EAST CENTRAL ZONAL OFFICE, PATNA

==========

LIFE INSURANCE CORPORATION OF INDIA
EAST CENTRAL ZONAL OFFICE, ENGG. DEPTT. (4TH FLOOR)
"JEEVAN DEEP", EXHIBITION ROAD, PATNA – 800 001
PHONE: 0612-2501118/2503014/2501103,
E-mail: ecz_engg@licindia.com
AN ISO 9001:2015 CERTIFIED DEPARTMENT

TENDER NO:LICI/ECZO/ENGG/2026-27/31

E-Tender on Percentage Rate basis for Proposed Modernization ie civil interior, false ceiling, modular furniture, chairs, Telephone & data cable, electrical installations, fire alarm, Air Conditioning system, etc works at BO Deoghar (Rented premises) under DO Bhagalpur

BID – III

THIS DOCUMENT IS TO BE DOWNLOADED AND UPLOADED WITH DIGITAL SIGNATURE. SUBMISSION OF HARD COPY IS NOT REQUIRED.

CONTENTS

Sl No.	Description	Page	
		From	To
	PART - I		
1	Conditions of Contract	3	28
2	General instruction to Contractors.	29	37
3	Proforma of Articles of Agreement (Annexure – "A")	38	39
4	Form of Bank Guarantee in lieu of Security Deposit (Annexure – "B")	40	42
5	Specification for Builders' work –General Specification	43	65
6	Technical Specification for Interior Work	66	82
7	Technical Specification for Electrical Works, Fire Alarm System and Air-conditioning System	83	140
	PART – II		
9	Letter to Bidder from the Chief Engineer	141	142
10	Letter from Bidder to the Chief Engineer	143	144
11	Appendix to the Conditions of Contract	145	147
	& No Claim Certificate	148	148
12	Appendix to General Instructions to Bidders	149	149
13	Special Conditions including Testing of Materials	150	153
14	General Preambles to Schedule of Quantities	154	164
15	Bill Format	165	170
16	List of Principal Makes/ Brands of various Materials	171	186
17	Special Condition regarding Inspection of Work	187	187
18	Forfeiture of Earnest Money Deposit	188	188
19	Schedule of Quantities (Civil & Electrical) (Separate sheet attached)	1	19

CONDITIONS OF CONTRACT

1. INTERPRETATIONS:

1.1 In construing these Conditions, the Specifications, the Priced Schedule of Quantities, Tender and Agreement, the following words shall have the meanings herein assigned to them except where the subject or context otherwise requires:

1.2 "Employer" shall mean THE LIFE INSURANCE CORPORATION OF INDIA and his (their) heirs, legal representatives, assignees and successors.

1.3 "Chief Engineer" shall mean the person occupying the post of head of the Zonal Engineering Department of the Corporation.

1.4 "Corporation's Engineers" shall mean such Deputy Chief Engineers, Superintending Engineers and/or Executive Engineers of the Corporation, who shall from time to time be appointed by the Chief Engineer for supervising the work carried out by the Contractor or for any purpose in connection therewith:

1.5 The term "Site Engineer" shall mean the person appointed and paid by the Employer, acting under the order of the Corporation's Engineer to superintendent the work.

1.6 The Contractor shall mean the individual, firm or company whether incorporated or not, who is awarded the contract & shall include the legal representative of such individual or the persons composing such firm or company or the successors of such individual, firm or company & the permitted assignees of such individual, firm or company.

1.7 The "Site" shall mean the lands/buildings and/or other places on, in, into or through which work is to be executed under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.

1.8 "This Contract" shall mean the Articles of Agreement, these Conditions, the General Instructions to Contractor, the General Preambles to Schedule of Quantities, Special Conditions, the priced Schedule of Quantities, the Specifications, the Appendices, the Drawings and other related correspondence.

1.9 "Act of Insolvency" shall mean any act of insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any amending Statute.

1.10 "Notice in Writing" or written notice shall mean a notice in written, typed or printed characters, sent (unless delivered personally or otherwise proved to have been received) by registered post

to the last known private or business address 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.

1.11 Words importing persons include Firms and Corporations, words importing the singular only also include the plural and vice versa where the context so requires.

1.12 The titles of the Clauses shall not affect or alter the meaning of Clauses and are solely for the purpose of facilitating reference.

1.13 The following abbreviations shall be followed for the designations of various LIC Officers:

DESIGNATIONS	**ABBREVIATIONS**
Executive Director (Engineering)	E.D.(E)
Zonal Manager	Z.M.
Chief Engineer	C.E.
Chief Architect	C.A.
Deputy Chief Architect	D.C.A.
Deputy Chief Engineer	Dy.C.E.
Superintending Engineer	S.E.
Senior Architect	S.A.
Executive Engineer	E.E.
Deputy Senior Architect	D.S.A.
Asstt. Secretary	A.S.

1.14 Wherever the words “approved”, “directed”, “as required”, “selected” or words of like effect are used, it is to be understood that the approval/direction, requirement or selection of the Corporation’s Engineer are intended unless otherwise specified.

1.15 The words “as described” shall mean the description in the Special Conditions, Specifications, General Instructions, Drawings etc. of this tender.

1.16 The words “allow” shall mean that the Contractor shall include in his rates for the particular matter referred to.

1.17 “Day Work” shall mean items of labour and/or materials which in the opinion of the Corporation’s Engineer are not capable of being evaluated by the accepted method of measurement and analysis.

2. SCOPE OF CONTRACT:

2.1 The Contractor shall carry out and complete the works in every respect in accordance with this Contract and in accordance with the directions and to the satisfaction of the Corporation's Engineer. The Corporation's Engineer may issue further drawings and/or written instructions, details, directions and explanation in regard to:

a. The variation or modification of the Design, quality of works or the addition or omission or substitution of any work;

b. Any discrepancy in the Drawings or between the Schedule of Quantities and/or Drawings and/or Specifications;

c. The removal from the site of any materials brought thereon by the Contractor and the substitution of any other material thereof;

d. The removal and/or re-execution of any work executed by the Contractor;

e. The dismissal from the work of any persons employed thereupon;

f. The opening up for inspection of any work covered thereupon;

g. The amending and making good of any defects under relevant Clause giving details of defects after completion.

2.2 The Contractor shall forthwith comply with and duly execute all works comprised in such Instructions subject to the provisions of relevant specific conditions of the Contract. In the event of any dispute or difference of opinion the contractor shall refer the matter within 7 (seven) days of the issue of such instruction to the Chief Engineer whose decision shall be final & binding.

3. DISCREPANCIES:

3.1 If there are varying or conflicting provisions made in any one document forming part of Contract, the Chief Engineer shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the contractor.

3.2 The several documents forming the Contract are to be taken as mutually explanatory of one another, and the order of precedence shall be as follows;

a) Special conditions
b) General preambles to schedule of quantities
c) General instructions
d) Conditions of contract

3.3 In case of discrepancies between the Schedule of Quantities, the specifications and/or drawings the following order of precedence shall be observed

(a) Description in Schedule of Quantities

(b) Specifications of relevant Trade

(c) Drawings; detailed drawings shall be followed in preference to small scale drawings and figured dimension in preference to scale.

(d) Indian Standard Specifications of `BIS'

4. DRAWINGS AND SCHEDULE OF QUANTITIES:

4.1 Two complete sets of the Drawings and Specifications and Schedule of Quantities shall be furnished by the employer to the contractor. Two copies of the additional Drawings, if any, shall be furnished within such time as the Chief Engineer may consider reasonable which may be necessary for execution of any part of the work. Such copies shall be kept on the work site and the CE and his representatives shall at all reasonable times have access to the same and they shall be returned to the EE by the Contractor on completion of the contract.

This Contract and the signed Drawings, Specifications and Schedule of Quantities shall remain in the custody of the Employer.

5. CONTRACTOR TO PROVIDE EVERYTHING NECESSARY FOR EXECUTION OF WORK:

5.1 Contractor shall provide everything necessary for the proper execution of the work according to the intent & meaning of the Drawings, Priced Schedule of Quantities and Specifications taken together, whether the same may or may not be explicitly shown or described therein provided that the same can reasonably be inferred there from and if the Contractor finds any discrepancy therein he shall immediately and in writing refer the same to the CE whose decision shall be final and binding on the Contractor.

5.2 The Contractor shall supply, fix and maintain at his cost during the execution of any work all the necessary Centering, Scaffolding, Staging, Planking, Timbering, Strutting, Shoring, Pumping, Fencing, Boarding, Watching and Lighting by night as well as by day, required not only for the proper execution and protection of the said work but also for the protection of the Public and the safety of any adjacent Roads, Streets, Cellars, Vaults, Ovens, Pavements, Walls, Houses, Buildings and all other erections, matters or things and the Contractors shall take down and remove any or all such Centering, Scaffolding, Staging, Planking, Timbering, Strutting, Shoring, etc., as occasion shall require or when ordered to do so, and shall fully reinstate and make good all matters and things disturbed during the execution of the work to the satisfaction of the Corporation's Engineer.

6. AUTHORITIES NOTICES AND PATENTS:

6.1 The Contractors shall conform to the provisions of any Acts of the Legislature relating to the work and to the Regulations and Bye-Laws of any Authority and or any Water, Lighting and other Companies and/or Authorities with whose system the structure is proposed to be connected and shall before making any variations from the Drawings or Specifications that may be necessitated by so conforming give to the CE written notice specifying the variations proposed to be made and the reasons for making them and apply for instructions thereon. In case the Contractor shall not within 7 (seven) days receive such instructions, he shall proceed with the work conforming with the Provisions, Regulations or Bye-Laws in question.

6.2 In particular, the Contractors shall be responsible to Register themselves under the Contract Labour (Regulation & Abolition) Act 1970 and Rules there under and any amendment thereto; they must comply with and carry out all the provisions and obligations under the said Act and Rules and furnish all information to Employer as may be required by it and shall indemnify the Employer against any penalties/claims arising from any default on their part.

6.3 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 fee that may be properly chargeable in respect of the work and lodge the receipts with the Employer.

6.4 The Contractors shall indemnify the Employer against all claims in respect of patent, rights, and shall defend all actions arising from such claims unless he has informed the Chief Engineerbefore any such infringement and received his permission to proceed and shall himself pay all royalties, licence fees, damages, costs and charges of all and every sort that may be legally incurred in respect thereof.

6.5 The Contractor should observe that his work shall not cause any nuisance to the Public in general and to the neighbouring occupants in particular.

6.6 Should the Contractor desire to work on Sundays, Holidays and during night hours, permission in writing from the Corporation's Engineer must be obtained in time. It shall be the responsibility of the Contractor to obtain permission from Civil Authorities, if necessary.

7. SETTING OUT WORK:

7.1 The Contractor shall set out the work and shall be responsible for the true and perfect setting out of the same and for the corrections of the positions, levels, dimensions and alignment of all parts thereof. If at any time any error shall appear during the progress of any part of the work, the

Contractor shall at his own cost rectify such error, if called upon, to the satisfaction of the Corporation's Engineer. The Contractor must not commence work until the outlines of the building and Centre line layout have been pegged out and approved by the Corporation's Engineer.

8. CONTRACTOR IMMEDIATELY TO REMOVE OFFENSIVE MATTER:

8.1 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.

9. MATERIALS AND SAMPLES:

9.1 All the materials stores and equipment required for the full performance of the Contract must be provided through normal trade channels and must include applicable import duties and all applicable taxes and other charges, if any. They shall be of approved quality and the best of their kind available and the Contractor must be entirely responsible for the proper and efficient carrying out of the work. The Contractor shall order all materials required for the execution of the work from local as well as from outside sources if situation warrants so as early as necessary to the satisfaction of the Corporation's Engineer and to ensure that such materials are on site well ahead of requirement for use in the work. Non – availability of materials in local market will not be an issue behind slow progress of work.

9.2 Before ordering such materials, the Contractor shall get samples of the materials approved well in time. Preference shall be given to ISI marked products and approved brands of requisite quality as mentioned in the tender. For materials, which are neither approved brands nor ISI marked, the same shall be got tested from approved laboratories at the Contractor's cost before approval. Approved brand and ISI marked product will also be tested if desired by the CE and if the test results are satisfactory, the cost of testing shall be borne by the Employer otherwise by the Contractor. No claim will be allowed for delay to the progress of work caused by test. If called upon by the Executive Engineer the Contractor shall produce proof for having arranged for the supply of materials well in time.

9.3 The Contractor shall furnish well in time before work commences at his own cost, any samples of workmanship that may be called for by the Corporation's Engineer for his approval and any further samples in case of rejection until such samples are approved. Such samples when approved shall be the minimum standard for the work to which they apply. In case of items like suspended ceiling, partitions, etc. typical sample panels or proto-types shall be erected in position for approval before undertaking work. Rates quoted shall cover for such preliminary work.

10. ACCESS:

10.1 Any of the Corporation's Engineers or any persons authorized by any one of them shall at all reasonable time have free access to the work and/or the workshops, factories or other places where materials are being prepared or constructed for the Contract and also to any place where the materials are lying or from which they are being obtained and the Contractor shall give every facility to all of them necessary for inspection and examination and test of the materials and workmanship. Except the representatives of the Public Authorities, no person shall be allowed on the work at any time without the written permission of the Corporation's Engineer.

If any work is to be done at a place other than the site of the work, the Contractor shall obtain the written permission of the Corporation's Engineer for doing so.

11. CONTRACTOR'S SUPERVISION & MINIMUM REQUIREMENT OF TECHNICAL STAFF:

11.1 The Contractor shall either himself supervise the execution of the contract or may appoint a Competent Agent approved by the CE to act in his stead.

11.2 Where the contractor is not a qualified Engineer or even if he is so qualified, he cannot in the opinion of C.E., give his full personal attention to the works, he shall at his own expense employ person(s) possessing the qualification and experience as described hereunder as his accredited agent to supervise the works and to receive instructions from Corporation's Engineers. Any directions, instructions or notices given by the Corporation's Engineer to such supervisor(s) shall be deemed to be given to the contractors.

a. **FOR WORKS COSTING UPTO Rs. 100 LAKHS** :

A qualified resident Engineer having a Government recognized Diploma in Civil Engineering and minimum of 2 years experience on building construction site.

b. **FOR WORKS COSTING MORE THAN Rs. 100 LAKHS & UPTO Rs. 200 LAKHS** :

A qualified resident Engineer having a Recognized Degree in Civil Engineering or equivalent qualification and minimum of 2 years experience on building construction site/s or a recognized Diploma in Civil Engineering with minimum 5 years experience on such construction jobs.

c. **FOR WORKS COSTING MORE THAN Rs.200 LAKHS** :

i) A qualified resident Engineer having a Recognized Degree in Civil Engineering and minimum of 3 years experience of such major construction site/s or a recognized diploma in Civil Engineering with 8 years experience.

ii) In addition the contractor shall employ suitable number of supervisors with recognized degree / diploma in the relevant branches or recognized qualification & experience in the relevant trades for proper execution of the work as approved by the Chief Engineer.

d. The CE may vary any of the above qualification / experience at his discretion if so warranted by conditions prevailing and applicable to any particular work such as Air-conditioning, HT, and Interiors etc.

e. If the contractor fails to employ suitable person(s) to supervise the work or fails to appoint replacement(s) when necessitated, amount as stipulated in the Appendix to the conditions of contract shall be recovered from the contractor for each Engineer and each supervisor for the period of non-employment.

12. DISMISSAL OF WORKMEN:

12.1 The Contractor shall, on the instruction of the Corporation's Engineer, immediately dismiss from the work any person employed thereon, who may, in the opinion of the Corporation's Engineer, 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 Corporation's Engineer.

