area of the pile unless otherwise specified.

8.2 Reinforcement shall be provided for the full length of the pile.

8.3 The reinforcement shall be made into cages sufficiently rigid to withstand handling without damaging.

8.4 Binders shall be so placed as not to impede the pouring of concrete. The spiral binding of lateral use shall not be closer than 15cm centre to centre.

8.5 Proper cover and central placement of the reinforcement shall be ensured by use of suitable concrete spacers or rollers, cast specially for the purpose.

8.6 The diameter of the cage shall be such as to permit the working of a rammer within it without fouling with the cage.

9.0 CONCRETING

9.1 Before placement of concrete, care should be taken to ensure that the inside of the tube or borehole is free from sludge or any foreign matter. Water in the tube if any shall be removed by bailing or pumping. Where this is not possible, especially when the hole is formed using an open end casing, underwater concrete may be permitted by the engineer in charge.

9.2 The method of placing concrete shall be so as to avoid segregation. When the bottom of the hole has not been properly cleaned, the first charge shall be of dry concrete which shall be properly rammed. Underwater concrete if permitted shall be carried out using an approved technique in all cases it shall be ensured that the concrete fills the entire volume of the tube or borehole without formation of voids, caused by quality alignment for reinforcement and avoid any damage to it throughout the whole operation of placing the concrete.

9.3 The consistency of the concrete shall be suitable to the method of compaction used and to the subsoil condition.

9.4 A liner shall be used to protect the green concrete where a high hydrostatic pressure exists in the subsoil or where an underground flow of water exists which is likely to damage the concrete on withdrawal of the casing or mandrel.

9.5 Withdrawal of casing or mandrel shall be carried out in stages and utmost care shall be exercised in maintaining an adequate head of concrete above bottom of the casing at each stage of withdrawal, so as to prevent ingress of soil and water in to the tube and cause contamination of the green concrete.

10.00 REPLACEMENT OF DEFECTIVE PILES

Defective pile shall be removed or left in place as judges convenient by the Engineer in charge, without affecting the performance of adjacent piles or capping above, and additional pile shall be provided to replace them.

SECTION – 3 SPECIFICATIONS FOR TESTING OF CONCRETE PILES

1. GENERAL

Scope: This specification covers the requirements and the methods of testing of a single pile for evaluating its safe capacity in vertical loading.

Definitions: Reference of Indian Standard Codes shall always mean reference to the latest issue of the relevant standards, including all its amendments up to date.

Codes: All testing shall be performed in accordance with the following codes and the provisions of these specification:

- a) IS:2911-PartIV-Code of practice for design and construction of pile foundation.
- b) ASTM Designation D 1143-61T-Load settlement Relationship for individual piles under vertical axial load.
- c) Civil Engineering Code of practice No. 4-Foundations. The institutions of Civil Engineers, UK.

Requirements

- 1) The load test shall be required to provide data regarding the load deformation characteristics of the pile up to failure or otherwise specified and the safe design capacity.
- 2) Full details of the equipments proposed to be used and the test set up shall be submitted to the engineer in charge with detailed sketches for approval. Approval of the Engineer in charge shall also be obtained after the test set up is completed, prior to commencement of loading.
- 3) All measuring devices shall be calibrated for satisfactory performance and accuracy at an approved institution and certificate to that effect obtained and submitted to the Engineer in charge prior to use.
- 4) The minimum time period not less than four weeks from the time of casting in case of a cast-in-situ pile for testing.
- 5) Records:- A full record giving all details of the test in the profoma shown in Appendix – I shall be submitted in quadruplicate to the Engineer in charge immediately on completion of each test. The record shall also include the plot of load settlement characteristics of the pile.

2. VERTICAL LOADING TEST

2.1 Equipment and Test Setup

2.1.1. Test Pile:

The test pile shall be decided by the Engineer in charge. It may be one of the working piles.

2.1.2. Loading System:

1. Loading shall be applied by the reaction method consisting of a hydraulic jack reacting centrally against a loaded platform. Supports of the platform shall be adequately designed. Special anchor pile or any other suitable type of anchorage system may also be used. However, use of the uplift capacity of neighboring piles for providing the reaction shall normally, not be permitted.

2. The loading system shall be adequate to ensure that the test can be carried up to the specified limit.

0.1.3. Measuring system:

1. Loading on piles:

The load applied on the pile shall be recorded on a calibrated pressure gauge mounted on the jack.

1. Settlement of piles:

a. Settlement of pile shall be recorded by dial gauges suspended from datum bars. Two dial gauges places diametrically opposite and having a having a least count of 0.02mm shall be used.

b. The datum bar shall have rigid supports preferably of concrete pillar or steel section embedded well in to the ground. The support shall be located more than five times the pile diameter clear away from the pile and also sufficiently away from the supports of the datum bar of the loaded platform to avoid any disturbance of these accounts. Movements near the supports of the datum bar shall be avoided while the testing is in progress.

2.2 Method of Conducting Test:

The test shall be carried out by the direct method of loading in successive intervals of 20% of design load as Directed by the Engineer in charge.

1.2.1 Direct Method of Loading in Successive Measurements:

The test shall be carried out as per the procedure outlined ASTM designation D1143-61T and as directed below.

All tests shall be carried out at the cut off line.

a. The load shall be applied to the pile top in measurements of about one fifth the estimated as safe capacity of the pile or as specified. Settlement reading shall be taken before and after the application of each new load increment and at 2, 4, 8, 25, 30, 60 minutes and at every two hours until application of the next load increment.

b. Each stage of loading shall be maintained till the rate of movement of the pile top is not more than 0.2mm per hour or until two hours have elapsed, whichever is later.

c. At the load corresponding to the assumed safe capacity of the pile, the load shall be maintained for a minimum period of 12 hours.

d. Further loading shall then be continued as in (a) above till one of the following occurs.

1. Yield of soil pile system occurs causing progressive settlement of the pile exceeding a value of 1/10 of the pile diameter.

1. The loading on the pile top equals 1.5 times the rated capacity of the pile in case of working pile.

e. Where yielding of the soil does not occur the full test load shall be maintained on the pile head for 24 hours or more if necessary and settlement readings shall be taken at 6 hour intervals during the period.

f. Unloading shall be carried out in same steps as loading. A minimum period of half hour shall be allowed to elapse between two successive stages of load decrement. The final rebound shall be recorded two hours after the entire test load has been removed.

SUGGESTED LIST OF APPROVED MATERIALS AND SUPPLIERS:

Separately attached/

B. PLUMBING

1. GENERAL PROVISIONS FOR PLUMBING & SANITARY SYSTEMS INSTALLATION.

1.1 SCOPE OF WORK

The General character and the scope of work to be carried out under this contract is illustrated in the drawings and specifications attached herewith. The contractor shall carry out and complete the said work under this contract in every respect in conformity with the rules and regulations of the local authority. The contractor shall furnish all labor, supply and installation of all materials, appliances, tools equipment necessary for the complete work and testing the whole plumbing services installation as specified herein, as per the relevant IS codes, and as shown in the drawings. This also includes any materials, appliances, equipment not specifically mentioned herein or noted in the drawings as being furnished or installed which are necessary and customary to make a complete installation properly connected and in working order.

In general, the work to be performed under this contract shall comprise of the following:

- 1.1.1 All incidental works connected with plumbing services installation such as excavation of trenches and back filling, cutting and chasing in concrete and brick and making good, cutting/drilling holes through walls, floors, and grouting for fixing of fixtures/equipment, etc.
- 1.1.2 Furnish and install a complete workable plumbing services installation as shown on the drawings and described in this specification and as per the latest IS specifications including all that which is reasonably inferred.
- 1.1.3 Installation of internal & external water supply system completely.
- 1.1.4 Installation of internal & external drainage and sewerage appurtenances all round the building completely.
- 1.1.5 Installing all Sanitary and plumbing fixtures completely.
- 1.1.6 Installation shall be done in co-ordination with other agencies. Contractor shall remove any work done without regard or consultation with other trades, consultants without additional cost to the Employer, to permit the proper installation of all other work, as desired by the architect/Engineer.
- 1.1.7 Repair all damage done to the premises as a result of this installation and remove all debris left by those engaged for this installation to the satisfaction of employer.
- 1.1.8 Cleaning of all plumbing fixtures, testing and proving the satisfactory performance of all fixtures at the time the building is handed over to the employer.
- 1.1.9 It is the responsibility of the contractor to take care of all the fixtures fitted until the time of handing over to the Employer.
- 1.1.10 Painting of all concealed and exposed pipes as specified.
- 1.1.11 Assume full responsibility of all required applications and costs to connect to corporation water mains, sewers and storm water drains; to the extent these are applicable to this installation.

1.2 REGULATIONS AND STANDARDS

The installation shall conform in all respects to the following standards in general:

Indian Standard	Reaffirmation	Subject
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269-1989	Reaffirmed 2004	Specifications for 33 grade Ordinary Portland Cement
407-1981	Reaffirmed 2001	Brass tubes for General purposes
456-2000	-	Code of practice for Plain & Reinforced concrete.
458-2003	-	Specifications for Concrete Pipes.
554-1999	-	Dimensions for pipe thread where pressure tight joints are required.
638-1979	Reaffirmed 2003	Sheet rubber jointing & rubber insertion jointing
651-1992	Reaffirmed 2003	Specifications for Salt glazed stoneware pipes & fittings.
771 (Pt. I & VII)		Glazed Fire Clay Sanitary Appliances.
771-1979 (Pt. I)	Reaffirmed 2003	General requirements
774-1984	Reaffirmed 2000	Flushing cistern for water closet and urinals.
775-1970	Reaffirmed 2000	Cast iron brackets and supports for wash basin and sink.
778-1984	Reaffirmed 2000	Specifications for copper alloy gate & Globe check valves for water works
779-1994	Reaffirmed 2004	Water meters (domestic type)
781-1984	Reaffirmed 2001	Specifications for cast copper alloy screw down bib taps & stop cocks for water services
783-1985	Reaffirmed 2001	Code of practice for laying concrete pipes.
784-2001	Reaffirmed 2002	Pre-stressed concrete pipes.
1172-1993	Reaffirmed 2002	Code of basic requirements for water supply, drainage and sanitation
1200-1979 (Pt. 16)	Reaffirmed 2002	Method of measurements for Laying of water and sewer lines including appurtenant items.
1200-1981 (Pt. 19)	Reaffirmed 2002	Method of measurements for Water supply, plumbing and drains.
1239-2004 (Pt I)		Specifications for Mild steel tubes
1239-1992 (Pt. II)	Reaffirmed 2002	Specifications for Mild Steel Tubular & other wrought steel pipe fittings

1300-1994	Reaffirmed 2000	Phenolic molding material specification
1701-1960	Reaffirmed 2003	Combination valve, mixing valves
1703-2000		Ball valve (horizontal plunger type) including floats for water supply.
1742-1983	Reaffirmed 2002	Code of practice for building drainage
1795-1982	Reaffirmed 2000	Pillar taps for water supply purposes
1979-1985	Reaffirmed 2002	Specification for high test line pipe
2065-1983	Reaffirmed 2001	Code of practice for water supply in buildings.
2104-1981	Reaffirmed 2003	Water meter boxes (domestic type)
2326-1987	Reaffirmed 2003	Automatic flushing cistern for urinals
2373		Specification for Water Meter (Bulk type)
2379-1990	Reaffirmed 2000	Color code for identification of pipe lines.
2401-1973	Reaffirmed 2003	Code of practice for selection, installation & maintenance of domestic water meters
2556 (Pt. 1 to XV)	-	Specification for Vitreous (Vitreous China) sanitary appliances.
2556-1994 (Pt.1)	Reaffirmed 2004	General requirements
2556-1994 (Pt.2)	Reaffirmed 1999	Specific requirements of wash down water-closets
2556-2004 (Pt.3)	-	Specific requirements of squatting pans
2556-2004 (Pt. 4)	-	Specific requirements of wash basins
2556-1995 (Pt.7)	Reaffirmed 2003	Specific requirements of accessories for sanitary appliances
2643 -1999	-	Type Threads where pressure tight joints are not mase on the threads – dimension, tolerances and designation
Indian Standard	Reaffirmation	Subject
2951 (Pt. I to II)	-	Recommendation for estimate of flow of liquids in closed conduits.

2951-1965 (Pt. I)	Reaffirmed 2003	Head loss in straight pipes due to frictional resistance
2951-1965 (Pt. II)	Reaffirmed 2003	Head loss in valves & fittings.
3006-1979	Reaffirmed 2003	Specification for Chemically resistant glazed S.W. pipes and Fitting
3076-1985	Reaffirmed 2003	Low density polyethylene pipes for potable water supply
3311-1979	Reaffirmed 2003	Waste plug & its accessories for sinks & wash basins.
4038-1986	Reaffirmed 2000	Foot valves for water works purposes.
4111 (Pt. I to V)		Code of practice for ancillary structures in sewage system.
4111-1986 (Pt. I)	Reaffirmed 2001	Manholes
4111-1985 (Pt. II)	Reaffirmed 2001	Flushing tanks
4111-1985 (Pt. III)	Reaffirmed 2001	Inverted syphon
4111-1968 (Pt. IV)	Reaffirmed 2001	Pumping stations & pumping mains (rising mains)
4854 (Pt. I to III)	---	Glossary terms for valves and their parts
4854-1969 (Pt. I)	Reaffirmed 1999	Screw down stop, check & gate valves & their parts
4854-1968 (Pt. II)	Reaffirmed 1999	Plug valves & cocks & their parts
4854-1974 (Pt. III)	Reaffirmed 1999	Butterfly valves
4984-1995	Reaffirmed 2002	Specifications for HDPE pipes for water supply
4985-2000	-	Specifications for Unplasticised PVC pipes for potable water supplies
5312 (Pt. I)	-	Swing check type reflux (nonreturn) valves
5329-1983	Reaffirmed 2001	Code of Practice for sanitary pipe work above ground for building
5330-1984	Reaffirmed 2000	Criteria for design for anchor blocks for penstocks with expansions joints.
Indian Standard	Reaffirmation	Subject
5382-1985	Reaffirmed	Specifications for rubber sealing rings for water, gas &