13. DATES OF COMMENCEMENT AND COMPLETION:

13.1 The "Date of Commencement" shall be as stated in the Work Order and the Contractor shall thereupon and forthwith begin the work and shall regularly proceed with and complete the same on or before the "Date of Completion" stated in the Work Order, subject to the provisions for extension of time hereinafter contained.

14. ASSIGNMENT:

14.1 The whole of the work included in the Contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign or underlet the Contract or any part, share of interest therein nor shall he take a new partner without the written consent of the CE and

no subletting shall relieve the Contractor from the full and entire responsibility of the Contract or from the active superintendence of the work during its progress.

15. DEVIATION, VARIATION, EXTRA/DEVIATED ITEMS AND PRICING:

15.1 The Contractor should note that unless otherwise stated, the tender is strictly on Item Rate basis and his attention is drawn to the fact that rates for each and every item should be correct, workable and self supporting. The quantities in the Schedule of Quantities approximately indicate the total extent of work and no variation i.e. additions, omissions or subtractions shall vitiate the Contract. No liability shall attach to the Employer for any error therein or variation there from.

15.2 The contractor may when authorized and shall when directed, in writing by the CE or the Corporation's Engineers, whom the CE may for that purpose appoint, add to, omit from, make alterations in, substitutions for, or vary the works shown upon the Drawings or described in Specifications or included in the priced Schedule of Quantities but the Contractor shall make no additions, omissions, alterations, substitutions or variations without such authorization or direction. A verbal authority or direction by the CE, if confirmed by the contractor in writing within 7 (seven) days, be deemed to have been given in writing.

15.3 The rates of such altered, additional or substituted works shall be determined in accordance with the following.

a. The net rates or prices in the original tender shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced therein.

b. The net price of the items in the original tender shall determine the value of the items omitted. However, if omissions vary the conditions under which any remaining items of the work are carried out or if the amount of any omission relative to the amount of the whole of the Contract works or to any part thereof shall be such that in the opinion of the Chief Engineer, the net rate or price contained in the Priced Schedule of Quantities or Tender or for any item of work involves loss or expenses beyond that reasonably contemplated by the Contractor and is by reason of such omission rendered unreasonable or inapplicable, the Chief Engineer shall fix another rate or price as in the circumstance he shall think reasonable and proper.

c. If the rate for any altered, additional, or substituted item of work is not specified in the schedule of quantities, the rate for that item shall be derived from the rate for the nearest similar item specified therein.

d. If the rate for altered, additional or substituted item of work cannot be determined in the manner specified above, then such items of work shall be priced on the basis of coefficients of labour and materials as given in the latest CPWD rate analysis handbook and rates for labour and materials wherever applicable shall be the market rate prevailing at the time of execution.

e. Where such co-efficient are not available in C.P.W.D. rate analysis, the actual Labour/Materials involved and recorded by the Executive Engineer in executing the items shall be considered.

f. Where extra work cannot be properly measured or valued, the Contractor shall be allowed "Day Work" prices at the net rates stated in the Tender or the Priced Schedule of Quantities or, if not so stated, then in accordance with the local "Day Work" rates and wages for the district, provided that in either case vouchers specifying the date and time (and if required by the EE the names of workmen employed) and materials incorporated be delivered for verification to the EE or his representative at or before the end of the week following that in which the work has been executed. The EE is not bound to recognize the cost of materials furnished in vouchers; the CE at his discretion will fix the price of such materials based upon market value.

g. While fixing rates of extra items 15% (Fifteen percent only) shall be allowed over & above the basic rate of material (without GST), T & P, water charges and labour to cover all supervision, overheads, profits and all other applicable taxes/cess. GST on works contract will be paid separately.

.

h. For all extra items of work, the contractor should submit to the concerned Corporation's Engineer the necessary particulars along with his analysis and the rate he proposes to claim for consideration within a period of 4 (four) weeks from the time of cropping up of any authorized extra / deviated item. He shall also ensure that all the authorized claims are included in the final bill. If the contractor fails to submit his claim within the stipulated period or the period duly extended by the Corporation's Engineer, then the CE shall proceed to fix the rate for the item(s) and the same shall be final and binding on the contractor.

i. The Contractor shall note that Extra/Deviated items claim and/or any other claim whatsoever if submitted after submission of his Final Bill, will not be entertained and considered by the Employer. The Contractor shall not be allowed to make any Additions/ Alterations/ Revisions / Changes/ Modifications/ Variations in the final bill, after the final bill is submitted by him.

16. SUB-CONTRACTORS:

16.1 All specialist Merchants, Tradesmen and others, executing any work or supplying, fixing any goods for which provisional sums are included in the Schedule of Quantities and/or Specifications, who may be nominated or selected by the CE, who shall be the final authority are hereby declared to be Sub-Contractors and are herein referred to as nominated Sub-Contractors.

16.2 No nominated Sub-contractor shall be employed on or in connection with the work against whom the Contractors shall make reasonable objection or (save where the CE and the Contractor shall otherwise agree) who will not enter into a Contract providing:-

a. That the nominated Sub-Contractor shall indemnify the Contractor against the same obligation in respect of the Sub-Contractor as the Contractor is under, in respect of this Contract;

b. That the nominated Sub-Contractor shall indemnify the Contractor against claims in respect of any negligence by the Sub-Contractor or his servants or agents or any misuse by him or them of any scaffolding or other plant or the property of the Contractor or under any Workmen's Compensation Act in force.

17. THIRD PARTY LIABILITY, DAMAGE TO NEIGHBOURING PROPERTY, LOSS OF MATERIAL AND WORKMEN'S COMPENSATION:

17.1 The Contractor shall be responsible for all injury to persons, animals or things, and for all damage to structural and/or decorative part of property which may arise from the operations or neglect of himself or of any Sub-contractor or any of his Sub-Contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of his Contract. This Clause shall be held to include inter-alias, any damage to Building, whether immediately adjacent or otherwise and any damage to roads, streets, footpaths, bridges, or ways as well as all damage caused to the building, and the works forming the subject of this Contract by frost, rain, wind or other inclemency of the weather. The Contractor shall fully indemnify the Employer and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of all and any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of any award or compensation or damages consequent upon such claim.

17.2 The Contractor shall fully indemnify the employer against any loss, damage or deterioration for whatever reason, of all materials brought at site and especially material supplied by or paid for partly or wholly by the employer.

17.3 The Contractor shall reinstate all damage and loss of every sort mentioned in this Clause so as to deliver up the whole of the Contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of the third parties.

17.4 The Contractor shall fully indemnify the Employer against all claims which may be made against the Employer by any member of the Public or other third party in respect of anything which may arise in respect of the works or in consequence thereof.

17.5 The contractor shall at his own expense arrange to effect from the date of commencement & maintain till the date of virtual completion of contract, with any licensed general insurance company, a ***POLICY OF INSURANCE(Contractor's All Risk Policy)*** to cover all such risks detailed above viz. loss, damage & third party liability etc. The policy shall be of an amount as mentioned in Appendix to Conditions of contract and in the joint names of the employer & contractor and shall be deposited with the employer and renewed as required from time to time during the currency of the contract.

17.6 The Contractor shall also fully indemnify the Employer against all claims which may be made upon the Employer, whether under the ***WORKMEN'S COMPENSATION ACT*** or any other ***STATUTE*** in force during the currency of this Contract or at Common law in respect of any Employee of the Contractor or any Sub-Contractor and shall at his own expense effect and maintain until the Virtual completion of the work, with "licensed General Insurance Company" a ***POLICY OF INSURANCE*** of adequate amount in the joint names of the Employer and the Contractor against such risks and deposit such policy or policies with the employer & renew the same as required from time to time during the currency of the Contract.

17.7 The Contractor shall be responsible for anything, which may be excluded from the Insurance Policies above referred to, and also for all other damage to any property arising out of or incidental to the negligence or defective carrying out of the Contract.

17.8 The amount of insurance to be taken for the above policies will be jointly decided between the contractor and the employer before issue of acceptance letter based on the tendered cost, nature of work, location of site, local hazards etc.

17.9 In default of the Contractor insuring as provided above, or having insured failing to renew the same as required the Employer on his behalf may so insure/renew and may deduct the premiums paid from any monies due or which may become due to the Contractor together with penalty as the CE deems appropriate.

17.10 The Contractor shall also fully indemnify the Employer in respect of any costs, charges or expenses arising out of any claim or proceedings at law and also in respect of any award of compensation of damages arising there from.

17.11 The Employer shall be at liberty and is hereby empowered to deduct fully the amount of any damages, compensation costs, charges and expenses arising or accruing any such claim of damage from any sum or sums due or to become due to the Contractor.

18. DELAY AND EXTENSION OF TIME:

18.1 If the works be delayed due to any of the following:

(a) by force majeure ,

(b) by reason of any exceptionally inclement weather,

(c) by reason of proceedings taken or threatened by, or disputes with, adjoining or neighbouring owners, or public authorities,

(d) by the work, or delays, of other Contractors or Tradesmen engaged by the Employer,

(e) by reason of any additional work or instruction ordered by the employer,

(f) by reason of Civil Commotion, local commotion of workmen or strike or lock-out affecting any of the building trades,

(g) in consequence of the Contractor not having received in due time necessary instructions from the CE for which he shall have specifically applied in writing,

(h) from other causes which the CE may certify as beyond the Control of the Contractor,

(i) by reason of non-payment of interim certificate at specified time,

Then upon the happening of any such event causing delay, the contractor shall immediately, give notice thereof in writing to the Corporation's Engineer, but shall nevertheless use constantly his best endeavours to make good this delay.

18.2 Request for extension of time shall be made by the contractor **at the earliest** of the event causing delay.

18.3 In case of strike or lockout the Contractor shall give written notice thereof to the CE as soon as possible but he shall nevertheless constantly use his endeavours to prevent delay and shall do all that may reasonably be required to the satisfaction of the CE to proceed with the work.

18.4 The CE shall make a fair and reasonable assessment of the delay and grant extension of time accordingly. Such extension shall be communicated to the contractor by the Corporation's Engineer immediately within **30 (Thirty) days of the date of receipt of request for extension**. Non-application by the contractor for extension shall however not be a bar for giving fair and reasonable extension which shall be as decided by the CE.

18.5 The decision of the CE as communicated by the Corporation's Engineer to the contractor on the extension of time shall be final & binding.

18.6 No claim in respect of compensation or otherwise, howsoever arising, as a result of extension granted under the above conditions shall be admissible.

19. COMPENSATION IN THE FORM OF PENALTY FOR DELAY OF WORK AND REWARDS FOR EARLY COMPLETION:

19.1 The Contractor shall submit a Time and Progress Chart (CPM/PERT/Quantified Bar Chart) within 10 (Ten) days of Letter of intent and get it approved by the Chief Engineer, LICI of the Zone. The Milestone Chart shall be prepared as produced below in direct relation to the time stated in the contract documents for completion of items of the works. It shall indicate the forecast (mile-stones) of the dates of commencement and completion of various items, trades, sections of the work and may be amended as necessary by agreement between the Chief Engineer, LICI and the Contractor within the limitations of time stipulated in the Contract documents and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work exceeds one month (save for special jobs for which a separate program has to be agreed upon) complete.

The physical progress report including photographs shall be submitted by the contractor on the prescribed format & the intervals (not exceeding one month) as decided by the Chief Engineer. The compensation for delay as per clause shall be leviable at intermediate stages also, in case the required progress is not achieved to meet the above time deadlines of the completion period and /or milestones of time and progress chart, provided always that the total amount of Compensation in the form of Penalty for delay to be paid under this condition shall not exceed 10% of the tendered value of work.”.

Compensation in the form of Penalty for delay of work @ 0.5% of contract sum of work per week of delay to be computed on per day basis and maximum 10 % of contract sum.

The amount of compensation in the form of Penalty shall be adjusted or set-off against any sum payable to the Contractor under this or any other contract with LIC. In case, the contractor does not achieve a particular milestone mentioned elsewhere in the tender document, or the re-scheduled milestone(s), the amount shown against that milestone shall be withheld and to be adjusted against the compensation levied at the final grant of Extension of Time if needed. With-holding of this amount on failure to achieve a milestone, shall be automatic without any notice to the Contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.”

20. FAILURE BY CONTRACTOR TO COMPLY WITH CE’S INSTRUCTIONS :

20.1 If the Contractor after receipt of written notice from the CE, requiring compliance with such further Drawings and/or his instructions, fails within 7 (seven) days to comply with the same the CE may employ and pay other persons to execute any such work whatsoever as may be necessary to

give effect thereto and all additional costs incurred in connection therewith shall be deducted from any money due or to become due to the Contractor.

21. PAYMENT OF BILLS :

a. MEASUREMENT OF WORKS

21.1 The EE may, from time to time, intimate the contractor that he requires the work to be measured and the contractor shall forthwith attend or send a qualified representative to assist the EE or his representative in taking such measurements and calculations and to furnish all particulars or to give all assistance required by either of them. All items having a financial value shall be entered in the Measurement Book. All measurements and levels shall be taken jointly by the Contractor or his authorized representative and Site Engineer or his authorized representative from time to time during the progress of the work and such measurements shall be signed and dated by both the parties in token of their acceptance. If any of the measurements recorded are objected by any one of the party, a note shall be made to that effect with reason, signed by both parties and referred to Corporation's Engineer whose decision in the matter shall be final and binding. Measurements can also be recorded through electronic medium where specifically approved by Chief Engineer.

21.2 Should the contractor not attend or neglect or omit to send such representative, then the measurements taken by the EE or representative shall be taken to be correct measurements of the work. Wherever not specified in the "Schedule of Quantities or elsewhere" the mode of measurements shall be in accordance with the latest brochure issued by the Indian Standards Institutions (now renamed as Bureau of Indian Standards) on "Method of measurement of Building works".

21.3 The Contractor or his representative may, at the time of measurement, take such notes and measurements as he may require.

21.4 All authorized extra work. Omissions and all variations made without the Chief Engineer's knowledge, if subsequently sanctioned by him in writing, shall be included in such measurement.

21.5 If the contractor or his authorised representative does not record the measurements periodically for the completed works, then the site Engineer shall take measurements after giving notice in writing of at least 3 (three) days. Measurements recorded in the absence of Contractor shall be intimated with a copy of such measurements to the contractor. If the contractor fails to countersign or record objections within a week from the date of measurement, then such measurement recorded in absence by the Site Engineer shall be deemed to be accepted by and binding on the Contractor.

21.6 The Contractor shall, without any extra charge provide all assistance with every appliance, labour and other things necessary for taking measurements (either by him or by site Engineer) and

recording levels including test checking of such measurements by any person authorised by the Employer.

21.7 All work shall be measured net as fixed in its place. All measurements of 'cutting' shall be held to include for the consequent wastage on the materials used.

21.8 Except where any general or detail description of the works expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items for which procedure is not covered in the specification, measurement shall be taken in accordance with the relevant Standard Method of measurement issued by BIS and if for any item no such standard is available then a mutually agreed method shall be followed.

21.9 Measurements of all hidden/concealed items of work including extra items if any, such as, work in foundations including excavations, plinth filling, masonry, concrete etc. steel in all R.C.C. work, pipe to be encased etc. shall be jointly recorded by the contractor and Site Engineer or his authorised representative before they are covered up. Immediately after the work is ready for measurements, Contractor will give specific notice to the Site Engineer for recording the measurements. If the Site Engineer or his authorised representative fails to record the measurements, the Contractor will refer the matter to the Corporation's Engineer for instructions, but in no case shall cover up work without the latter's permission.