	2003	sewer mains
5600-2002	-	Specifications for Sewage and drainage pumps
5714-1981	Reaffirmed 2002	Specifications for Hydrant stand-pipe for fire fighting
6280-1971	Reaffirmed 2001	Sewage screens
7231-1994	Reaffirmed 2004	Specifications for Plastic Flushing Cisterns for w.c. & urinals
7558-1974	Reaffirmed 2001	Code of Practice for domestic hot water installations
7634 (Pt. I to III)		Code of Practice for Plastic pipe work for potable water supplies
7634-1975 (Pt. I)	Reaffirmed 2002	Choice of materials & general recommendations
7634-2003 (Pt. III)	-	Laying & jointing Unplasticised PVC pipes
7740-1985	Reaffirmed 2001	Code of Practice for road gullies
7834 (Pt. I to VIII)		Injection molded PVC socket fittings with solvent cement joints for water supplies
7834 -1987(Pt.I)	Reaffirmed 2003	General requirements
7834-1987 (Pt.II)	Reaffirmed 2003	Specific requirements for 45 0 elbows
7834-1987 (Pt. III)	Reaffirmed 2003	Specific requirements for 90 0 elbows
7834-1987 (Pt. IV)	Reaffirmed 2003	Specific requirements for 90 0 tees
7834-1987(Pt.V)	Reaffirmed 2003	Specific requirements for 45 0 tees
7834-1987 (Pt. VI)	Reaffirmed 2003	Specific requirements for sockets
7834-1987(Pt. VII)	Reaffirmed 2003	Specific requirements for unions
7834-1987 (Pt. VIII)	Reaffirmed 2003	Specific requirements for caps
8727-1978	Reaffirmed 2000	Specifications for vitreous enameled steel wash basin
8835-1978	Reaffirmed 1999	Guideline for planning and design of surface drains.
8931-1993	Reaffirmed 2003	Specifications for copper alloys Fancy single taps, combination tap assembly & stop valves for water

		services
9140-1996	Reaffirmed 2002	Method of sampling of vitreous & fire clay sanitary appliances
9293-1991	Reaffirmed 1996	Specifications for flax canvas
9739-1981	Reaffirmed 2003	Specifications for Pressure reducing valves for Domestic water supply system.
9758-1981	Reaffirmed 2003	Flush valves and Fittings for water closets and urinals
9762-1994	Reaffirmed 2004	Specifications for polyethylene floats for float valves
10500-1991	Reaffirmed 2003	Specification of Drinking water
12183-1987 (Pt. I)	Reaffirmed 2004	Code of practice for Plumbing in multistoried buildings (for water supply)
12231 -1987	Reaffirmed 2003	UPVC pipes for section & delivery lines of agricultural pumps–Specification.
12235 -1986	Reaffirmed 1998	Method of test for UPVC pipe for potable water supply
12469 -1988	Reaffirmed 2002	Specifications for pumps
12818 -1992	Reaffirmed 2002	Spn. for UPVC ribbed screen casing & plain casing pipes for bore / tube well
12820 -1989	Reaffirmed 1999	Dimensional Requirements of Rubber Gaskets for Mechanical Joints & push in joints for use with Cast Iron Pipes & fittings for carrying water, Gas & sewage.
13095 -1991	Reaffirmed 2003	Butterfly valves for general purposes
13114 -1991	Reaffirmed 2003	Spn. for forged brass gate, globe & check valves for water works purposes
13592-1992	Reaffirmed 2002	Specifications for PVC soil, waste & rain water (SWR) including ventilation pipes
13593 -1992	Reaffirmed 2002	UPVC pipes fittings for use with section and delivery lines for Agricultural pumps – Specification.
13916 – 1994	Reaffirmed 2004	
13983-1994	Reaffirmed 2004	Specifications for stainless steel kitchen sinks & drain boards for domestic purpose
14735-1999	Reaffirmed	UPVC injection molded fittings for UPVC – SWR pipes –

	2004	Specifications.
14845-2000	Reaffirmed 2004	Resilient seated cast iron air relief valves for water works purposes – Spn
14846-2000	-	Specifications for sluice valve for water works purposes (50 to 1200 mm size)
15265 – 2003	-	Specifications for flexible PVC pipes or polymer reinforcement thermo plastic hoses for suction and delivery lines for Agricultural pumps.
15328 – 2003	-	UPVC non-pressure pipes for use in underground drainage and sewerage system – Specifications.
15450-2004	-	Polyethylene/Aluminum/Polyethylene composite pressure pipes for hot and cold-water supplies – Specifications.

The system shall in general be installed in accordance with National building code for water supply, drainage and sanitation. Part IX Plumbing services section 1 & 2.

The installation shall also be in conformity with the byelaws and requirements of the local authority in so far as these become applicable to the installation. Wherever this specification calls for a higher standard of materials and/or workmanship than those required by any of the above regulations and standards, then this specification shall take precedence over the said regulations and standards. Wherever drawings and specifications require something that may violate the regulations, the regulations shall govern.

1.3 DRAWINGS AND SPECIFICATIONS

The drawings and specifications shall be considered as part of this contract and any work or materials shown in the drawings and not called for in the specifications or vice versa shall be executed as if specifically called for in both. The tender drawings indicate the extent and general arrangement of the fixtures, drainage system, etc. and are essentially diagrammatic. The drawings indicate the points of supply and termination of work shall be installed as indicated in the drawings. However, any changes found essential to co-ordinate with this work or other trades shall be made without any additional cost. The drawings and specifications are for the assistance and guidance of the contractor, and exact location, distance and levels will be governed by the individual building and site conditions, therefore approval of the Architect/Engineer shall be obtained before commencement of work.

After execution of the works, contractor shall furnish one set of 'marked up' drawings showing the installation as built, where the originals are the issue of the Engineer and incorporated on the "Originals". In case the original drawings are issue of the contractor, then the contractor shall furnish a new set of "As built" drawings. Both hard copy and soft copy (in color) A1 or A0

1.4 MANUFACTURER'S INSTRUCTIONS

Where manufacturers have furnished specific instructions relating to the materials used in this job and methods of construction that are not specifically mentioned in these documents, such installations shall be followed in all cases.

2.0 MATERIALS

- 2.1** Materials shall be of the best quality approved obtainable and unless otherwise specified they shall conform to the respective Bureau of Indian Standard Specifications.
- 2.2** Samples of all materials shall be as per the list of approved brand manufacture, which shall be got approved before placing order and the approved samples shall be deposited with the Employer.
- 2.3** In any case of non-availability of materials in metric sizes, the nearest size of FPS units shall be provided with prior approval of the Architect/Engineer, for which no extra cost will be paid.

2.4 UNDERGROUND TRENCHES

2.4.1 ALIGNMENT AND GRADE

The drains are to be laid to correct alignment and grade shown in the drawings but subject to such modifications as necessary to meet the requirements of the works. No deviations from the lines, depths of cutting or gradients of sewers shown in the plans and sections shall be permitted except by the express directions in writing of the Architect/Engineer.

2.4.2 OPENING OUT TRENCHES

In excavating the trenches, the road metal, pavement curb, etc., are to be placed on one side and preserved for reinstatement and the trench or other excavation shall be filled up and laid back to original condition at no extra cost.

Before any road metal is replaced, it shall be carefully shifted. The surface of all trenches and holes shall be restored and maintained to the satisfaction of the Employer; the contractor shall not cut or break down any live fence or trees in the line of the proposed works but shall tunnel under them unless the Employer orders to the contrary. The contractor shall scrub up and clear the surface over the trenches and other excavations of all stumps, roots and other encumbrances affecting execution of the work and shall remove from the site to the approval of the Architect/Engineer.

2.4.3 EXCAVATION TO BE TAKEN TO PROPER DEPTH

The trenches shall be excavated in all conditions of soil and to such a depth that the sewers shall reset as described in the several clauses relating thereto and so that the inverts may be at the levels given on the section. In bad ground, the Engineer may order the contractor to excavate to a greater depth than shown in the drawings and to fill up the excavation to the level of the sewer with concrete, sand, gravel, or other materials. For such works the contractor shall be paid extra at the rates laid down for such works in the schedule, if the extra work ordered by the Employer/Engineer in writing. But if the contractor should excavate the trench to a greater depth than is required without a specific order to that effect in writing of the Employer/Engineer, the extra depth shall have to be filled up with concrete at the contractor's own cost to the requirements and satisfaction of the Engineer.

2.4.4 RE - FILLING

After the sewer or other work has been laid and proved to be watertight, the trench or other excavation shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the sewer and other permanent works. Filling in the trenches and up to 50cms. Above the crown of the sewer shall consist of the finest selected materials placed carefully and consolidated. After this has been laid, the trench and other excavation shall be refilled carefully in layers of 150mm with materials taken from the excavation, each layer each layer being watered and consolidated.

2.4.5 CONTRACTOR SHALL RESTORE SETTLEMENT AND DAMAGES

The Contractor shall at his own cost make good promptly, during the whole period the works are in hand, any settlement that may occur in the surfaces or roads, berms, footpaths, gardens, open spaces, etc. whether public or private caused by his trenches or his other excavation and he shall be liable for any accidents caused thereby. He also shall, at his own expense and charges, repair and make good any damage done to the buildings and other properties.

2.4.6 DISPOSAL OF SURPLUS EARTH

The contractor shall at his own cost dispose within the site or as directed all surplus excavated materials not required on the works.

2.4.7 TIMBERING

The contractor shall at all times support efficiently and effectively the sides of the trenches and other excavations by suitable timbering, piling, sheeting, etc. The trenches shall be timbered closely in loose or sandy strata and below the surface of the sub-soil table. All timbering, sheeting and piling with their walls and supports shall be of adequate dimensions and strength and fully braced and strutted so that there is no risk of collapse or subsidence of the walls of the trench. The Contractor shall be held accountable and responsible for the sufficiency of all timbering, bracing, sheeting and piling used for and for all damages to persons and property resulting from the improper quality, strength, placing, maintenance, or removing of the same.

2.4.8 REMOVAL OF WATER

The Contractor shall at all times during the progress of work keep the trenches and excavations free from water which shall be disposed off by him in a manner as will neither cause injury to the public health nor to the public or private property not to the work completed or in progress nor to the surface of any roads or streets nor cause any interference with the use of the same.

2.4.9 TRENCH WIDTH

The width of excavated trench shall be as per the table given below:

Width at bottom

Up to 110mm Dia pipe	Up to 160mm dia pipe	Up to 300mm dia pipe
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Excavation up to: 900mm depth	450mm	450mm	600mm
900mm to 1500 mm depth	600mm	600mm	900mm
1500mm to 3000 mm depth	750mm	750mm	1100mm
3000mm to 5000 mm depth	900mm	1000mm	1300mm

2.4.10 PROTECTION OF EXISTING SERVICES

All pipes, water mains, cables, etc. met in the course of excavation shall be carefully protected and supported.

2.4.11 CONCRETING

All pipes at shallow road crossings and made up ground shall be laid on a bed of 6" (150mm) concrete with one part of cement, four parts of sand and eight parts of stone metal of ¾" (20mm) down grade properly consolidated. Concrete shall be laid to the full width of the trench and also in haunches.

2.4.12 CONSTRUCTION ACROSS ROADS

All works across the roads shall be carried out as per the directions of the Employer.

2.5 WATER SUPPLY

2.5.1 CPVC PIPES AND FITTINGS (INTERNAL SERVICES)

The pipes shall be of medium quality CPVC SDR 11 and PVC SCH 40 & 80, screwed socketed and shall conform to IS. All fittings shall be Brass fittings of approved best Indian make.

2.5.2 CPVC PIPES AND FITTINGS (EXTERNAL SERVICES)

The pipes shall be of medium quality CPVC SDR 11 and PVC SCH 40 & 80, screwed socketed and shall conform to IS. All fittings shall be Brass fittings of approved best Indian make.

2.5.2.1 LAYING AND FIXING

Where pipes have to be cut or re-threaded, ends shall be carefully filed out so that no Obstruction to bore is offered. For internal work, all pipes and fittings shall be fixed truly vertical and horizontal, either by means of standard pattern holder bat clamps keeping the pipes ½" (12mm) clear of the wall everywhere or concealed as directed. CPVC and UPVC Pipes and fittings shall be laid in trenches for external works. The width of the trench shall be the minimum width required for Working. The pipes laid minimum width required for working. The pipes laid underground shall be not less than 600mm from the finished ground level.

2.5.2.2 TESTING

Before any pipes are painted or covered, they shall be tested to a hydrostatic pressure of 7.0 kg/Sq.cm. Pressure shall be maintained for at least two hours without appreciable drop in pressure. In addition to the sectional testing of water supply pipes, the contractor shall test the whole of the installation to the entire satisfaction of the Engineer in Charge. He shall rectify any leakage, failure of fittings or valves. (Calibration certificate to be produced for Gauge)

2.5.2.3 MODE OF MEASUREMENT

Above ground UPVC & CPVC pipes shall be measured along the centerline of the pipes and fittings. The quoted rate for respective item shall be per RMT and shall include the following:

- a. Cost of respective pipes and specials.
- b. Labor for laying, fixing and jointing with necessary clamps.
- c. Cutting holes and chases in walls, floors, etc. and making good the same.
- d. All supporting arrangements, brackets, etc.
- e. Testing and making good the defects, if any. UPVC. Pipes lay underground shall be
Measured as stated elsewhere in the specification.

2.6. WATER FITTINGS (TAPS, STOPCOCKS, ETC.)

All water fittings shall be of approved quality and design and shall generally comply with latest I.S. specifications. The fittings and joints shall be tested for 4kg/sq.cm. Defective fittings and the joints shall be repaired or redone/replaced as directed.

2.6.1 MODE OF MEASUREMENT

These items shall be measured in number unless included as part of other items viz. Wash basins, inlets to flush valve etc.

Cost of fittings shall include:

Cost of material

Cost of fixing accessories like bolts, nuts, washers.

2.7. VALVES AND PRESSURE GAUGES

The pressure gauges shall have not less than 115mm dia, 10mm BSP full threads brass body siphon and gauge cock of 10mm size. Dial gauges shall be adequate for the pressures encountered and specified (0-15 Kg/cm square).

2.7.1 Valves shall be provided on branch pipe connection to mains and at connection to equipment where indicated. All valves are to be located for easy access and are to be full bore of pipe connected together. All valves shall be supported wherever necessary. Valves shall be ball valve type with C.I. body and S.S internal parts.

2.8 BIB COCK AND STOP COCK:

Bib cock (hose bib) is a draw off tap with a horizontal inlet and free outlet and stop cock (stop tap) is a valve with a suitable means of connections for insertion in a pipeline for controlling or stopping the flow. They shall be of specified size and shall be of screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer shutting against water pressure on the seating at right angles to the axis of the threaded spindle operating it. The handle shall be either crutch or butterfly type securely seated pattern. The cocks (taps) shall open in anti clockwise direction.