22. <u>PAYMENTS:</u>

22.1 The contractor shall be paid by the Employer, from time to time, by installment under Interim Certificate to be issued by the EE to the Contractor on account of the work executed, when in the opinion of the EE, work to the approximate value named in the Appendix to the conditions of Contract as "Value of work for Interim certificate" (or less at the reasonable discretion of the Executive Engineer) has been executed in accordance with this contract, subject however to a retention of the percentage of such value mentioned in Appendix to the Conditions of Contract hereto as "Retention percentage on account of Security Deposit". The Interim Certificate shall be based upon interim Bills of Running Account Bills to be prepared by the Contractor and supported by the detailed measurements. The EE may include in the Interim Certificate such amount as he may consider proper on account of materials delivered upon the site by the contractor for use in the work, after satisfying price of materials on basis of vouchers/bills submitted by the contractor.

In case any material have been supplied by the Employer to the contractor in connection with the work, necessary recovery for the same shall be effected from the bills of the contractor by the CE at the issue rates of such materials as stipulated while calling for tenders and in other cases at a stock rate or market rates of such materials, whichever is higher. The contractor will, however, not be entitled to modify his rates for items of work requiring use of such materials and when the work

has been virtually completed and the CE shall have certified in writing that it has been so completed on the basis of detailed measurements and after obtaining written endorsement by the CE that the CE/ Deputy Chief Engineer has made a final Scrutiny and that there are no disputed items, rates of quantities, the contractor shall be paid by the Employer in accordance with certificate to be issued by the CE the sum of money named in the Appendix as "Installment after Virtual Completion" and the contractor shall be entitled to the payment of the final bill in accordance with the final certificate to be issued in writing by the Deputy Chief Engineer with the approval of the CE with expiration of the period referred to as "Defects Liability Period", in the Appendix to Conditions of Contract hereto from the date of Virtual Completion or as soon after the expiration of such period as to work shall have been finally completed and all defects made good according to the true intent and meaning hereof, whichever shall last happen.

Provided always that the issue by the EE of any certificate during the progress of the works or at after their completion shall not relieve the contractor from his liability under Clause (2) in cases of fraud, dishonesty or fraudulent concealment relating to the work of materials or to nay matter dealt with in the certificate in case of all defects and insufficiencies in the work or materials which a reasonable examination would not have disclosed. No certificate of the Chief Engineer or Executive Engineer shall of itself be conclusive evidence that any work or materials to which it related are in accordance with the contract.

The Chief Engineer may make any correction in previous certificate which shall have been issued by the Executive Engineer/Superintending Engineer.

Payment upon the EE's certificate shall be made within the periods named in the Appendix "Period for honouring Interim Certificate" after such a certificate has been delivered to the Employer.

The CE shall have power to withhold any certificate if the work or any parts thereof are not being carried out to his satisfaction.

22.2 Provided always that the issue by the Corporation's Engineer of any Certificate during the progress of the works or after their completion shall not relieve the Contractor from his liability in cases of fraud, dishonesty or fraudulent concealment relating to the work or materials or any matter dealt with in the Certificate in case of all defects and insufficiencies in the work or materials which a reasonable examination would not have disclosed. No Certificate of the Corporation's Engineer shall of itself be conclusive evidence that any work or materials to which it related are in accordance with the Contract.

22.3 Payment upon the Corporation's Engineer's Certificate shall be made within the periods named in the Appendix "Period for honouring Interim Certificate" after such a Certificate has been delivered to the Employer;

22.4 The CE shall have power to withhold any Certificate if the work or any parts thereof are not being carried out to his satisfaction. However, if the final certificate is not issued within the period as mentioned under Clause No.22.5, 26 due to Audit para by CTE etc., the amount involved for such items of deficient work as decided by Chief Engineer would be with held. The same would be allowed as agreed upon by the CTE & the Chief Engineer and the final certificate would accordingly be issued and final bill passed. For such withheld amount, a simple interest @ 6% per annum shall be paid to the contractor along with the said payment. Such interest will be calculated from the last date (as mentioned in Appendix to Conditions of Contract) for honoring final certificate till the date of payment.

22.5 The measurements and valuation in respect of the Contract shall be completed within the "period of Final Measurement" stated in the Appendix or if not so stated then within six months of the completion of the contract works as defined in Clause (26) hereof. No further claim shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished.

22.6 The final certificate shall be based on the submission of final measurements or overall measurements of the work (to be taken if so directed by Corporation's Engineer) with all relevant details similar to 22.1 above. The CE may direct the Contractor to resubmit details if the same are found incomplete to issue the final certificate and his decision to accept the details is final and binding on the Contractor. Final Certificate shall be issued by the CE after the conditions are met with as per 22.4, 22.5, 22.6 and 26 and contractor's submission of **No Claim certificate cum receipt** as per the Pro-forma given in Appendix to Conditions of Contract.

23. SECURED ADVANCE AGAINST MATERIALS

23.1 The Contractor shall be entitled to be paid advance along with interim bill against materials which are not perishable and which are in the opinion of Corporation's Engineer, required for the works and have been brought on site for incorporation in the work but have not been so incorporated and are safeguarded against loss due to any cause whatsoever, (refer clause no-17). The amount of such advance against materials shall be arrived at on the following basis:

a) 80% of the market value of materials required for the work and brought on site.

OR

80% of the cost of such materials (brought on site) as derived from the relevant accepted tender rate for the particular item involving such materials, whichever is lower.

b) Such advance payment made against materials shall be recovered from or adjusted from the interim bills as and when the materials are utilized in the work.

Examples of certain perishable materials on which no advance shall be paid are Sand, Paint, Bitumen, Hard Boards/Soft Boards and other paper products, Petroleum Products, Coal Tar, and Insulating Boards etc.

23.2 In case of dispute, the decision of the Chief Engineer on whether advance payment can be made against specific materials shall be final and binding.

24. UNFIXED MATERIALS AND EQUIPMENTS:

24.1 All tools, plants and materials brought to the site by the Contractor shall vest in the Employer and shall not be removed from the site of works except by permission of the Corporation's Engineer in writing. The Employer shall have a lien on these materials and plants.

25. REMOVAL OF IMPROPER WORK:

25.1 The Corporation's Engineer shall during the progress of the work have power to order in writing from time to time the removal from the work within such reasonable time or as may be specified in the order, of any materials, which in their opinion are not in accordance with the Specifications or instructions, the substitution of proper materials and the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the Drawings and Specifications or Instructions and the Contractor shall forthwith carry out such an order at his own cost. In case of default on the part of the Contractor to carry out such an order, the CE shall have the power to employ other persons to carry out the same and all expenses consequent thereon or incidental thereto as certified by the EE shall be borne by the Contractor and may be deducted from any amounts due or that may become due to the Contractor.

26. VIRTUAL COMPLETION:

26.1 The work shall be completed in accordance with the Contract and to the entire satisfaction of Chief Engineer. All unused materials, tools, plants, scaffoldings, temporary structures, hutments and things belonging to the Contractor shall be removed and the site of works cleared of rubbish and all waste materials by the contractor at his own expenses and delivered up tidy to the employer. After completion of the work, the contractor will serve a written notice to the CE to this effect. The Chief Engineer after satisfying himself shall thereupon approve the virtual completion. The Defect Liability Period shall commence from the date of such certification.

27. DEFECTS AFTER COMPLETION:

27.1 The defects, shrinkage, settlements or other faults, which may appear within "the Defects Liability Period, stated in the "Appendix to the Conditions of Contract" or if not stated then, within 24 (twenty four) months after virtual completion of the work, arising on account of materials or workmanship not in accordance with the Contract shall, upon the directions in writing of the Corporation's Engineer and within such reasonable time specified therein, be amended and made good by the Contractor at his own cost unless the CE shall decide that he ought to be paid for such amendment and for making good, and in case of default, the CE 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 recovered from any monies due or that may become due to the Contractor. The CE may in lieu of such amending and making good by the Contractors, deduct from any money due or that may become due to the Contractor, a sum to be determined by the CE equivalent to the cost of amending such work. Should any defective work have been done or materials supplied by any Sub-Contractor employed on the work, who has been nominated or approved by the CE as provided in Clause No.16 the Contractor shall be liable to make good in the same manner as if such work or material had been done or supplied by the Contractor and been subjected to the provisions of this Clause and Clause No.2 hereof. The Contractor shall remain liable under the provision of this Clause notwithstanding the payment of any Certificate or the passing of any accounts.

28. PROVISIONAL SUMS, APPLICATION OF:

28.1 For all the work listed under items for which provisional sums are provided in the tender, the CE reserves the right to invite separate tenders or select or order from any manufacturer or firms at his discretion and reserves to himself the right of paying direct to persons or firms for any such work. The Contractor will not have any claims over these items, but if tenders are invited for such items, he will also be invited to quote along with others.

28.2 If ordered by the CE, Contractor shall be required to carry out provisional sum items at the same conditions and rates as applicable for this Contract.

29. OTHER PERSONS ENGAGED BY THE EMPLOYER:

29.1 CE reserves the right to execute any work not included in this Contract, which he may desire to have carried out, by other persons and the Contractor shall allow all reasonable facilities and the use of his scaffolding and plant for the execution of such work, but is not required to provide any special plant or materials for the execution of such work except by special arrangement with the Employer. Such work shall be carried out in such manner 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 happen to or be occasioned by such work.

30. SUSPENSION BY THE CONTRACTOR:

30.1 If the Contractor except on account of any legal restraint upon the Employer preventing the continuance of the work, shall suspend the work or in the opinion of the CE shall neglect or fail to proceed with due diligence in the performance of his part of the Contract or if he shall make default in respect of Clause No.2, the Employer shall have the power to give notice in writing to the Contractor requiring that the work be proceeded within a reasonable manner and with reasonable dispatch. Such Notice shall purport to be a notice under this clause. After such notice is given, the Contractor shall not be at liberty to remove from the site of the work or from any ground contiguous thereto any plant or materials belonging to him, which shall have been placed thereon for the work and the Employer shall have a lien upon all such plant and materials to subsist from the date of such notice being given until the notice shall have been complied with. If the Contractor shall fail for 7 (seven) days after such notice given to proceed with the work as therein prescribed, the CE may proceed as provided in Clause No.31.

31. DETERMINATION OF CONTRACT BY EMPLOYER:

31.1 If the Contractor (being an individual or a firm) commit any "Act of Insolvency" or shall be adjudged as Insolvent or shall make an assignment or composition of the greater part in number or amount of his creditors or shall enter into a deed of assignment with his creditors, or being an Incorporated Company shall have an order made against him or pass an effective resolution for winding up either compulsorily or subject to the supervision of the Court or Voluntarily or if the official Assignee of the Contractor shall repudiate the Contract or if the official Assignee or the Liquidator in any such winding up shall be liable within 7 (seven) days after notice to him requiring him to do so, to show to the reasonable satisfaction of CE that he is able to carry out and fulfill the Contract and if required by the CE to give security therefore or if the Contractor (whether an Individual Firm or Incorporated Company) shall suffer execution to be issued or if the Contractor shall suffer any payment under this Contract to be attached by or on behalf of any of the creditors of the Contractors or if the contractor shall assign or sublet the Contract without the consent in writing of the CE first obtained or if the Contractor shall charge or encumber this Contract or any payment due or which may become due to the Contractor there under, or if the CE shall certify in writing that in his opinion the Contractor,

a. has abandoned the Contract, or

b. has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the work for 7 (seven) days after receiving from the CE written notice to proceed, or

c. has failed to proceed with work 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

d. has failed to complete the work within the stipulated date including authorized extensions or

e. has failed to remove the materials from the site or to pull down and replace the work within 7 (seven) days after receiving a written notice from the Corporation's Engineer that the said materials or work were condemned or rejected or

f. 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 7 (seven) days after written notice shall have been given to the Contractor requiring the Contractor to observe or perform the same, or

g. has to the detriment of good workmanship or in defiance of the CE's instructions to the contrary sub-let any part of the Contract.

then and in any of the said causes, the CE notwithstanding any previous waiver, after giving 7 (seven) days notice in writing to the Contractors, determine the Contract, but without thereby affecting the powers of the CE or the obligations and liabilities of the Contractor, the whole of which shall continue to be in force as fully as if the contract has not been so determined and as if the work subsequently executed had been executed by or on behalf of the Contractor. And further, the Employer, his agents or servants, may enter upon and take possession of the work and all plant, tools, scaffolding, sheds, machinery, steam and other power, utensils and materials, lying upon the premises or the adjoining lands or road and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the work or by employing any other Contractors or other person or persons to complete the work, and the Contractor shall not in any way interrupt or do any act, matter, or thing to prevent or hinder such other Contractor, other persons or person employed for completing and finishing or using the materials and plant for the work. When the work shall be completed or as soon thereafter as convenient, the CE shall give a notice in writing to the Contractor to remove his surplus materials and plant and should the Contractor fail to do so within a period of 14 (Fourteen) days after receipt thereof by him, the Employer may sell the same by public auction and shall give credit to the Contractor for the amount so realized. The CE shall thereafter ascertain and certify in writing under his hand what (if anything) shall be due or payable to or by the Employer for the value of the said plant and materials so taken possession of by the Employer and the expense or loss which the Employer shall have been put to in getting the work to be so completed, and the amount, if any, owing to the Contractor and the amount, which shall be so certified shall thereupon be paid by the Employer to the Contractor or by the Contractor to

the Employer, as the case may be and the Certificate of the CE shall be final and conclusive between the parties.

32. TERMINATION OF CONTRACT BY CONTRACTOR:

32.1 If payment of the amount payable by the Employer under any Certificate of the EE shall be in arrears as unpaid for 60 (sixty) days after notice in writing requiring payment of the amount with interest of aforesaid shall have been given by the Contractor to the Employer, or if the work be stopped for six months under order of the CE or by any injunction or other order of any Court of Law, then and in any of the said cases, the Contractor shall be at liberty to determine the Contract by notice in writing to the Employer and he shall be entitled to recover from the Employer payment for all the work executed and for any loss, he may sustain upon any plant or material supplied or purchased or prepared for the purpose of the Contract.

32.2 In arriving at the amount of such payment, the net rates contained in the Contractor's original tender shall be followed or where the same may not apply, valuation shall be made in accordance with Clause No.15 hereof.

33. DETERMINATION OF CONTRACT DUE TO ABANDONMENT OR REDUCTION IN SCOPE OF WORK:

33.1 If at any time after the acceptance of the tender, the Employer shall for any reasons whatsoever not require the whole or any part of the works to be carried out, the CE shall give notice in writing to the Contractor who shall have no claim to any payment of compensation or otherwise whatsoever on account of any profit or advantage which he might have derived from the Execution of the whole of the works.

The Contractor shall be paid at contract rates for the full amount of work executed and in addition:

a. The cost at site of all surplus approved materials collected for incorporation in the work, which the Contractor does not wish to retain and which shall thereafter become the property of the Employer.

b. Where the Contractor desires to retain the surplus of approved materials (excepting materials supplied by the Employer or obtained in Employer's name, which shall, in any case, be returned to the Employer) the cost of handling and cartage charges for removal from the site to a reasonable distance not exceeding 25 kms.

c. If upon the determination of the Contract under this condition, the Contractor is of the opinion that he has suffered hardship by reason of the operation of these conditions, he may refer the circumstances with full details to the Chief Engineer, who on being satisfied

that such hardship exists or has existed, shall make such allowance, if any as in his opinion is reasonable, and his decision shall be final, conclusive and binding.