The Bib cocks and stopcocks shall be polished bright. The minimum finished weights or bib tap (cock) and stop tap (cock) as given in the IS specifications are reproduced below:

Minimum finished weight

Size	-----
Bib tap	Stop tap

Mm	kg.	Kg.
08	0.25	0.25
10	0.30	0.30
15	0.40	0.40
20	0.75	0.75

2.9 BALL VALVE:

The ball valve shall be of high pressure type shall be of sizes as specified.

The normal size of a ball valve shall be that corresponding to the size of the pipe to which it is fixed. The ball valve shall be of brass or gunmetal as specified, and the float of copper sheet. The minimum thickness of copper sheet used for making the float shall be 0.45mm for float exceeding 115mmdia. Plastic floats may also be used if specified. Body of the ball valve when assembled in working conditions with the float immersed to not more than half of its volume shall remain closed against a test pressure of 3.5kg/sqcm.

The ball valve shall generally conform to IS specification No.1703: 1977. The weight of ball cock and the size of the ball cock shall be as per IS specification.

2.10 FOOT VALVES:

Provide cast iron body with brass disc and strainer of approved quality, wherever shown.

2.11 PRESSURE REDUCING VALVES:

Pressure reducing valves are of approved make bronze pilot operated spring-loaded valves for reducing pressure from 4.0 kg/cm² to 1.5 kg/cm² suitable for specified dia of pipe.

2.12 MODE OF MEASUREMENTS

Valves shall be measured in number only and the cost shall include:

Cost of valve and jointing materials.
Fixing and jointing with necessary bolts, nuts, rubber inserting,
Testing and making good the defects if any.

2.13 APPURTENANCES

2.13.1 The other appurtenances of pipeline are mentioned below:

Scour Valves:

These are placed at the bottom of all depressions for emptying the main or letting out the Sediment.

Reflux valves:

These are fixed so as to open in the direction of flow but automatically close if the water flows back. They are used to diminish the damage done by the escape of water due to a burst or prevent damage to impellers of pumps.

2.14.0 PVC PIPES AND FITTINGS

2.14.1 MATERIAL

PVC pipes and fittings for soil, waste and rainwater pipes (SWR grade) shall be heavy quality conforming to IS 13592, fittings to BS 4515 and rubber rings to IS 5382.

2.14.2 LAYING

The PVC pipe shall be laid under the floors in the slab sunk or on walls either buried or exposed as the case may be, as shown on the drawings. The minimum shell or wall thickness of fittings shall be 3.2mm. The fittings shall be of injection molded with rubber ring socket. The pipes and fittings shall be capable of with standing sunrays.

2.14.3 JOINTING

The jointing of the pipes to the fittings shall be done as per the manufacturer's instructions/recommendation. The rubber ring socket fittings and pipes shall be jointed as follows:

Clean the outside of the pipe spigot-end and the inside of the sealing groove of the fitting. Apply the lubricant uniformly to the spigot end,

sealing ring and pass the spigot end into the socket containing sealing ring until fully home. Mark the position of the socket edge with pencil or felt pen on the pipe, then withdraw the pipe from the socket by approximately 10mm to make the pipe fully fitted to the fitting. The horizontal pipes on the wall shall be fixed with pipe clips supplied from the same manufacturer. The spacing of the clips shall be at the intervals of 1.5m to 2 m depending on the availability of the supporting arrangements.

2.14.4 TESTING

PVC pipes and fittings shall be tested for three meters of water head. The opening of the pipes shall be sealed for the section to be tested. The water pressure shall be maintained for maximum of one hour. The Engineer in charge shall examine carefully all the joints for leaking.

2.15 MODE OF MEASUREMENT

2.15.1 EXCAVATION

The width of excavation shall be in accordance with the table in clause 3.9 any excavation done within the building shall not be measured and paid for.

2.15.2 UPVC PIPES

UPVC Pipes shall be measured along the centerline of the pipeline including the specials in running meter (Rmt.) length between:

- a) Chambers: shall be measured along the centerline of the chamber to inside of another chamber.
- b) Gully trap and chamber: Shall be recorded between socket pipe near gully trap and inside of Chamber.

The quoted rate shall include the following:

- i) The cost of pipes, special and other jointing materials.
- ii) Labor for Installing, Jointing and curing.
- iii) Testing and making good the defects, in any.

2.15.3 PVC PIPES

Pipes shall be measured along the centerline of the pipe including all specials in Rmt. The quoted rate for respective items shall include the following:

- a) Cost of respective pipes and special and jointing materials.
- b) Labor for Laying, fixing and jointing with necessary clamps, brackets, screws, etc. and curing.
- c) Making good all damages to the parts of the building to suit the surroundings.
- d) Testing and making good the defects, if any.

2.16 SEWER APPURTENANCE

2.16.1 LOCATION AND SIZES

The sizes given in the drawings shall be internal size of chamber. Unless otherwise specified, manholes and inspection drains, at all changes of direction of drains and where branch drain meets the Main drain. Chambers shall be of such size as to allow necessary examination and clearance of drains. The minimum internal sizes shall be taken as per details drawings, standards specified and local byelaws if any. In the absence of local bye laws the code of practice for Ancillary Structures in Sewerage System shall be followed, the work shall be done strictly as per standard drawings and the following specifications:

2.16.2 BED CONCRETE

Shall be in 1:4:8 cement concrete 150mm thick for inspection chambers, 230mm for depths up to 2.1m and 300mm for greater depths in case of manholes.

2.16.3 BRICK MASONRY

Brickwork shall be with best quality table molded bricks in 1:6 cement mortar as per the specification for brick masonry.

2.16.4 PLASTER

Inside of the walls of chamber/manhole shall be plastered with 15mm thick cement plaster 1:3 mixed with waterproofing material and finished smooth with a floating coat of neat cement.

2.16.5 BENCHING

Channels and benching shall be done in cement concrete 1:2:4 rendered smooth with neat cement. The following sizes of channels for the bench shall be adopted:

Size of Drain	Depth of Center	Depth at sides I.e. at walls
100 mm (4")	150mm (6")	250 mm (10")
150mm (6")	200mm (8")	300 mm (12")

2.16.6 CHAMBER/MANHOLE COVER

Covers shall be of heavy duty FRC with lifting hooks as per the details given in the drawing and fixed on the frame embedded in concrete. Cover placed on the frame shall be airtight. The weight of frame and cover shall be as per bill of quantities.

2.16.7 STEPS

PVC steps heavy duty shall be provided whenever the depth of the manhole/chamber is more than 1.2m.

2.16.8 DROP CONNECTIONS

In case the difference in invert levels between main drain and the branch line requires a drop more than 600mm, a drop connection should be provided with cast iron or stoneware four Sway junctions, fixed at right angles to the drop pipe at the level where branch pipe enters the manhole. Access for cleaning the bend should be provided at finished ground level.