34. DISPUTES TO BE FINALLY DETERMINED BY CHIEF ENGINEER:

34.1 The Instruction, Decision, Opinion, Direction, Certificate or Valuation of the CE with respect to all or any of the matters under Clause (2), (3), (5), (6), (9), (14), (15), (18), (23), (27), (30), (31) and (33) hereof (which matters are herein referred to as EXCEPTED MATTERS) shall be final and conclusive and binding on the parties hereto and shall be without appeal. Any other Decision, Opinion, Direction, Certificate or Valuation of the CE or any refusal of the CE to give any of the same shall be subject to the right of Arbitration and review as given under Clause No.36.

35. SECURITY DEPOSIT AND PERFORMANCE GUARANTEE:

35.1 Amount towards Security deposit shall be calculated as per details given under Serial No.9 of "APPENDIX TO CONDITIONS OF CONTRACT" in the tender. Security Deposit can be either in Cash or in the form of Bank Guarantee.

In case of cash option, the EMD shall be retained as part of Security Deposit and balance Security Deposit shall be accumulated through retentions from Running Account Bills at 7.5% (maximum) of gross amount of bill. If the total amount / 50% of EMD is submitted in the form of Bank Guarantee and the contractor wants to avail the cash option i.e. the deduction of security deposit from the bills, then the contractor has to deposit a demand draft /pay order in the name of Life Insurance Corporation of India payable at Patna amounting to the total amount / 50% of EMD in lieu of Bank guarantee submitted towards EMD. Once this amount is deposited the contractor can avail cash option for security deposit and the bank guarantee submitted towards EMD shall be returned.

In case of Bank Guarantee option, the Contractor shall furnish one Bank Guarantee for full amount of Security deposit valid till end of defects liability period OR, two Bank Guarantees of like amounts each equal to half the Security deposit; one valid till virtual completion and the other till end of defects liability period.

35.2 Performance Guarantee under 9(b) of "Appendix to Conditions of Contract" shall be only in the form of Bank Guarantee valid up to scheduled date of completion.

35.3 The Bank Guarantee/s shall be from any Nationalised / Scheduled Bank preferably at place of work site or Zonal Headquarter of LIC within whose jurisdiction the work falls or where a Branch/Division of the Corporation exists.

35.4 Bank Guarantee/s (BGs) against Security Deposit (SD) and Performance Guarantee (PG) shall be executed as per the specimen pro-forma at Annexure B and C. Bank guarantee/s against Security Deposit and Performance guarantee shall be submitted within 21 (twenty one) days from the date of acceptance letter.

35.5 In case of failure by the contractor to furnish the Bank Guarantee against Performance Guarantee as per Cl.35.2 by the stipulated date or extended date if any, Employer shall without prejudice to any other right or remedy available in law, be at liberty to cancel the tender and forfeit the 50% Earnest Money absolutely.

35.6 50% of the Security Deposit (cash option) shall be refunded after the certificate of virtual completion is issued to the contractor & provided that the employer has no claim for forfeiture of part or whole of the said deposit.

35.7 Balance 50% of Security deposit will be refunded to the contractor after the satisfactory completion of the defects liability period, subject to deductions for any appropriations thereof required to be made by the employer as per the conditions of contract.

35.8 If one Bank Guarantee in lieu of total Security Deposit is furnished, the same will be released only after the successful completion of Defects Liability period subject to any appropriations as aforesaid.

35.9 If two Bank Guarantees in lieu of Security deposit are furnished, the First Bank Guarantee will be released after the certificate of Virtual completion is issued to the contractor and second shall be released after the satisfactory completion of Defects Liability Period subject to any appropriations as aforesaid.

35.10 Bank Guarantees towards Performance Guarantees (where applicable) shall be released after the virtual completion is issued.

35.11 Contractor shall keep the Security Deposit and Performance Guarantee, where applicable, replenished to its full value whenever any recovery or appropriation there from occurs. The employer reserves the right to do so from any money(s) due to the contractor laying with them.

35.12 The Contractor should note that no interest will be allowed on any part of the Security deposit.

35.13 No deductions will be effected from the bills when the total security deposit is paid in the form of Bank Guarantee(s) and the E.M.D shall be refunded after acceptance of Bank Guarantee(s).

35.14 In the event of failure by the contractor to submit Bank Guarantee(s) by the specified / extended date, recovery of Security deposit shall be effected from the R.A Bills. However, where the contractor fails to furnish Bank Guarantee against Performance Guarantee the matter shall be dealt with as per Cl. 35.5 above.

35.15 In all cases of Bank Guarantees, there shall be further provision of claim period of 6 months. If the contract period gets extended for any reason whatsoever, the contractor shall obtain the required extensions to the Bank Guarantee(s).

36. SETTLEMENT OF DISPUTES, ARBITRATION:

36.1 All Disputes and Differences of any kind whatsoever arising out of or in connection with the Contract or the carrying out of work (whether during the progress of the work or after its completion and whether before or after determination, abandonment or breach of contract) shall be referred to a Standing Committee consisting of 1. Retired High Court Judge and 2. Members from engineering fraternity retiring as senior Engineer from Government/ Government Undertaking. The Committee will be constituted by the Chairman, LIC of India.

36.2 The claims arising out of the Contract will be placed before the Committee once in a quarter and decision will be conveyed to both the contractually agreed parties.

36.3 Either of the Party on being dis-satisfied with the decision may approach to a Three Member Arbitral Tribunal, one each will be appointed by Either Party and 2 appointed Arbitrators will appoint 3rd Arbitrator who will act as Presiding Arbitrator.

36.4 Chief Engineer will appoint the Arbitrator on behalf of LIC of India. The Arbitration shall be conducted in accordance with Arbitration and Reconciliation Act 1996 as amended by the Arbitration and Reconciliation (Amendment) Act 2015 (3 of 2016) and any other amendment thereafter if any.

36.5. The Contractually Agreed Parties hereby also agree that the Arbitration under this clause shall be a Condition Precedent to any Right of Action in Law of Court under the Contract.

GENERAL INSTRUCTIONS TO CONTRACTORS

1. DRAWINGS:

1.1 Drawings shall be kept open for inspection at places as mentioned in the letter to the contractor from the Chief Engineer. Drawings generally include the site plan, floor plans, elevations and sections of the proposed work.

2. INSPECTION OF SITE:

2.1 The Tenderer shall visit and examine the site of work and satisfy himself as to the nature of the existing roads or other means of communication, the character of the soil and of the excavations, the correct dimensions of the work and facilities for obtaining materials and shall obtain generally his own information on all matters affecting the execution of the work. No extra charge made, in consequence of any misunderstanding or incorrect information on any of these points or on the grounds of insufficient description will be allowed. All expenses incurred by the Tenderer in connection with obtaining information for submitting this tender including his visits to site and efforts in compiling the Tender shall be borne by the Tenderer and no claims for reimbursement thereof shall be entertained.

3. WHOLE WORK TO BE COMPLETED IN THE SPECIFIED COMPLETION PERIOD:

3.1 The whole work is to be completed within the completion period stated in the Appendix to Conditions of Contract or the extended date of completion, if any. The Contractor will be required if necessary, to work overtime to complete the work by the stipulated date. No extra will be allowed on the Contract sum for such overtime work.

4. TIME AND PROGRESS CHART:

4.1 A time and Progress Chart is attached to this Contract for guidance. The Contractor shall submit a time and progress chart (**CPM/PERT/Quantified Bar Chart**) fitted within the specified overall period of completion (as stated in Appendix to Conditions of Contract) within **10 (Ten)** days of the communication of letter of intent, to the Corporation's Engineer. In case the Contractor does not come forward for any change in the Time and Progress Chart as provided in the General Instruction to the Contractors, it shall be presumed that the Time and Progress Chart is accepted in full in letter and spirit to maintain the pace of the progress of the Work.

4.2 Ancillary work should be so started that all such work is completed before the specified overall contractual period of completion.

4.3 The Contractor shall assume full responsibility for any delay in delivery of materials by Merchants or nominated Sub-Contractors not having completed the work in accordance with the Time and Progress Chart. Such excuses shall not form any criterion for extension of time, or any claims by the Contractor.

4.4 Any failure on the part of the contractor to adhere to the starting and completion date of individual items mentioned in the chart shall entail application of the liquidated clause on while or part at the discretion of the Chief Engineer, notwithstanding the overall period of completion stated in the appendix to the conditions of contract.

5. BENCHES:

5.1 The Contractor is to construct and maintain proper benches to indicate the inter-section of all main walls in order that the lines and levels may be accurately checked at all times. The Contractor shall provide suitable stones with flat tops and build the same in concrete for temporary or permanent benchmarks. All the pegs for setting out the work and fixing the necessary levels required for the execution thereof shall, if desired by the Corporation's Engineer likewise, be built in masonry at such places and in such a manner as the Corporation's Engineer may determine. Contractors' rates shall cover for these factors.

6. DRAWINGS ON SITE:

6.1 The Drawings maintained on the site are to be carefully mounted on boards of appropriate size and covered with a coat of approved transparent varnish or laminated at the cost of the Contractor. They are to be protected from the ravages of termites, ants, silver fish and other insects.

7. ORDER OF WORK:

7.1 The Chief Engineer 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.

8. WORKMANSHIP:

8.1 The Work calls for a high standard of workmanship combined with speed.

9. REJECTED WORKMANSHIP OR MATERIALS:

9.1 Any workmanship, or materials not complying with the specific requirements or approved samples, or which have been damaged, contaminated or deteriorated, must be removed immediately from the site and replaced at the Contractor's expense as directed.

10. QUOTED RATES:

10.1 The rate is percentage tender.

11. WATCHING AND LIGHTING:

11.1 The Contractor from the time of being placed in possession of the site must allow for watching, lighting and protecting the work, the site and surrounding, properly by day and night on all days including Sundays or other holidays, at his own cost.

12. WATER:

12.1 The rates quoted by the Contractors shall include for providing all water required for the work including that required by special tradesmen and Sub-Contractors and pay all charges required by Local Municipal or other Authorities. Water must be clean, fresh, pure and free from earth, vegetable or organic matters, acid or alkaline substance in solution or suspension. The Contractors shall make their own arrangements for water supply. If supply from the Municipality or other local bodies be inadequate, the Contractor should provide tube well or wells or open well at his own cost. The Contractors must execute any temporary plumbing and pay all fees and charges. All health regulations in force shall be strictly observed by the Contractor and pay all necessary charges.

13. ELECTRICITY:

13.1 The Contractor shall arrange with the concerned Electricity Supply Authorities for a temporary meter and supply to the site and shall provide all temporary wiring, power and lighting points for the whole of the works and clear away when no longer required. He shall pay all charges for the same and for electricity consumed, including that consumed by Sub-Contractors. **The Contractor should submit disconnection & no dues certificate from the supplying authority along with his final bill.**

14. OFFICE FOR CORPORATION'S ENGINEER ON SITE:

14.1 The Contractor shall at his cost, provide a separate office (of suitable size) for the Corporation's Engineer/s on site with writing tables, chairs, electric lights and fans, drinking water arrangements, etc. as directed by the Executive Engineer and clear away at completion of work and make good all work disturbed and pay all charges. The Contractor shall also provide facilities for having the Corporation Engineer's office cleaned every day and kept in good and hygienic condition.

15. OFFICE ACCOMMODATION FOR CONTRACTOR'S STAFF :

15.1 The Contractor shall, at his cost, provide, fit-up and maintain in an approved position proper office accommodation for his representative and staff, which offices shall be open at all reasonable hours to receive instructions, notices or communications and clear away on completion and make good all work disturbed.

16. SECURITY AND PROTECTION:

16.1 The Contractor shall at his cost, provide any necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials and for altering and adapting same as may be required and removing at completion of the works and making good all works disturbed.

16.2 During inclement weather, the Contractor shall suspend concreting or plastering for such time as the Corporation's Engineer may direct and shall protect such work in course of execution from damage by approved measures.

16.3 Should the work be suspended by reason of rain, strike, lock-outs or any other cause, the Contractor shall at his cost take all precautions necessary for the protection of the work and shall make good any damage arising from any of these causes.

16.4 The Contractor shall at his expense cover-up and protect from injury from any cause, all new work and supply all temporary doors protection to windows, and any other requisite protection for the whole work executed, whether by himself or special tradesmen of Sub-Contractors and any damage caused must be made good by the Contractor at his own expense.

16.5 All fences, trees, shrubs, grasses, lawn and other surfaces around the buildings or approaches thereto, which are required to be maintained are to be kept free from damage due to operations in connection with the work, at Contractor's expense.

16.6 The Contractor shall, at his expense, protect all projecting sills, jambs, copings, stone or concrete treads and mouldings and all concrete steps, wood work and joinery and the like from injury during the progress of the work.

16.7 The Contractor shall at his cost, protect joinery and make good all damages to the same from any cause whatsoever during the performance of the Contract and leave perfect to the satisfaction of the CE at completion. Before giving possession, the Contractor must see that all doors, windows and ventilation etc. work easily and shall make all necessary adjustments for such smooth working.

17. SANITATION:

17.1 The Contractor shall at his cost provide adequate latrine facilities and keep the same in a clean and hygienic condition to the satisfaction of the Public Health Authorities and shall cause such latrine and night soil to be cleared away whenever necessary and shall make good all works disturbed by these conveniences.

18. MINIMUM WAGES ACT:

18.1 The Contractor shall pay rates of wages and observe hours of work and conditions of employment to existing rules under Minimum Wages Act. Further, it shall be Contractor's responsibility to ensure that he pays his workmen wages, which are not lower than the minimum prescribed by the Union Government and State Government in which area this Contract, is being operated.

19. SHEDS FOR MATERIALS:

19.1 The Contractor shall at his cost provide and maintain proper approved sheds for the storage and protection of materials etc. and other work that may be executed on the site including the tools and materials of Sub-Contractors and remove on completion. Sheds for storage of Cement are to have floors raised from the ground.

20. TEMPORARY ROADS:

20.1 The Contractor shall, at his expense, provide such temporary roads on the site as may be necessary for the proper performance of the Contract and for his own convenience but not otherwise. Upon completion, such roads shall be broken up and levelled where so required by the Drawings at Contractor's expense unless the CE shall otherwise direct.

21. OBJECTS OF VALUE AND ANTIQUITY FOUND ON SITE:

21.1 All objects of value or antiquity found on the site shall remain the property of the Employer and such findings shall be immediately reported to the Chief Engineer.

22. WORKS AND SITE TO BE KEPT AND DELIVERED UP CLEAN:

22.1 All shavings, cuttings and other rubbish as it accumulates from time to time during the progress of the work and at completion, including that of Sub-Contractor and special tradesman to be cleared and carted away. All rejected materials shall be removed. Contractor's quoted rates shall allow for these factors.

23. USEFUL EXCAVATED MATERIALS:

23.1 Any sand, gravel, moorum or rock taken from excavation will remain the property of the Employer and in the event of it not being allowed to use in the work, the Employer reserves the right to dispose it off in any way he wishes or to direct the Contractor to cart it away as ordinary materials.

23.2 Should suitable sand or gravel or moorum or rock be found in the excavations and the Contractor be allowed to use the same in the work, in place of materials to be brought by him from outside he will be required to pay the Employer the full market value of the same.

24. SIGN BOARD AND HOARDINGS:

24.1 The Contractor shall not affix or place any placards or advertisement of any description or permit the same to be affixed or placed in or upon any hoarding, gantry, buildings or structure other than that approved by the Chief Engineer.

25. SCIENTIFIC AND MEASURING INSTRUMENTS:

25.1 Theodolite, levelling instruments, 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 Corporation's Engineer.

26. TOOLS FOR MASONS:

26.1 Every bricklayer or plasterer on the work shall be provided with suitable level, battens, trowels, wooden floats and breaking hammers for cutting bricks and templates, to enable him to carry out the work in a neat and workman like manner and each gang of brick layers or plasterers not

exceeding six in number shall be provided with a suitable measuring rule, a plumb bob, a spirit level and a square in addition to the above mentioned, all to be to the approval of the Site Engineer.

27. CONTRACTOR'S MISTERIES AND SUPERVISORS:

27.1 The Contractor's Masson and the Supervisors on the works shall carry with them a suitable measuring rule, a measuring tape, a spirit level, a plumb bob and a square and shall check the work of the bricklayer, plasterers, and carpenters and joiners to see that the work is being done according to the Drawings and Specifications. The Corporation's Engineer/Supervising Staff will use any and all measuring instruments or tools belonging to the Contractor as he chooses, while checking the work executed or being executed on the works.

28. NO OVERLOADING OF SLABS:

28.1 Floors of buildings under construction shall not be loaded by stacks of materials during construction without the prior approval of Corporation's Engineer. It is important that no load comes on the reinforced concrete floors until they are at least three weeks old and at no time must the load placed upon them exceed the load for which they are designed.

29. ALTERNATIVE ITEMS:

29.1 In regard to alternative items, if any, specified in the Schedule of Quantities, Contractor should note that the Employer reserves the right to order the Principal item or its alternatives at the CE's discretion.

30. ATTENDANCE ON SUB-CONTRACTORS:

30.1 Co-ordination: The Contractor shall be responsible for the co-ordination of all the work including that of Sub-Contractors, for arranging runs of all services and working to the requirements and layout of the specialist trades, in all matters necessary for the complete execution of the work.

30.2 Rates quoted by the Contractor shall be inclusive of all attendance on Sub-Contractors or other Contractors nominated by the Employer. Contractor must allow for provision of the use of his scaffolding to Sub-Contractors and for its retention until such time all relevant Sub-Contract works are completed.

30.3 The Contractor shall accept liability for and bear the cost of the supply of all necessary water, electricity, lighting, watching etc. for the Sub-Contractors work.

30.4 The Contractor must allow in his rates for making good any holes and chases left by the Sub-Contractors or other Contractors nominated by the Employer before the Builder's Work is completed and handed over

30.5 The Contractors shall, at all times, give access to workmen employed by the local or other authorities or any men directly employed on the buildings and to provide such parties with proper, sufficient, and if required, special scaffolding, hoists and ladders and provide them with water and lighting, and leave or make any holes, grooves etc. in
any work directed by the Chief Engineer, as may be required, to enable such workmen to lay or fix pipes, electric wiring, special fittings etc. Contractor's quoted rates shall allow for these factors.

31. OCCUPATION BY EMPLOYER:

31.1 The Employer reserves the right to occupy the works by sections as completed, as may be considered by the Chief Engineer both practicable and reasonable and without hindrance to the Contractor's progress.

32. TAXES, DUTIES, LEVIES AND DEDUCTION AT SOURCE:

32.1 The Contractors shall be responsible to pay all statutory levies/taxes imposed by the State and Central Government from time to time. It is deemed that the rates quoted by the contractor for each item of works includes all applicable taxes except GST on works contract which shall be paid by LICI as applicable from time-to-time as per notification of Government of India.

32.2 Deduction at source of Income tax, all other statutory taxes as applicable and labour cess shall be made by LIC of India as per statutory provisions prevailing from time to time, from the running account/ final bill and remitted to the concerned taxation authorities / State Government on behalf of the contractor.

32.3 The contractor shall mention the following LIC of India GSTIN Number according to State of work site in their bill.

FOR BIHAR GSTIN NUMBER : 10AAACL0582H2Z0
FOR JHARKHAND GSTIN NUMBER : 20AAACL0582H1Z0
FOR ODISHA GSTIN NUMBER : 21AAACL0582H1ZY

32.4 The vendor needs to display the invoice on the GST portal and remit the tax to the Govt. within specified period.

32.5 The measurement **sheets (Excel format)** along with the abstract are to be checked, corrected and accepted by the vendor and then only invoice with zero correction will be raised and uploaded by the vendor on GST portal.

32.6 The vendor should quote their rate considering all taxes/duties/levies/ labour welfare cess etc. which are not subsumed in GST but excluding GST on works contract as applicable which will be paid extra at the rate prevailing at the time of billing. It is also advised to quote the rate after considering the input tax credit advantage and adjusting / deducting the same in the quoted rate/amount.

32.7 GST on works contract will be paid extra along with Bill payment as per applicable rate of GST at the time of billing.

EAST CENTRAL ZONAL OFFICE, PATNA

ANNEXURE –'A'

PROFORMA FOR ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made at.....this.....day of .....20..... between THE LIFE INSURANCE CORPORATION OF INDIA, a body corporate constituted and established by the Life Insurance Corporation Act, 1956 (Act 31 of 1956) and having its Central Office at "Yogakshema", Jeevan Bima Marg, Mumbai and its Zonal Office at ..... hereinafter called the Employer (which expression shall include its successors and assignees wherever context or meaning shall so require or permit) of the one part and M/s …….(hereinafter called **"The Contractor"**) of the other part.

WHEREAS the Employer is desirous of constructing the…….

and has prepared drawings and specifications and the Schedule of Quantities which have been signed by or on behalf of the parties hereto.

AND WHEREAS the Contractor has agreed to execute upon and subject to the conditions and instructions set forth herein (hereinafter referred to as **"the said Conditions")** the works shown upon the said drawings and /or described in the said Specifications and included in the said Abstract Schedule of Quantities at the item rates therein set forth amounting to the contract sum of Rs…….. hereinafter referred to as **"the said contract Amount".**

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said Contract Amount to be paid at the times and in the manner set forth in the said conditions, the contractor shall upon and subject to the said Conditions execute and complete the works shown upon the said Drawings and described in the Specifications and/or the priced Schedule of Quantities.

2. The Employer shall pay the contractor the said Contract Amount or such other sum as shall become payable for the items and in the manner hereinafter specified in the said conditions.

3. The said Conditions and Appendices thereto shall be read and construed as forming part of this Agreement, and the parties hereto shall respectively abide by and submit themselves to the conditions and perform the Agreement in their part respectively in such conditions contained.

4. All disputes arising out of or in any way concerned with this Agreement shall be deemed to have arisen in_____and only the Courts in _____shall have jurisdiction to determine the same.

5. The contract comprises :-
   i) Tender Documents Serial Pages……..
   ii) Subsequent Correspondence Serial Pages……
   iii) Architectural Drawings Serial Pages ……..

6. Only ( ) alterations have been made in these documents and as evidence that these alterations were made before the execution of Contract Agreement, they have been initialed by the contractor and..... …… _____Engineer, _____ Zone, Life Insurance Corporation of India _____. The said officer is hereby authorised to sign and initial on the Employer's behalf, the documents forming part of this contract.

7. IN WITNESS WHEREOF THE Official seal of the LIFE INSURANCE CORPORATION OF INDIA, _____ ZONE, was thereto affixed and signed on its behalf by the Chief Engineer and by _____ on behalf of the Contractor/s on the dates respectively mentioned against their signatures in the presence of the witnesses whose signatures are also appended.

In the presence of

Chief Engineer

1. Signature : .....

   Name :.....

   Address : .....
   .....

2. Signature : .....

   Name : .....

   Address : .....
   .....

FOR AND ON BEHALF OF THE
LIFE INSURANCE CORPORATION
OF INDIA

Date :…….

In the presence of .....

1. Signature : .....

   Name :.....

   Address : .....
   .....

2. Signature : .....

   Name : .....
   Address : .....

FOR AND ON BEHALF OF THE
CONTRACTOR
M/S .....

Date : .....

EAST CENTRAL ZONAL OFFICE, PATNA

ANNEXURE – 'B'

LIFE INSURANCE CORPORATION OF INDIA

(Refer Clause No. 35 of Conditions of Contract)

FORM OF BANK GUARANTEE IN LIEU OF SECURITY DEPOSIT IN INDIVIDUAL CONTRACTS

To

THE LIFE INSURANCE CORPORATION OF INDIA

In consideration of the Life Insurance Corporation of India having its _____ Zonal Office at _____ in the State of _____ (hereinafter called **'the Corporation'** which expression shall unless repugnant to the subject or context include its successors and assignees) having agreed under terms and conditions of contract (vide its acceptance letter No._____ dated_____) made between _____ (hereinafter called the said Contractor) and the Corporation in connection with _____ (hereinafter called **'the said contract'**) to accept a Deed of Guarantee and Indemnity as herein provided for Rs._____ from the _____ in lieu of the Security Deposit to be made by the contractor and/or in lieu of the deduction to be made from the Contractor's bills, for the due fulfillment by the said contractor of the terms and conditions contained in the said contract, we the _____ (hereinafter referred to as **'the said Bank'**) and having our office at _____ do hereby undertake and agree to indemnify and keep indemnified the Corporation from time to time to the extent of Rs._____ (Rupees _____ only) against any loss or damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation by reason of any breach or breaches by the said contractor in respect of the said contract or of any of the terms and conditions contained in the said contract, or in respect of all its claims for money and / or material found due and recoverable from the said contractor and to unconditionally pay the amount claimed as such by the Corporation on demand and without demur to the extent aforesaid.

2. We, the said Bank further agree that the Corporation shall be the sole judge of and as to whether the said contractor has committed any breach or breaches of any of the terms and conditions of the said contract and the extent of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation from time to time on account thereof and the decision of the Corporation in this respect shall be final and binding on us.

3. The Corporation shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or Indemnity from time to time to vary any of the terms and conditions of the said contract or to extend time of performance by the said contractor, or to postpone for any time and from time to time any of the powers exercisable by it against the said contractor and either to enforce or forbear from enforcing any of the terms and conditions governing the said Contract or securities available to the Corporation and the said Bank shall not be released from its liability under these presents by any exercise by the Corporation of the liberty with reference to the matters aforesaid or by reason of time being given to the said contractor or any other forbearance, act or omission on the part of the Corporation or any indulgence by the Corporation to the said contractor or of any other matter or thing whatsoever, which under the law-relating to sureties would but for this provision have the effect of so releasing the Bank from its liability.

4. It shall not be necessary for the Corporation to proceed against the contractor before proceeding against the Bank and the Guarantee and Indemnity herein contained shall be enforceable against the said Bank, notwithstanding any security which the corporation may have obtained or obtain from the contractor shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

5. Notwithstanding anything contained in any of the foregoing clauses the liability of the Bank under this Guarantee shall not exceed Rs. _____ (Rupees _____ only). The guarantee shall remain in force till_____. If any extension of time be granted to the contractor, we undertake to extend the guarantee with the consent of the contractor. Unless a claim or demand under this guarantee is made or presented to the Bank within six months from the expiry date, all the rights of the Corporation under this Guarantee shall cease and the Bank shall be released and discharged from all liability hereunder.

6. We, the said bank lastly undertake not to revoke this guarantee and indemnity during its currency except with the previous consent of the Corporation in writing and agree that any change in the constitution of the said contractor or the said Bank shall not discharge our liability hereunder.

For and on behalf of the Bank

(Name and Designation)

The above Guarantee is accepted by the
LIFE INSURANCE CORPORATION OF INDIA.

For and on behalf of the LIC of India

(Name and Designation)

Dated:

==========

Note No.1 ∗ : FILL IN AS APPLICABLE

A) For Proprietary concerns:-

Shri _____ son of _____ resident of _____ carrying on business under the name and style of _____ at _____ (hereinafter called **'the said contractor'** which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representative).

OR

B) For Partnership concerns:-

1. Shri _____
   son of _____
   resident of _____
2. Shri _____
   son of _____
   resident of _____

carrying on business in partnership under the name and style of _____ of _____ at _____ (hereinafter collectively called **'the contractor'** which expression shall unless the context requires otherwise include each of them and their respective heirs, executors, administrators and legal representatives)

OR

C) For companies :-

M/S / Shri _____ a company under the Companies Act 1956 and having its registered office at _____ in the state of _____ (hereinafter called **'the said contractor'** which expression shall unless the context requires otherwise include its successors and assignees).

Note No.2:

∗∗ Please fill in the name and address of Bank.

2. WOOD WORK AND JOINERY

2.1 TIMBER

i. Unless otherwise specified all timber for frames and shutters for doors, windows, ventilators, cupboards etc., shall be first class, sound, well seasoned, C.P. Balarshah or other equivalent and approved teak and shall be free from knots, shakes, fissures, flaws, sun cracks and other defects. The planned surface shall be smoothened free from blemishes and discolorations. Timber shall be wrought, framed and cut to shape as shown on drawings and/or as directed.

ii. All timber for carpentry and joinery in touch with masonry or concrete shall be coal tarred or creosoted before fixing. All rough frame work in partitions, suspended ceilings and veneering to walls etc., shall be treated with approved wood preservative 'Bison' or other equivalent and approved as per manufacturer's instructions and specifications. The rates quoted shall provide for such treatments.

iii. All fully fabricated timber shall be air seasoned on site of work for a period of not less than two months to allow for any shrinkage that may take place. The preparations of timber for joinery is to commence simultaneously with the beginning of the project work generally and should proceed continuously until all the wood work is prepared and fixed/stacked on or near the site as the case may be. Generally wood shall be free from knots, however, wood with knots may be permitted provided individual hard and sound knot shall not be more than 40 mm n diameter and aggregate area of all the knots shall not exceed one half percent of the area of the piece
Teak wood shall be approved incorporating in the work Contractor should ensure wood work does not warp or show other defects due to lack of proper seasoning.

2.2 HOLD FASTS :

Three hold-facts shall be fixed to each post of the door from and two to each post of the window frame. Unless otherwise mentioned in the item, the M.S. Hold-fasts shall be of the Size 300mm x 35 mm and 6 mm and shall be fixed to the frames by means of screws and not nails. The other. End of the hold fast shall be fixed into jambs within 1:2:4 P.C.C if dimensions as directed.
Whenever asked for, rawl plugs or bolts as directed shall be used for rough grounds framing hangers etc. The rates quoted for wood work and joinery shall allow for all types of hold fasts as directed (Horns in frames shall be cut and shall not be used as hold facts)

2.3 WORKMANSHIP AND CONSTRUCTION :

i. The workmanship shall be first class and to the approval of the E.E. Scantling and boarding shall be accurately sawn and shall be of required width and thickness. All carpenter's work shall be wrought except where otherwise described. The workmanship and joinery shall be accurately set out in strict accordance with the drawings and shall be framed together and securely fixed in approved manner and with properly made joints. All work is to be properly tenoned, shouldered, wedged, pinned, braded etc. and properly glued with approved quality glue to the satisfaction of the E.E.

ii. **SCREWS :**All screws to be used in wood work and joinery shall be of brass and not iron.

iii. **TOLERANCES** :

15mm (1/16") will be allowed for each wrought face of the sizes specified except where described as 'finished' in which case they shall hold to the full dimensions. For door/window frames tolerance shall be +/- 2/3 mm. in cross sectional dimensions and for shutters +/- mm in thickness +/- 2/3 mm in width of styles and rails. For flush door shutters tolerance in width/height shall be +/- 3 mm and on thickness +/- 1.2 mm.

iv. **PROTECTION :**

All wood work and joinery edges of timber frames etc., shall be protected from being damaged during construction by the Contractor.

v. If it is decided by the Employer to provide antitermite treatment, the Building Contractor shall coordinate his work suitably as directed by the Executive Engineer.

vi. Door/Window frames shall have cut rebates. Planted rebates shall not be permitted.