2.16.9 GULLY TRAP CHAMBERS

UPVC gully traps of specified size and as per IS 651 shall be provided. It shall be fixed on 15cm. thick and 70cm square 1:4:8 cement concrete bedding and the gully outlet shall be jointed similar to the jointed similar to the jointing stoneware pipes. A brick masonry chamber 300 x 300 mm (internally) shall be constructed in ½ brick masonry with 1:6 cement mortars and the space between the trap and the wall shall be filled up with 1:3:6 concrete and the upper portion of the chamber shall be finished with neat cement mortar. The corners and the bottom of the chamber shall be rounded off so as to slope towards the grating and the bottom of the inspection cover shall not be less than 230 mm. In addition to 150 mm x 150 mm SFRC cover, the chamber shall have a SFRC cover (300 x 300 mm). It shall then be placed on top of the brick masonry. And **(As Per IS 12592 Heavy duty load 35 MT)**

2.16.10 FLOOR TRAPS

The uPVC floor trap shall be of multi-inlet and one outlet type either fabricated or molded as per BOQ. The floor trap shall be deep seal type with effective seal of minimum 50 mm. The waste from sanitary fixtures shall be directly discharged to floor trap. The jointing of waste pipe to floor drain shall be done as per manufacturer's instructions. The height riser fitting shall be made use, wherever the floor drain located in deep – sunk floors or is suspended ceiling, the PVC floor trap shall be of reputed make and preferably of the same make as of the pipes used.

The floor trap shall be provided with 150x150mm square stainless steel 304 grade grating with rim of approved design. Minimum thickness of the grating shall be 4 to 5 mm.

2.17 MODE OF MEASUREMENT

2.17.1 INSPECTION CHAMBERS

The inspection chambers shall be measured in number and the rate quoted shall also be per number only. The quoted rate shall include the cost of all the following items:

- a) Bed concrete
- b) Brick work
- c) Plastering
- d) Concrete benching channeling
- e) Inspection chamber cover and frame including PCC bed for fixing the frame.
- f) Providing holes and embedding pipes for all connections

- g) Excavation, refilling, necessary de-watering and disposing off extra material to a place as directed by the Engineer.
- h) Curing
- i) Testing

2.17.2 GULLY TRAP CHAMBER

Gully trap chambers shall be measured in numbers and the rate quoted shall also be per number only. The quoted rate shall include the cost of all the following its:

- a) Bed concrete.
- b) Brick Work
- c) Plastering
- d) Gully trap and SFRC cover
- e) Concrete cover and SFRC cover
- f) Providing holes and embedding pipes for all connections.
- g) Excavation, refilling, necessary de-watering and disposing off extra material to a place as directed by Engineer.

2.18 SANITARY INSTALLATION AND FIXTURES

2.18.1 GENERAL

All fixtures shall be fixed in a neat workman like manner true to line and as recommended by the manufacturer or shown in the drawings. Care shall be taken to fix all fixtures, brackets and accessories by using proper wooden cleats, rawl plugs, bolts and nuts.

2.18.2 Care shall be taken in fixing all approved chromium plated (CP) fixtures and accessories so as not to leave any tool marks or damages on the finish. All such fixtures shall be tightened with fixed spanners. Use of 'Stiltson' type wrenches with toothed jaws shall not be allowed.

2.18.3 Testing of sanitary fixtures shall be thoroughly done after connection of drainage and water supply system to it. All fixtures shall be thoroughly fixed and leakage if any in pipes, valves and waste fittings corrected to the entire satisfaction of the Consultant/Engineer.

2.18.4 Upon completion of the work, all labels, stickers, plasters, etc shall be removed from the fixtures and all fixtures shall be cleaned with soap and water so as to present and clean toilet.

2.19. a. EUROPEAN TYPE WATER CLOSET

The closet shall be White color (as per BOQ) European type Water Closet wall mounted / floor mounted water closet with CONSEALED CISTERN OR flush valve. Shall be of the best quality manufactured by an approved firm, and fixed by approved means. It shall have 100 mm dia porcelain P or 'S' traps with effective seal. Each closet shall be provided with the following accessories;

- a) Double flapped heavy plastic seat cover of approved quality and color with rubber buffers and C.P. brass screws fixed to the pan
- b) Flush vale with all internal parts.
- c) 15mmdia CP angle cock with CP inlet connection pipe
CI chair brackets

2.19.1. MODE OF MEASUREMENT

These items shall be measured in numbers and the rate quoted shall be per number only. The quoted rate shall include.

- a) The cost of W.C. pan with HDPE cistern, all internal parts
- b) Plastic seat cover, CP angle cock, inlet connection pipe
- c) Jointing and fixing materials, including painting of brackets.
CI brackets

2.20. a. WASH BASINS

They shall be of White colored (as per BOQ) vitreous China best quality manufactured by an approved firm and size as specified. They shall be supported on a below counter type of approved design.

Each washbasin shall be provided with 1 Nos. CP 15mmdia Pillar Cock unit, 15 mm CP brass angle cock, 450 mm long 8mmdia CP inlet pipes, 32 mm CP waste coupling, 32mmdia CP bottle trap with CP extension pipe, unless otherwise specified.

2.20.1 MODE OF MEASUREMENT

These items shall be measured in number and rate quoted shall be per number only. The quoted rate shall include:

- a) The cost of washbasin with brackets and other items stated.
- b) Jointing and fixing materials.
- c) Painting of brackets.

2.21 SINKS

These shall be of Stainless steel sink of 1mm thick best quality and shall be supported on necessary brackets. Each sink shall be provided with 15mm dia CP sinkcock with 'swivels pout wall mounted type, CP flange, 40mmdia CP waste coupling, 40mmdia heavy cast CP bottle trap with CP extension pipe, CP wall flange.

2.21.1 MODE OF MEASUREMENT

These items shall be measured in numbers including all the items mentioned above and rate quoted shall be per number only. The quoted rate shall include all accessories as mentioned in BOQ, jointing and fixing materials and fixing materials etc., complete.

2.22 BIB – COCKS

The Bib - cocks shall be of 15mmdia brass CP with CP wall flanges.

2.22.1 MODE OF MEASUREMENT

These items shall be measured in numbers and rate quoted shall be per number only. The quoted rate shall include jointing and fixing materials etc., complete

2.23 MODE OF MEASUREMENT

These shall be measured in numbers and shall include all Accessories as described in BOQ.

2.23 MODE OF MEASUREMENT (General Note)

All the items above shall be measured in numbers and the quoted rate shall be per number only which shall include unless otherwise specified: The cost of respective materials Necessary Fixtures Fixing in position and testing where necessary/specified.

3.0 CENTRIFUGAL MONO BLOCK PUMPS:

- 3.1 Pumps shall be of Transfer pump system comprising of Horizontal Centrifugal pumps mounted on a base frame bonding with PCC bed (1:4:8). Pumps shall be built of CI with dynamically balanced GM Impeller and SS shaft. The bearing shall be grease lubricated ball type.
- 3.2 The motor shall be squirrel cage TEFC induction type suitable for operation on 400/440V, 3Ph, 50Hz AC supply. The winding shall be suitably insulated with Class "E" materials and impregnated to exclude moisture. The performance of the motor shall be in conformity with IS 325.
- 3.3 The base frame for pump set shall be cast iron drip and splash proof and shall accommodate both pump and motor.
- 3.4 Each pump shall be provided with 100mmdia dial type pressure gauge with GM isolation cock and connecting pipe.
- 3.5 The pumps are housed in pump room located in the basement and shall be provided with a common control panel fabricated to accommodate feeders for Filter feed pumps, Treated water transfer pumps, Basement drainage water lift pumps and Chlorine doser. The control panel shall comprise of safety devices viz. O/L relays, Dry run protector, single phase preventor, incoming SFU of suitable capacity, DOL starters push button type, panel type AMP & Volt meter, pilot lamps for phase indication, Auto-manual switch, leads for water level controllers installed in raw & treated water UGR compartments and in the OHT. The scope of work includes necessary cabling of appropriate sizes between the UGR, pumps, control panel, basement water collection sump.
- 3.6 The control panel OUTGOING for 2nos.TW transfer Pumps 1No. 63 Amps MCCB 1 No.S/D starter suitable for 2.5HP 1No. Single phase preventor suitable for the pump described above 1No. Set of ON/OFF indicating lamps 1No. Auto/manual selector switch 1set of start/stop push buttons Note: 2nos. Pump working, 1no. stand by shall be floor or wall mounted type as approved. The pumps shall be installed true to level on 150mm thick PCC pedestals as shown on drawings. Manufacturer's instruction shall be followed during installation and commissioning of pumps and control panels.
- 3.7 Pumps shall be measured in nos. and shall include all items mentioned in the above specs.