2.4 WOODEN FLUSH SHUTTERS (SOLID CORE TYPE)

a. Solid core flush shutters shall be of commercial or Teak veneered type as specified in the item manufactured by M/s Sita Board Mysore Commercial Union Ltd., or other equivalent and approved quality. An approved sample shall be deposited in the office of the Corporation's Engineer on site for reference. The shutters will be provided with lipping. Finished thickness of the shutter shall be as mentioned in the item.

b. **PARTITION BOARD :** Shall be of waterproof quality 'NOVA TEAK SUPER' (Phenol bonded, 3 layers flat pressed), manufactured by M/s Plywood Manufacturing Ltd., Bombay or other equal and approved.

2.5 TEAK WOOD PANELLED SHUTTERS :

Solid wood panels for shutter shall be of pattern and size specified. Wherever possible each panel shall be in a single width piece. But where two pieces are used, width of each piece should not be less than 12.5 cm. In order to avoid warping, splitting and cracking, normally pieces not exceeding 20 cm. in width should be used. When made from more than one pieces. The pieces shall be jointed with a continuous tongued and grooved joint and glued together and reinforced the longer dimension of the panel. Planes shall be framed in to grooves to the full depth of the groove leaving an air space of 1.6 mm and the faces shall be closely fitted to the sides of the groove. Mouldings to the edges of panel openings shall be scribed at the joints.

2.6 FIXTURES AND FASTENINGS :

Unless otherwise specified in the Schedule of Quantities each shutter shall be hung with three iron butt/parliamentary hinges of approved quality size and make with iron screws the things and screws bolt should be copper Oxide coated and the Contractors rate shall cover for providing and fixing hinges to the shutters. Unless otherwise specified in the Schedule of Quantities other fittings, if ordered, shall be paid separately as prime cost items. Hardware for doors and windows shall be of M/s Bivon, M/s Manmatha Hari & Sons, M/s De's Lock Industries, M/s Godrej, M/s Garnishor other equivalent and approved make.

2.7 FINISHING :

The wood work shall be finished by 3coat of painting. French polishing or wax polishing as specified in the item.

2.8 RATE TO INCLUDE :

Apart from other factors mentioned elsewhere in this Contract, the rate for item of wood work and joinery shall include for the following :-

i. All labour, materials and equipments for carrying out the work.

ii. Providing and fixing frames and shutters, fastening and fixtures including embedding in the floor about 40/50 mm deep and labour for fixing hardware fittings, supplied by L.I.C.I. or purchased under prime cost items.

iii. Bison or other equivalent wood preservative treatment to rough frame work in partitions, suspended frame work in ceilings and timber veneering to walls etc.

iv. Coal tarring / creosoting of embedded parts of woodwork in masonry and concrete.

v. Unless otherwise specified, sheet glass (plain or frosted) for shutters of doors/windows/fanlight, as manufactured by M/s Hindustan Pilkington or other equal and approved.

vi. T.W. beadings/T.W. planted beads for fixing panels of shutters of doors, wherever required to be provided.

vii. Providing T.W. cover mould of approved size.

viii. 3 coats of 1st quality synthetic Enamel paint of approved colour and shade including primer as manufactured by M/s The Alkalis & Chemical Corporation of India Ltd. (With I.S.I. trade mark), M/s Goodlace Nerolac, M/s Jenson & Nicholson or equal and approved, 3 coats of French or wax polishing to approval as specified in the item.

2.9 MODE OF MEASUREMENT :

Timber Doors/Windows shall be measured in Sqm. over door, window frames if the item specified is composite one otherwise only shutter shall be measured in Sqm. Length shall be measured nearest to centimetre..

3. CEMENT CONCRETE FLOORING AND CEMENT SKIRTING OR DADO, PLAIN CEMENT CONCRETE FLOORING IN SINGLE LAYER.

3.1 CEMENT CONCRETE :

Unless otherwise specified, the proportion of cement concrete shall be 1:2.5:3.5 (Cement fine aggregate : coarse stone aggregate : coarse stone aggregate of size 12 mm and below by volume. Cement however, shall not be measured in volume but by weight. One bag of cement of 50 Kgs. shall be assumed to contain 35 litres of cement i.e., 1.20 cft.). The coarse aggregate shall be from approved source, carefully selected, sufficiently tough and hard stone pieces broken in a manner that will provide particles of approximate cubicle shapes affording good interlocking. Elongated or thin flake like fragments should be avoided. The maximum size of coarse aggregate shall be 12mm. The fine aggregate shall be sand from approved source and consist of properly graded particles. The coarse and fine aggregates shall be conforming to relevant I.S. 383-1970 and shall be washed clean if necessary.

Unless otherwise mentioned in the item concrete in flooring shall be 40 mm thick. The least amount of mixing water that will produce a workable mix and will allow finishing without excessive trowelling shall be used. Generally a water cement ratio of 0.5 should suffice.

3.2 PREPARATION OF SUB-GRADE :

Before placing the concrete flooring the sub-grade shall be got approved by the Executive Engineer. The top surface of the sub-grade, shall be thoroughly cleaned of the dirt, loose

particles, cake mortar droppings and laitance, if any, by scrubbing with coir or steel wire brush or by hacking if necessary. The top surface of sub-grade shall be slightly rough and shall have the required slope. The sub-grade shall be mentioned before laying the concrete flooring without forming any pools of water.

3.3 LAYING :

The concrete flooring shall be laid in alternate bays not exceeding 2x2 M each. The edge of each panel into which the floor is decided should be supported by flat iron or wood duly oiled to prevent sticking. Their depth shall be same as that proposed for the concrete flooring as mentioned in the item. The flat iron should be removed before filling in the adjoining panels. At least 48 hours shall elapse before the concreting in the adjoining bays is commenced. A.C. glass strips or approved separators shall be provided if specified in the item.

The concrete shall be laid immediately after mixing. While being place, the concrete shall be vigorously sliced and spaded with suitable tools to prevent formation of voids or honeycomb pockets. The concrete shall be brought to the specified levels by means of a heavy straight edge resting on the side forms and drawn ahead with a sawing motion in combination with a series of lift sand drops alternating with small lateral shifts. While concreting the adjacent bays, care shall be taken to ensure that the edges of previously laid bays are not broken by careless or hard tampering. Immediately after laying the concrete , the surface shall be inspected for high or low spots and any needed correction shall be done by adding or removing the concrete. After striking of the surface to the required grade, it shall be compacted with wooden float. The blows shall be fairly heavy in the beginning but as consolidation takes place, light rapid strokes shall be given to complete the ramming. The floating shall be followed by steel trowelling after the surface has hardened sufficiently to prevent excess of fine material from working to the surface. The finish shall be brought to a smoothened eve surface, free from defects and blemished and tested with straight edges and mason's spirit level to detect any inequalities in the surface which, if any , shall be made good immediately. No dry cement mixture of dry cement and sand shall be sprinkled on the surface of concrete to absorb moisture or to stiffen the mix. The junctions of floor and walls shall be rounded off if so directed without extra payment.

No extra mortar shall be laid over the concrete to make the floor in level if broom finish is specifically mentioned in the item, the surface shall be obtained rough with parallel broom marks before the concrete sets. After the concrete in the bays has set, the joints of the panels shall be filled with cement paste as directed. The joints shall be straight both ways i.e., along the length and width. The vertical edge of the bays shall be neatly marked on the surface with a pointed trowel after filling the joints.

3.4 CURING :

The surface shall be protected from direct sun when it is green. As soon as the surface had hardened sufficiently to prevent damage to it, it shall be kept continuously moist for at least 14 days by means of wet gunny bags, 50mm thick layer damp sand spread over the surface or pooling water on the surface.

3.5 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the rates shall include for the following :

i. Cleaning and Preparing the sub-grade.

ii. Providing and laying concrete of the specified mix, and finishing the surface as described above.

iii. Providing and fixing A.C. or glass of approved separators to form panels when specified

iv. Curing

v. All labour, materials and use of equipments and tools required for carrying out the work satisfactorily.

3.6 MODE OF MEASUREMENT :

The measurements shall be in square metre of cast in situ of cement flooring as provided

3.7 CEMENT DADO AND SKIRTING :

a. The walls to which skirting or dado is to be done shall have all joints raked out to a depth of 10mm, if not already done. R.C.C. surface shall be properly hacked to get good key to the mortar. All dust and oily matter, if any, shall be brushed and cleaned and the surface shall be kept wet for 6 hours before the dado or skirting work commences. The dado or skirting work shall not be commenced unless the preparatory work is passed by the Executive Engineer.

b. CEMENT MORTAR :

Unless otherwise mentioned the proportion of mortar shall be 1:3 (1 cement : 3 sand). Sand in mortar shall be as per I.S. : 1542-1960 as applicable to internal wall plastering, and washed clean if necessary. The thickness of dado or skirting shall be 20mm thick unless otherwise specified.

c. APPLICATION :

The mortar shall be firmly applied with somewhat more than the required thickness and well pressed, rubbed and leveled with a flat wooden rule to give required thickness. Long straight edges shall be freely used to ensure perfectly plane and even surface. No dry cement or mixture of dry cement and sand shall be sprinkled directly on the surface to absorb moisture or to stiffen intimately when set and there should be no hollow sound when struck. All corners, angles and junctions shall be truly vertical and neatly horizontal as the case may be , carefully and neatly

finished. Care shall be taken to see that the top edge of the skirting or dado shall be straight in line and square and jointed with plaster above as required. When neat cement finish is specified over the plaster surface, a coat of pure Portland cement slurry 1.5mm thick shall be applied and well rubbed to the plaster surface while the plaster surface is still fresh. When the finish is specified, the plastered surface shall be rubbed well to an even plane with a wooden float for external surface and finished smooth with a steel trowel for internal surface. If coloured dado or skirting is required, approved coloured cement or cement mixed with the required shade of approved pigment shall be used.

d. CURING :

The dado or skirting shall be kept wet for 14 days.

3.8 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the rates for the items of dado or skirting shall include for the following:

i. Preparing the surface.
ii. Providing and applying cement mortar of specified mix, and finishing the edges with plaster as stated above.
iii. Providing coloured cement and colouring pigment when coloured cement dado/skirting is specified.
iv. Curing
v. All labour, materials, tools and equipment for carrying out the items as specified above.

3.9 MODE OF MEASUREMENT :

a. Dado shall be measured in square metre as provided.

b. The height of skirting shall be specified in the item and shall be measured in R.M. (Skirting up to 30 cm. in height shall be measured in running metres.)

4. WHITE GLAZED TILES IN FLOORING AND DADO

4.01 TILES

White glazed tiles including specials shall be of approved make and quality and shall conform to IS-777-1961 in all respects. Samples of tiles shall be got approved by the Chief Engineer, who will keep them in his office for verification as to whether the materials brought for use conform to the approved samples. White glazed tiles shall be of the size 152x152x 5 mm.

4.02 MORTAR BEDDING :

Unless otherwise specified the tiles in Flooring shall be laid In the cement mortar 1:6 bedding . The amount of water added shall be minimum necessary to give just sufficient plasticity for laying

and satisfactory bedding. Care shall be taken in preparing the mortar to ensure that there are no hard lumps that would interfere with the even bedding of the tiles. Before spreading mortar, sub-floor or base shall be cleaned of all dirt, scum, loose materials and laitance if any, by scrubbing with coir or steel wire brush or by hacking if necessary and then well wetted without forming any pools of water on the surface. Before laying, the mortar , the sub-grade shall be got approved by the Executive Engineer in case of R.C.C. floors, the top shall be left a little rough. All points of level for the finished paving surface shall be marked out. The mortar shall then be evenly and smoothly spread over the base by the use of screed battens only over so much area as will be covered with tiles before the setting of the mortar. The thickness of the mortar bed shall not be less than 20 mm.

4.03 LAYING, FINISHING, CURING AND CLEANING :

The tiles before laying shall be soaked in water for at least 2 hours. Tiles which are fixed in the floor adjoining the wall shall be so arranged that the surface of the round edge tiles shall correspond to the skirting or dado. Neat cement grout of honey like consistency shall be spread over the bedding mortar just to cover so much area as can be tiles within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed of joints. The joints shall be kept as close as possible and in straight lines. The joints between the tiles shall not exceed 1.5mm wide. After fixing the tiles finally in an even plane, the flooring shall be covered with wet saw dust. The tile flooring shall be cured for 14 days.

After the tiles have been laid in a room or the day's fixing work is completed the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set, the floor shall be covered with oil free dry saw dust which shall be removed only after completion of the construction work and just before the floor is occupied.

4.04 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the Contractor's rate quoted include for the following.

i. Cleaning the base and providing and laying bedding mortar and levelling.
ii. Providing and fixing the tiles including all specials like round edges corner cups, angles etc. in neat cement float over the bedding mortar.
iii. Filling the joints of tiles with neat white cement slurry.
iv. Finishing, curing and cleaning.

v. All labour, materials and use of tools for carrying out the items as specified above.

4.05 MODE OF MEASUREMENT :

Measurement for flooring tiles shall be in square metres as provided.

4.06 WHITE GLAZED TILES DADO :

a. TILES

White glazed tiles shall be same as described under white glazed tiles flooring.

b. MORTAR BACKING :

All joints in the face work shall be raked out to a depth equal to not less than the width of the joints or as directed by the Executive Engineer. Concrete surfaces shall be properly hacked. All dirt, soot oil, or any other material that might interfere with satisfactory bond shall be removed. The surface shall be cleared and scrubbed with fresh water and kept wet for 6 hours prior to applying backing mortar. The dado work shall not be commenced unless the preparatory work is passed by the Executive Engineer. The proportion of mortar bedding shall be 1:3 cement mortar. Sand in mortar bedding shall be from approved source, and shall conform to I.S.1542-1960 as applicable to internal wall and ceiling plastering and external wall plastering. The thickness of mortar backing shall not be less than 12mm and not more than 20mm.

c. FIXING DADO TILES :

Dado work shall be done after fixing tiles on the floor. The white glazed tiles shall be soaked in water for atleast 2 hours before being used for dado work. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back of tiles shall be covered with a thin layer of neat cement paste and the tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from bottom of wall upwards without any hollows in the bed or joints. Each tile shall be fixed as close as possible to the one adjoining. The tiles shall be jointed with white cement slurry. Any difference in the thickness of tiles shall be evened out in cushioning mortar so that all tiles faces are in one vertical place. The joints between the tiles shall not exceed 1.5mm in width and they shall be uniform. The tiles shall be fixed with straight joints. After fixing the dado, they shall be kept continuously wet for 14 days. If doors, windows or other openings are located within the dado area, the sills, jambs angles etc., shall be provided with white glazed tiles and appropriate specials according to the foregoing specification and such tiled area be measured net along with the dado.

d. CLEANING :

After the tiles have been fixed the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting work shall be washed thoroughly clean.

4.07 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the rates for the item or dado or skirting shall include the following:-

i. Backing mortar.

ii. Providing and fixing tiles including all specials like round edges, angles, capping etc. in neat cement float over backing mortar.

iii. Jointing of the tiles with white cement slurry.

iv. Curing.

v. Cleaning.

vi. All labour, material, use of tools and equipments for carrying out the items as specified above.

4.08 MODE OF MEASUREMENT :

Dado shall be measured in square metres as provided.

5. POLISHED KOTAH/SHAHABAD/TANDUR STONE FLOORING, DADO/LINING AND SKIRTING FLOORING

5.1 STONE SLABS :

The stone slabs shall be hard, sound, durable, resistant to wear. Unless otherwise specified, stone slabs shall be square in shape 30 x 30 cm size and 25mm thick. The stone slabs shall be without any soft veins, cracks or flaws and shall have a uniform colour. A tolerance of 3mm in thickness at any point shall be permitted. The exposed surface of stone slabs, shall be machine polished to a smooth even and true plan and the edges to be chiselled to half its depth, true and square to ensure uniform width of joint. The edges of stone slabs shall be machine cut square to the required shape, if necessary. The stone slabs shall be of approved colour and shades. A few approved samples of stone slabs to be used shall be deposited by the Contractor in the office of the Corporation's Engineer.

5.2 MORTAR BEDDING :

Lime mortar shall be prepared in mortar mill or pan. The amount of water added shall be the minimum necessary to give just sufficient plasticity for laying and satisfactory bedding. Care shall be taken in preparing the mortar to ensure that there are no hard lumps that would interfere with the even bedding of the stone slabs. Before spreading the mortar the sub-floor or base shall be cleaned of all dirt, scum, loose materials and laitance if any by scrubbing with coir or steel wire brush or by hacking if necessary, and then well wetted without forming any pools of water on the surface. Before laying the mortar, the sub-grade shall be got approved by the Executive Engineer. In case of R.C.C. floors, the top shall be left a little rough. All points of level for the finished paying surface shall be marked out. The mortar shall then be evenly and smoothly spread over the base by the use of screed battens, only over so much area as will be covered with slabs within half hour. The thickness of the mortar bedding shall not be less than 15mm and not more than 25mm. The required slope shall be given to the bed. Unless otherwise specified, the proportion of mortar bedding shall be20 mm thick average cement mortar 1:6 and where lime bedding is specified in the scheduled of the quantities proportion of Lime mortar shall be 1:3 1 lime : 3 sand).

5.3 LAYING, CURING, POLISHING, FINISHING AND CLEANING :

Before laying the stone slabs shall be thoroughly wetted with clean water. Neat cement grout of honey like consistency shall be spread on the mortar bed over as much area as could be covered with the slabs within half an hour. The stone slabs shall be laid on the neat cement float and shall be evenly and firmly bedded to the required level and slope in the mortar bed. The stone slabs shall be laid in the approved pattern in single or two tone colour. Each stone slab shall be gently tapped with a wooden mallet till it is firmly and properly bedded. There shall be no hollows left. If there is a hollow sound on gently tapping of the stone slab, such stone slabs shall be removed and reset properly. The mason shall make the joint of uniform thickness and straight lines. The thickness of joints shall not exceed 1.5mm. The joints shall be grouted with neat cement slurry. No border stone slabs shall be less than 100mm in width, unless otherwise approved by the Executive Engineer.

When the bedding and joints of the flooring have been completely set, the surface shall be machine polished to give a smooth, even and true plane to the floor and thoroughly cleaned.

5.4 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the Contractors rate quoted shall include for the following :

i. Cleaning the base of providing and laying bedding mortar and leveling.

ii. Providing and fixing the stone slabs in neat cement float on the bedding mortar.

iii. Filling joint of stone slabs with neat cement slurry of required colour to match the colour of the stone slabs.

iv. Chiselling, polishing, finishing and cleaning.

v. All labour, materials and use of tools for carrying out the item as specified above.

5.5 MODE OF MEASUREMENT :

Measurement for flooring, stone slabs shall be in square metre as provided.

5.6 DADO / LINING AND SKIRTING

The stone slabs shall be as specified above for flooring unless otherwise mentioned. The stone slabs shall be in approved lengths to math the flooring. The exposed edges of stone slabs such as in dado/lining and skirting, jams, soffits, sills etc, shall be machine cut and polished smooth.

a. MORTAR BACKING :

All joints in the face work shall be raked out to a depth equal to not less than the width of the joints or as directed by the Executive Engineer. Concrete surfaces shall be properly backed. All dirt, oil or any other materials that might interfere with satisfactory bond shall be removed. The surface shall be cleaned and scrubbed with fresh water and kept wet for 6 hours prior to applying backing mortar. The dado/lining or skirting work shall not be commenced unless the preparatory work is passed by the Executive Engineer. The proportion of mortar for backing shall be 1:3 cement mortar. Sand in mortar bedding shall be from approved sources and shall conform to I.S. 1542-1960 as applicable to internal wall and ceiling plastering and external wall plastering. The thickness of mortar backing shall not be less than 12mm and not more than 20mm.

b. FIXING DADO/LINING OR SKIRTING STONE SLABS :

Dado/lining or skirting shall be done only after fixing stone slabs on the floor. The stone slabs shall be thoroughly wetted in water before being used for Dado/lining or skirting work. The stone slabs shall be fixed when the backing mortar is still plastic and before it gets stiff. All the stone slabs shall be covered with an additional layer of neat cement paste and stones shall then be pressed in mortar and gently tapped against the wall with wooden mallet. The fixing shall be done from the bottom of wall upwards without any hollows in the beds or joints. Each stone slab shall be fixed as close as possible to the adjoining stone slab. The stone slab shall be jointed in neat cement slurry to match the colour of the stones. The joints shall not exceed 1.5mm in width and they shall be uniform. While fixing the stone slabs in dado/lining or skirting work, care shall be taken to see that the joints in the adjoining flooring below, matches with the joints in the dado/lining or in skirting, as the case may be, or shall be staggered as directed. When specified brass cramps and bins etc. of approved size shall also be used for fixing dado/lining.

c. **POLISHING :**

When stone slabs are completely set, polishing shall be done by hand with approved type of polishing stone. A smooth and even polished surface shall be obtained to match the finished surface of the flooring.

d. **CURING :**

The dado/lining or skirting shall be kept wet for 14 days.

5.7 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract the rate for the item of dado/lining or skirting shall include the following :-

i. Backing mortar.
ii. Providing and fixing stone slab with exposed edges machine cut including all special tiles and finishing the edges with plaster.
iii. Providing and fixing brass cramps and pins etc., for dado/lining where specified.
iv. Joints of the stone slabs filled with coloured cement slurry to match the stone slabs.
v. Curing.
vi. Chiseling, polishing, use of tools and equipments for carrying out the items as specified above.

5.8 MODE OF MEASUREMENT :

a. Dado/lining shall be measured in Square Meters as provided.

b. The height of skirting shall be specified in the item and shall be measured in R.M. (Skirting up to 30 cm. in height shall be measured in running meters)

6. CEMENT POINTING RECESSED/FLUSH RECESSED POINTING :

6.1 PREPARATION OF SURFACE :

The joints in the masonry shall be raked out to a depth not less than the width of the joint as directed, when the mortar is green. The joints are to be brushed clean of dust and loose particles, with stiff brush. The Ares shall then be washed and the joints thoroughly wetted before pointing is commenced. All dust and oily matters if any, shall be removed.

6.2 PROPORTION OF MORTAR :

The proportion of cement mortar shall be as described in item. The sand shall be from approved source free from foreign matter, washed clean if necessary and shall conform to I.S. 1542-1977. No more cement mortar shall be prepared than that can be used within half an hour. The mortar may be hand mixed or machine mixed. In hand mixed mortar, cement and sand in the specified proportion shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3

times or more till a homogeneous mixture of uniform colour is obtained. Fresh and clean water shall be added gradually through a rose and thoroughly mixed so that mix becomes homogeneous and each particle of sand shall be completely covered with a firm of wet cement. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar, not the mixing water of the mortar shall flow out.

6.3 APPLICATION :

Waterproofing compound of approved make, shall be added according to manufacturer's specifications to make the mortar waterproof. The raked out joints shall be filled with mortar of the specified mix and the required consistency and well pressed and rubbed smooth. A semi-circular depression 3 mm dia shall be made in the joint by pressing clean string with trowel keeping the string exactly horizontal and on the centre line of the joint. The vertical joints shall be similarly marked. These depressed lines will then be immediately rubbed with a nayla till they become uniformly 5 mm deep and 6mm wide and assumed fairly blackish colour intersections of the horizontal and vertical shall be finished neatly with the vertical line just touching the horizontal line but not crossing it. All superfluous mortar shall be removed with the trowel. The brick surface shall be cleaned and no stain shall be allowed to remain.

When joints are not horizontal or vertical as in the case of uncoursed rubble masonry, the pointing shall be made along the centre line of joints to uniform width and depth as directed and junctions of pointing made nearly. The pointing mortar shall not spread over the adjoining stones. Mortar pointing shall be restricted to the width of the joints and all superfluous mortar shall be removed with a trowel.

6.4 CURING :

All pointing work shall be kept damp, continuously for a period of 14 days.

6.5 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract rates for the item of pointing shall include for the following :-

i. Erecting, dismantling and removing scaffolding.

ii. Preparing the surface and watering.

iii. Providing and filling in the joints with cement mortar, including approved waterproofing compound.

iv. Curing and cleaning the surface.

v. All labour, materials, use of tools and equipments to complete the work as per specification.

6.6 MODE OF MEASUREMENT :

Pointing shall be measured in square meters as in the case of plaster.

6.7 FLUSH POINTING :

This item shall be carried out, when joints are not struck, while the masonry is being laid. All the specifications of recessed pointing shall apply to this as well except that instead of making the lines with string and forming groove etc., the joints shall be kept flush with face of joints in the masonry.

7. INTERNAL CEMENT PLASTER WITH / WITHOUT NEERU FINISH :

7.1 REPARATION OF SURFACE :

The walls to be plastered to have all joints raked out to a depth of 10 mm if not already done. R.C.C. surface shall be properly backed to get good key to the plaster. All dust and oily matter, if any , shall be brushed and cleaned and the surface to be plastered shall be kept wet for 6 hours before plastering is commenced.

7.2 PROPORTION OF MORTAR :

Unless otherwise mentioned, the proportion of internal cement plasters for walls and ceiling shall be 1:4 (1 cement: 4 sand). Sand shall be from approved source, free from foreign matter and shall be as per I.S. 1548-1960 as applicable to internal wall and ceiling plastering. No more cement mortar shall be prepared than that can be used within half an hour.

7.3 APPLICATION OF PLASTER :

The mortar shall be applied evenly with force on the surface to be plastered. The mortar surface shall be finished at once by being rubbed over with a trowel till the cement appears on the surface. All corners, angles and junctions shall be truly vertical and horizontal as the case may be, carefully and neatly finished. Rounding of corners and junction where required shall be done without extra charge. The mortar shall adhere to the surface intimately when set and there should be no hollow sound when struck. The thickness of plaster shall be minimum 12mm over the proudest part of the surface of brick wall and R.C.C. surfaces and 20mm over stone walls. Plaster for ceiling shall not be more than 12mm.

10.4 NEERU FINISH :

If the plaster surface is to be given neeru finish, the surface shall be combed slightly with wire brushes or nails before it is completely set to form key for neeru. The under coat shall be only

damped but not soaked before the application of neeru. The lime for preparing neeru shall be fat lime and shall be of approved quality and source. Lime shall be slaked and mixed with sufficient with water to form a thick paste. It shall be reduced to a fine paste by grinding. It shall then be passed through a fine sieve (3 mm mesh) to remove all unslaked particles and foreign matter and allow to mellow under water for at least 10 days in large slaking tanks. The surplus water on the top shall be allowed to run off. The slaked lime paste thus formed shall be used for preparing neeru. The neeru shall be prepared by mixing together 4 parts of this lime paste and 1 part of approved fine sieved sand by volume. Jute fibres finely chopped shall be added to the above mortar at the rate of 4 Kg. of jute to every Cubic Metre of lime sand mixture. The mixture shall then be properly ground to a fine paste between two stones or a mill. The neeru thus prepared shall be kept moist until used and no more than what can be consumed in 15 days shall be prepared at time.

Neeru shall be applied to the prepared and partially set but somewhat plaster surface with steel trowel to a thickness slightly exceeding 1.5 mm (About 1/16") and rubbed down to 1.5 mm (1/16") thickness and polished to a perfectly smooth and even finish, working from top to bottom. While trowelling is going on soap stone powder contained in thin muslin bags shall be dusted over the surface and worked in.

Moisturing shall be commenced as soon as the plaster has hardened sufficiently and is not susceptible to injury. Soaking of wall shall be avoided and only as much water as can be readily absorbed shall be used. The surface shall be kept sprinkled with water for 14 days.

7.5 NEAT CEMENT FINISH:

When neat cement finish is specified over the plaster surface, a coat of pure Portland cement slurry 1.5mm thick shall be applied and well rubbed to the plaster surface while the plaster surface itself fresh.

7.6 TROWEL FINISH :

When no finish is specified, the plastered surface shall be rubbed well to an even plane with wooden flat for external surface and finished smooth with a steel trowel for internal surface.

7.7 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere to this contract, rates for the item of plaster shall include for the following :-

i. Erecting, dismantling and removing the scaffolding.

ii. Providing the surface to receive the plaster.

iii. Providing cement plaster of specified average thickness.

iv. All labour, materials, use of tools and equipment to complete the plastering as per specification.

v. Curing for 14 days.

vi. Any moulding work if shown on the drawings or as specified unless separately provided in the tender.

v. Plaster work in hands, arises, rounded angles, fair edges, narrow returns, quirks, 'V' joints, splays, drip mouldings, making good to metal frames, junctions with skirting or dados, narrow widths and small quantities making good around pipes, conduits, timbers, sills, brackets, railings etc., and making good after all the sub-contractors or nominated sub-contractors have done their work.

viii. Neeru or cement finish when specified in the item.

7.8 MODE OF MEASUREMENT :

Plaster shall be measured in square meters.

a. WALLS :

i. The measurements of wall plastering shall be taken between the walls or partitions (the dimensions before plastering shall be taken) for the length, and from the top of floor/skirting/dado (As the case may be) to the ceiling for the height.

ii. **DEDUCTIONS :**

A. For jambs, soffits, sills, etc., for openings not exceeding 0.5 m2 each in area and opening not exceeding 3 m2 each , deductions and additions shall be made in the following manner :-

a. No deduction shall be made for ends of joists, beams, posts, etc., and openings not exceeding 0.5 m2 each and no addition shall be made for reveals, jambs, soffits, sills etc., of these openings nor for finishing the plaster around ends of joists, beams, posts etc.

b. Deductions for openings exceeding 0.5 m2 but not exceeding 3 m2 each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc., of these openings :-

1. When both faces of wall are plastered with the same plaster, deduction shall be made for one face only.

2. When two faces of wall are plastered with different plasters or if one face is plastered and the other pointed, deduction shall be made from the plaster or pointing out the side of frames for doors, windows, etc., on which the width of reveals, is less than that on the other side, but no deduction shall be made on the other side.

B. In case of openings of area above 3 m2 each, deductions shall be made for the openings but jambs, soffits and sills shall be measured.

b. CEILINGS :

i. Ceilings shall be measured between the walls or partitions and the dimensions before plastering shall be taken.

ii. Ceilings with projected beams shall be measured over beams and the plastered sides of beams shall be measured and added to plastering on ceilings.

8. WHITE WASHING, COLOUR WASHING AND DISTEMPERING:

8.1 WHITE WASHING :

A. MATERIALS :

White wash shall be prepared from fresh burnt fat lime. The lime shall be dissolved in a tub with sufficient quantity of water (about 4/5 litres/kg. of lime) and the whole thoroughly mixed and stirred until it attains the consistency cream. The wash shall be taken out in small quantities and strained through a clean coarse cloth. Clean gum dissolved in hot water shall then be added in suitable proportion of two grams of gum arabic to a litre of lime to prevent the white wash coming off easily when rubbed. Rice seize may also be used instead of gum., gum Regd. Neel colour added for whiteness .