C ELECTRICAL

1.1 LT SWITCH BOARD

1.1.1 PARTICULARS OF THE SYSTEM

- i. Operating Voltage : 415Volts
- ii. Frequency : 50 Hz
- iii. Phases : 3
- iv. No. of wires : 4
- v. Neutral : Solidly earthed

1.1.2 SERVICE CONDITION

Standard service conditions as per Appendix `A' of IS: 2516 (part I section 1965)

1.1.3 CONSTRUCTION

The LT switchgear shall be sheet steel 9 of 14 Swg CRCA clad totally enclosed dust tight/vermin proof, weather proof, indoor, free standing floor mounting and cubicle construction. The busbar chamber shall be extensible on both sides. The type of enclosure shall at least provide degree of protection covered by IP:53 (weather proof enclosure) of IS:2147-1962. The busbar shall be air insulated Aluminum conductor of suitable size for rated current. The current rating shall not be more than 0.8A/sq.mm. Suitable PVC shrouding with colour coding shall be provided over the busbar. The busbars shall be mounted on SMC supports only. The complete chamber shall be degreased, acid cleaned, washed, phosphate and painted with one coat of zinc chromate primer and 2 coats of enamel paint of Siemens gray colour or the complete panel shall be powder coated. This shall be done in the presence of a representative of the owner. The construction details of the LT panel shall be submitted and got approved by the consultant before fabrication. The installation charges shall include the cost of supply, fabrication and installation of all the necessary steel supports for the erection of the panel.

1.1.3.1 TEMPERATURE RISE

Rise in temperature of following parts of LT switchgear under normal current shall be limited to values as undertaking 40 degree centigrade as reference ambient temperature.

- 1.Contact parts : 45degree centigrade
- 2.Terminals for external insulated connection : 50degree centigrade
- 3.Manual operation means
 - a. Parts of metal : 15degree centigrade
 - b. Part insulated : 25degree centigrade

1.1.3.2 BUSBARS

RATING OF BUSBARS

- i. No. of busbars : 3phase and 1 neutral

- ii. Insulation voltage : 1.1KV
- iii. Normal current : as specified
- iv. Short circuit current : 65KA

Busbars shall be air insulated aluminium conductor enclosed in a sheet steel chamber. Busbars arrangement shall comply with IS:375-1963. Marking and arrangement of busbars of main connection shall be as per IS: specifications. Letter code and number code as per IS: specification shall be followed for auxiliary wiring. Section of busbars shall be suitable for rated current and corrected for an ambient temperature of 45degree centigrade. Neutral busbar shall be insulated and provision for its connections shall be given. The complete busbar shall be provided with PVC heat shrink insulation of the colour specification.

1.2 METERING

Current transformer operated ammeters shall be provided with each of the incoming feeders, to indicate current in each of the phases. Current transformers shall comply with IS:2705 (Part II) – 1964 and shall be of class 0.5 accuracy. Ammeter shall be of digital type and of 2.5 class accuracy and shall comply with IS: 1248 – 1968.

One voltmeter of 0 to 500Volt range with a four position selector switch shall be provided to indicate line voltages. The voltmeter shall be digital type and class 2.5 accuracy with resistance fuse and shall comply with IS;1248-1968.

1.3 INDICATING LAMPS

Switchgear shall be provided with LED type lamps to indicate ON/OFF and TRIP positions.

1.4 CABLE TERMINATION

Switchboard shall be provided with necessary cable end box and compression glands for connecting 1.1KV grade PVC insulated PVC sheathed armoured aluminium conductor outgoing cables as indicated in the drawing.

The incoming switchgear shall be provided with necessary cable end box and compression glands for connecting 1.1KV grade, PVC insulated, PVC sheathed armoured aluminium conductor cables.

The door of the compartment shall be suitably interlocked with the breaker so that it is not possible to close the switch when the door is open.

1.5 LT CABLE 1.1 KV GRADE/PVC CABLE

1.6.1 INSTALLATION

Cable shall be laid in the routes marked in the drawings. Where the cable route is not marked the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Consultant before laying of the cable. Procurement of cable shall be on the basis of actual site measurement and the quantities shown on the schedule of work shall be regarded as a guide. Cable rising indoors shall be laid on walls, ceiling, inside shafts or trenches. Single cables laid shall be fixed directly to walls or ceiling. All supports shall be at not more than 500mm. Where number of cables are run necessary perforated cable trays shall be provided wherever shown. Cables laid in built up trenches shall be on steel supports. Plastic identification tags shall be provided at every 20mtr.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cables or in accordance with the manufacturer's recommendation whichever is higher. In case of direct buried cable the cable route shall be parallel or perpendicular to roadways, wall etc. Cables shall be laid in an excavated graded trench over sand cushion to provide protection against abrasion. Width of excavated trenches shall be as required. The cable route shall be provided with cable route marker at every 20mtr.

1.6.2 TESTING

M V cables shall be tested upon installation with a 500V megger and the following readings established.

1. Continuity on all phases
 - a. between conductors
 - b. all conductors and ground
2. Insulation resistance

1.6.3 MODE OF MEASUREMENT

Cable will be measured on the basis of unit length and shall include the following:-

- i Cables and clamps
- ii Installation commissioning and testing
- iii Cable marking
- iv Cable route marker if required

1.7 WIRING INSTALLATION

1.7.1 The wiring installation for the complete complex may be done with ultimate care using experienced labour force.

1.7.2 The following standards and rules shall be applicable.

IS 732	Code of practice for electrical wiring installation
IS 1646	Code of practice for fire safety of buildings
IS 6946	Flexible non-metallic conduits for electrical installation
IS 1293	3 pin plug sockets

1.7.3 INSTALLATION

The number of wires of 1.5 sq.mm Cu, 2.5 Sq.mm Cu in a 20mm conduit shall be less than 5 and 4 Sq.mm shall be less than 4 nos only.

Conduits shall be kept at minimum of 100mm from the pipes of other non-electric services

- a. Normal lights and 6A 3 pin sockets on lighting circuits
- b .Power outlets- 16 /20 A 3 pin sockets on power circuits
- c . Emergency lighting if any

Wiring for short extension to outlets in wall or ceiling to vibrating equipment's, motor etc. shall be installed in flexible conduits . Otherwise rigid conduits shall be used.

Conduits run on surface shall be supported on metal 12mm wide saddles or PVC saddles of the same colour which in turn are

properly screwed to wall or ceiling. Saddles shall be at an interval of not more than 500mm. Fixing screws shall be with round or cheese head and of rust proof material. Exposed conduit shall be neatly run parallel or at right angles to the walls of the building. Unseen conduit bends and offsets shall be avoided by using fabricated mild steel junction boxes for better appearances. No cross over of conduit installation shall be allowed unless it is necessary and entire conduits installation shall be clean and neat in appearance.

Conduit buried in concrete structure shall be put in position and securely fastened to the reinforcement or fixed to the concrete approved by the Consultants. Proper care shall be taken to ensure that the conduits are neither dislocated nor choked at the time of pouring the concrete. Suitable fish wire shall be drawn in all conduits before they are embedded. Where conduits pass through expansion joints in the building, adequate expansion fittings shall be used to take care of any relative movement.

Inspection boxes/shall be provided for periodical inspection to facilitate drawal and removal of wire. Such inspection boxes shall be flush with the wall or ceiling in the case of concealed conduits. Inspection boxes shall be spaced at not more than 12metres apart or two 90 degree solid bends or equal. All junction boxes shall be covered by 6mm clear perspex plate truly cut and fixed with screws. These junction boxes shall form part of point wiring, conduit wiring as the case may be and shall be included in the cost of wiring including removing the Perspex cover for painting and refixing. No separate charges shall be allowed except where specially mentioned.

A bare earth wire of not less than 16 SWG copper shall be run in each conduit.

1.7.4 LIGHTING AND POWER WIRING

All final branch circuits for lighting and appliances shall be single conductor cables run inside conduits. The conduit shall be properly connected with socket, bends, junction boxes etc. The circuit wiring from DB to the first switch board shall be of 2.5 sq.mm and from switch board to switch board depends on the number of light points.

Final branch circuit shall preferably be kept in a separate conduit upto the distribution board. No other wiring shall be bunched in the same conduit ex-

cept those belonging to the same phase. Each lighting branch circuit shall not have more than eight outlets or 800W which ever is lower.

Flexible cords of connection to appliances, fans and pendants shall be 650/1100V grade (three or four cores ie. with insulated neutral wire of same size) with tinned stranded copper wires, insulated twisted and sheathed with strengthening code. Colour of sheath shall be subject to the Consultant's approval. Looping system of wiring shall be used. Wires shall not be joined, where joints are unavoidable, they shall be made through approved mechanical connectors. No such joints shall be made unless the length of the sub circuit, sub main or main is more than the length of the standard coil.

Control switches shall be connected in the phase conductors only and shall be `ON when knob is down. Switches shall be of plate type and fixed in 16 SWG thick MS boxes with cover plates as specified. Chromium plate brass screws shall be used or other standard arrangements as per Consultant's recommendation.

Power wiring shall be distinctly separate from lighting wiring. Conduits not less than 20mm and wires not less than 4 sq.mm copper shall be used for power wiring.

All the wiring shall be colour coded as follows

R - Red
Y - Yellow
B - Blue
N - Black
E - Green

Control wiring if any - Grey

Every conductor shall be provided with identification as per rules matching the drawings.

1.7.5 Testing

The following tests shall be carried out on all types of wiring on completion of the work and before energizing the installation.

- i. Insulation resistance test.
- ii. Electrical Continuity test.
- iii. Earth Continuity test.
- iv. Earth electrode resistance test
- v. Switch polarity.

1.7.6 Insulation resistance test: The insulation resistance shall be measured by using 500V megger between the following points.

- i. Phase and neutral conductor with all fuses in position and all switches in closed condition and main switch in OFF position with lamps and other devices removed.
- ii. Between earth and whole system of conductors with all fuses in place, all switches closed and all lamps in position.
- iii. Between all conductors connected to one phase of the supply and the conductors connected to neutral with all lamps in position and switches on OFF position.

The insulation resistance in mega ohm as obtained by each of the above tests shall not be less than 50 divided by the number of points on the circuit. Where a whole installation is being tested, a lower value than that given by the above formula is acceptable subject to a minimum of one mega ohm.

1.7.7 Electrical continuity test: Earth and every circuit shall be tested for electrical continuity by using a multimeter.

1.7.8 Earth Continuity test: The earth continuity conductor including metal conduit shall be tested for electrical continuity and the resistance of the same along with the earthing lead measured from the connection with the earth electrode to any point in the earth continuity conductor in the complete installation shall not exceed one ohm.

1.7.9 Earth electrode resistance test: The earth electrode resistance shall be tested as per standard.

1.7.10 Switch polarity test: Test shall be made to verify that all switched in every circuit had been fitted in the same conductor throughout and such conductor shall be marked for connection to the phase conductor.

1.7.11 As built drawings:
On completion of work the contractor has to provide as built drawing for all buildings along with the circuit diagrams.

2. EARTHING

2.1.1 SCOPE

The scope of work shall cover earthing stations, laying copper earthing strips.

2.1.2 STANDARDS

The following standards and rules shall be applicable.

1. IS:3043 – 1966 Code of practice for earthing.
2. Indian Electricity Act and Rules.

All codes and standards mean the latest, where not specified other wise. The installation shall generally follow the Indian Standard code of practice or the British Standard codes of practice in the absence of Indian standards.

2.1.3 PLATE EARTHING STATION

The substation earthing shall be with C.I plate earthing station.

The earthing station shall be as shown on the drawings. The earth electrodes shall be 1200x1200x12.6mm C.I./600x600x6.3mm G.I plate. The earth resistance shall be maintained with a suitable soil treatment as shown on drawings.

The resistance of each earth station should not exceed 5 ohms.

The earth lead shall be connected to the earth plate through copper/brass bolts as shown on the drawing. The earth plates, G.I. pipes, cross Cu bars and down copper connections shall form an earthing station.

2.1.4 EARTH LEADS AND CONNECTIONS

Earth lead shall be bare copper as specified with sizes shown on drawings. At road crossing necessary hume pipes shall be laid. Earth lead run on surface of wall or ceiling shall be fixed on saddles or wall so that the strips is at least 8mm away from the wall surface.

The complete earthing system shall be mechanically and electrically connected to provide an independent return path to the earthing source.

2.1.5 EQUIPMENT EARTHING

All apparatus and equipment transmitting or utilizing power shall be earthed in the following manner . Copper earth wires shall be used where copper wires are specified.

- a. Armoured cables shall be earthed by 2 distinct earth connections to the armouring at both the ends and the size of connection being same as for the metallic conduit.
- b. 3 phase power panels shall have 2 distinct earth connections of the size co-related to the incoming cable size.
- c.,An equipment earthing grid is to be established. All earth connections to all panels and equipment shall be connected to the nearest point of the earthing grid.

2.1.6 TESTING

The following earth resistance value shall be measured with an approved earth megger and recorded.

1. Each earthing station
2. Earthing system as a whole
3. Earth continuity conductors.

2.1.7 MODE OF MEASUREMENT

Providing earthing station complete with excavation, electrode, watering pipe, tope connector and interconnection for electrode, soil treatment , masonry chamber, concrete cover etc., shall be treated as one unit of measurement.

The following items of work shall be measured and paid at unit rates covering the cost of earth wire/strips, clamps , labour etc.

- a. Main equipment earthing grid and connections to the earthing stations.
- b. Connections to the switch board.

STATUTORY APPROVAL

The approvals shall be the supplier's responsibility to ensure that the design, supply and installation is carried out as per statute applicable. Further any changes/modifications suggested by the authorities shall be carried out at no extra cost to the complete satisfaction of the authority within the stipulated time.