B. SCAFFOLDING :

This shall be double or single according to requirements and as directed. If ladders are used pieces of old gunny bags or cloth bags shall be tied on their tops to avoid damage or scratches to the plastered surfaces, etc. proper stage scaffolding shall be erected when white washing the ceiling

C . PREPARATION OF SURFACE :

The surface shall be prepared by removing all mortar droppings and foreign matter other means as may be ordered by the corporation's Engineers to produce an approved clean

and an even surface. All loose pieces and scales shall be scraped of and holes, cracks etc. stopped with mortar to match with the surrounding finish. In case where the surfaces have been previously white washed or colour washed, the old white or colour wash shall be entirely removed and surfaces broomed down before the new white wash is applied. In case the old white wash cannot be removed by brooming, the surfaces shall be cleaned by scraping.

D. APPLICATION OF WHITE WASH :

On the surface so prepared, the white wash shall be laid on with a brush. The first stroke of the brush shall be from top downwards, another from bottom upwards over the first stroke and similarly one stroke from the right and another from the left over the first brush before it dries. This will form one coat. each coat must be allowed dry and shall be subject to inspection and approval before the next coat is applied. When dry, the surface shall show no signs of cracking. It shall present a smooth and uniform finish free from brush marks and it should not come off easily when rubbed with a finger. Minimum 3 coats of white wash shall be applied.

No portions in the surface shall be left out initially to be patched up later on. For old work, patches and repairs shall be white washed first. Thereafter, the whole surface shall be white washed with the required number of coats. For new work, the white washed surface shall present a smooth and uniform finish. Doors, windows, floors and other articles of furniture, etc shall be protected from being splashed upon. Splashing, droppings, if any, shall be removed and the surfaces cleaned.

E. RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the rates for white wash shall include for the following.

i. All labour material, equipment required for white washing.
ii. the surface for white wash including the scaffolding. Scaffolding including erection and removal.
iii. Providing and preparing the white wash.
iv. Preparing
v. Applying the white wash in three coats minimum. If a proper even surface is not obtained to the satisfaction of the Executive Engineer in 3 coats, contractor shall carry out additional coats of white wash to approval at Contractor's expenses.

F. MODE OF MEASUREMENT :

The measurement shall be in sq. metre. The mode of measurement shall be as applicable to that for plaster.

8.2 COLOUR WASH :

MATERIAL :

This shall be prepared by adding approved colouring matter to the white wash (prepared for white washing) according to that required. In all other respects the same conditions and specification as applicable to white wash shall also be applicable to colour wash.

8.3 DISTEMPERING :

POWDERED/DRY DISTEMPER :

a. MATERIAL :

The powdered/dry distemper shall be of approved colour and shade manufactured by M/s Blundell Eomite or other equivalent and approved.

b. SCAFFOLDING :

This shall be double or single as required and directed.

c. PREPARING THE SURFACE :

The surface to be distempered shall be cleaned and all cracks, holes and surfaces defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand prepared smooth and wiped clean. The surface so prepared must be completely dry and free from dust before distempering is commenced. In the case for walls newly plastered, special care shall be taken to see that it is completely dry before any treatment is attempted. For the old surface which had earlier been distempered, the surface shall be cleaned of grease dust etc. the flaking of previous coatings, if any, shall be taken off. all cracks, holes, and surface defects shall be repaired with gypsum and allowed to set hard and then sand prepared smooth and wiped clean. But in case the surfaces are coloured or white washed, the wash must be removed thoroughly first.

d. PRIMING COAT:

The priming coat shall be applied over the completely dry surface in the manner recommended by the makers in the case of patent distempers. When no priming coat is a specified by the manufacturer a finely powdered chalk mixed with a thin solution of glue

shall be applied to prepare a good, hard background the coating when dry being sand prepared as clean and smooth as possible.

e. APPLICATION OF DISTEMPER :

The instructions of the makers shall be followed regarding the preparation of the surface and application of priming and finishing coats. Distemper shall not be mixed in a larger quantity than is actually required for a day's work. Hot water should be used to prepare the mixture. Distempers shall be applied in dry weather with a broad stiff brush in long parallel strokes. The treated surface shall be allowed to dry and harden. Second or succeeding coats shall not be applied until the proceeding coat has been passed by the Executive Engineer. Two more coats of distemper shall be given in exactly the same manner as the first one but only after the earlier coat laid has thoroughly dried.

f. RATED INCLUDES :

The rate shall include all labour, materials, equipment and tools for carrying out the following operations:

i. Providing the primer and distemper and mixing the distemper.

ii. Scaffolding.

iii. Preparing the surface to receive the priming and finishing coats.

iv. Applying the priming coat.

v. Applying the distemper in 3 coats minimum. If a proper even surface is not obtained to the satisfaction of the Executive Engineer in 3 coats, Contractor shall carry out additional coats of distemper to approval at contractor's expense.

g. MODE OF MEASUREMENT :

Similar to that for white washing.

8.4 OIL BOUND DISTEMPER :

The specification and conditions for this shall be the same as that applicable for dry distemper above except that oil bound distemper or approved make, shade and colour shall be used after applying priming coat of petrifying liquid or other primer as may be recommended by the manufacturers of distemper or as directed.

9. PLASTIC EMULSION PAINT :

9.1 MATERIAL :

The emulsion paint and primers in general shall be of approved quality colour and shade as manufactured by M/s Goodlass Nerolac or other equal and approved.

9.2 SCAFFOLDING :

This shall be double or single as required and directed. If ladder are used, pieces of old gunny bags or cloth rags shall be tied on their tops to avoid damage of scratches to the plaster surfaces and flooring, etc. Proper stage scaffolding shall be erected when painting the ceiling.

9.3 PREPARATION OF THE SURFACE :

a. New surface:

The surface to be painted shall be cleaned and all cracks, holes and surface defects shall be repaired with plaster of Paris for spot filling and with filler prepared with whiting, water and little quantity of paint for filling and leveling the wider areas.

13.4 PRIMING COAT :

The priming coat of the approved shade shall be applied over the completely dry surface in the manner as recommended by the paint manufacturers. The emulsion paint, in the priming coat, may be thinned down with 20% water or as recommended by the paint manufacturer. Turpentine or any other solvent shall not be used for thinning the paint.

9.5 APPLICATION OF EMULSION PAINT :

The recommendation of approved paint manufacturers, whose product is used shall be followed regarding the preparation of the surface and the application of the priming and finishing coats. The contractor shall arrange for technical assistance and supervision from the paint manufacturer, during the execution of the painting work. After the priming coat has been applied and is perfectly dried all holes scratches if any, shall be repaired as mentioned in "preparation of surface" and then the second coat of approved shade and manufacture shall be evenly applied and allowed to dry. The third coat shall be carefully applied to achieve smooth and even surface after the previous coat has dried up. Minimum 3 coats of paint shall be applied inclusive of primer

coat. If a proper and even surface is not obtained to the satisfaction of the Executive Engineer in3 coats, contractor shall carry out additional coats of painting to approval, at contractor's expense. care shall be taken that dust or other foreign materials do not settle or disfigure the various coats.

9.6 RATES TO INCLUDE :

Apart from other factors mentioned elsewhere in this contract, the rate for the item of plastic emulsion paint shall include for the following :

i. All labour, materials and equipment necessary to carry out the work.

ii. Supplying the approved emulsion paint for priming and finishing coats.

iii. Preparing the surfaces for receiving the primer and finishing coats.

iv. Scaffolding including its erection and dismantling.

v. Application of one primer coat and minimum two coats of finishing. If a proper and even surface is not obtained to the satisfaction of the Executive Engineer, in 3 coats, contractor shall carry out additional coats of painting to approval at Contractor's expense.

vi. Protection to painted surface till dried and handed over.

vii. Expenses, if any, for supervision and technical assistance supplied by the approved paint manufacturer.

9.7 MODE OF MEASUREMENT :

The measurement shall be in square metre. The mode of measurement shall be as applicable to that for white washing.

1. TECHNICAL SPECIFICATIONS FOR INTERIOR WORKS

Material and Workmanship

1. All materials brought on the site of works and meant to be used for the said project site, shall be the best of their respective kinds and to the approval of the Employer. The Employer or his Representative will accept that the materials are really the best of their kinds, when it is proved beyond doubt that no better materials of the particular kind in question are available in the market.

2. The workmanship is to be the best available and of a high standard, use must be made of a special tradesman in all aspects of the work and allowances must be made in the rates for so doing.

3. Samples of all materials shall be got approved from the Employer and shall be deposited with them before the order for the materials are placed with the suppliers/manufacturers. The materials brought for the works shall conform in every respect with approved samples.

4. Workmanship: All works shall be to true line, level, plumb and square corners, edges and arises in all cases shall be unbroken and finished neat. Only first class workmanship will be accepted. Contractor shall maintain uniform quality and consistency in workmanship throughout the execution of he work.

5. Skilled Mistries/tradesman for the respective trades shall be employed by the Contractors to check the work in progress and to instruct and extract the right kind of workmanship from the men employed on the works. Instructions given to such Mistries by the Employer shall be carried out with a view to get the work executed in a neat and workman like manner, according to the specifications.

6. The Employer may order the inspection of any finished work as he chooses and in a manner he decides, and the Contractors shall bear all expenses in this connection. If the results of such inspection prove that the material used and/or workmanship is not of the standard required, the work will be rejected and removed forthwith and be replaced by works of the accepted standard of quality and material.

7. The materials and items to be provided by the Contractor shall be approved by the Employer in accordance with any samples, which will be submitted for approval by the Contractor and generally in accordance with the specifications. Also if products are specified in the specification and/or bill of brand, trade name or catalogue reference, the Contractor will be required to obtain the approval of the Employer before using a material. The Contractor shall produce all invoices vouchers or receipts for any materials if called upon to do so by the Employer.

8. Samples of all materials are to be submitted to the Employer for approval before the Contractor orders or deliver the materials at site. Samples together with their packing are to be provided free of charge by the Contractor and should any materials be rejected, they will be removed from the site at the Contractor's expense. All samples will be retained by the Employer for comparison with materials, which will be required to submit specimen finishes of colours, fabrics, etc. for the approval of the Employer before proceeding with the work.

   All ends of plywood/Block board/particle board/MDF/HDF shall be fitted with minimum 6 mm T.W. lipping strips.

All internal surfaces of furniture shall be finished with French polish wherever any finishes not specified.

Joinery in Woodwork

Joinery is to be prepared immediately after the placing of the contact framed up, bonded and wedged up. Any portions that are warped or found with other defects are to be replaced before wedging up. The whole of the work is to be framed and finished in a proper workman like manner in accordance with the detailed drawings, wrought and whenever required fitted with all necessary metal ties, straps, belts, screws, glue, etc., running beaded joints are to be cross-tongued. Jointers work generally to be finished with the sand/glass paper.

All joints will be standard mortise and tenon, dowl, dovetail and cross-halved. Nailed or glued butt joints will not be permitted. Screws, nail etc., will be stated, from or wire of oxidized “Nettle Fold” make unless specified where mortise and tenon joints are used, tenons should fit the mortises exactly.

Nailed or glued butt joints will not be permitted, except in exceptional cases with approval of the Employer.

Where screws shown on a finished surface, these will be sunk and the hole plugged with wood plug of the same wood and grains of the finished surfaces unless detailed otherwise. Nail on finished surfaces will be neatly punched and the hole filled with wood filer to match the colour.

Should joints in joiner’s work open, or other defects arise within the period stated for defect liability in the contract and the cause thereof be deemed by the Employer to be due to such defective joinery shall be taken down, and refilled, redecorated and/or replaced if necessary and any work disturbed shall be made good at the Contractor’s expense.

Nails, spikes and bolts shall be of lengths and weights approved by the Employer. Nails shall comply with IS 1959-1960 or approved equivalent quality sample. Brass headed nails are to comply with B.S. 1210. Wire staples shall comply with B.S. 1994 or equivalent.

The contact surfaces of dowel, tennons, wedges, etc., shall be glued with an approved adhesive.

Where glued joinery and carpentry work is likely to come into contact with moisture, the glue shall be waterproof.

All dovetail joints shall be further strengthened with M.S. cleats for cabinet furniture like tables, storage units, etc.

Hardware

The hardware throughout shall be of approved manufacturer or supplier well made and equal to in every respect to the samples deposited with the Employer. The Contractor may be required to produce and provide samples from many different sources before the Employer takes decision and nothing extra shall be paid for this.

Fitting generally shall be brass oxidized, unless otherwise specified and shall be suitable for their intended purpose. In any case, it will have to be approved by the Employer before the Contractor procures it t the site of work.

Screws are to match the finish of the article to be fixed, and to be round or flat headed or counter sunk as required.

The Contractor should cover up and protect the metal surfaces such as brass, bronze, SS etc. with a thick grease or other suitable protective material, renew as necessary and subsequently clean off and clear away on completion.
Aluminium and stainless steel shall be of approved manufacture and suitable for its particular application. Generally the surface of aluminium shall have an anodized finish and both shall comply with the samples approved by the Employer. All stainless steel sheets shall be 304 S. S. Japan or equivalent with gauge as specified but not thinner than 16G.

All steel, brass, bronze, aluminum and stainless steel articles shall be subjected to a reasonable test for strength, if so required by the Employer at the Contractor's expense.

All brazing and welds are to be executed in a clean and smooth manner rubbed down and left in the flattest and tidiest way, particularly where exposed.

Chromium plating shall be in accordance with I. S. standard or as per approved specifications for normal outdoor conditions and shall be on a base material of copper or brass.

Glazier

All glass to be of approved manufacturer complying with IS 1548-1966 as per approved quality and sample to be of the selective qualities specified and free from bubbles, smoke, wanes, waves, air holes and any other defects.

Polished plate glass shall be "glazing glass" (G.G.) quality and that for mirrors shall be "silvering quality" (S.Q.) confirming to I.S.3438 – 1965 or as per approved sample and quantity.

The compound for glazing to metal is to be a special non-hardening compound manufactured for the purpose and of a brand and quality approved by the Employer.

While cutting glass, proper allowance is to be made for expansion. Each square of glazing to be on whole sheet. On completion of work clean all glass inside and outside, replace all cracked scratched and broken panes and leave in good condition.

Paint and Polishes

All material required for the works shall be of specified and approved manufacturer, delivered to the site in the manufacturer's containers with the seals, etc., unbroken and clearly marked with the manufacturer's name or trade mark with a description of the contents and colour. All materials are to be stored on the site of work.

Spray painting with approved machines will be permitted only if written approval has been obtained from the Employer prior to painting. No spraying will be permitted in the case of priming coats where the soiling of adjacent surfaces is likely to occur. The nozzle and pressure to be so operated as to give an even coating throughout to the satisfaction of the Employer. The paint used for sprayings is to comply generally with the specifications concerned and is to be specially prepared by the manufacturer for spraying. Thinning of paint made for brushing will not be allowed.

Wood preservative shall be Solignum or other equal and approved impregnating wood preservative and all concealed woodwork shall be treated with wood preservative.

All brushes, tools, pots, kettles, etc., used in carrying out the work shall be clean and free from foreign matter and are to be thoroughly cleaned out before used with a different type of class of material.

All iron or steel surfaces shall be thoroughly scraped and rubbed with wire brushes and shall be entirely free from rust, mill scale, etc., before applying the priming coat.

Surfaces of new woodwork, which are to be painted, are to be rubbed down, cleaned down to the approval of the Employer.

Surfaces of previously painted wood work which are to be painted are to be cleaned down with soap and water detergent solution or approved solvent to remove dirt, grease, etc. Whilst wet the surface shall be flattened down with a suitable abrasive and then rinsed down and allowed to dry. Minor areas of defective paint shall be removed by scraping back to a firm edge and the exposed surface touched in with the primer as described and stopped with putty. Where woodwork has been previously painted or polished and is to be newly polished, scraping, burning off or rubbing down, should be carried out properly.

Surfaces of previously painted metal which shall be painted are to be cleaned down and flattened down as described in surfaces of any rust and loose scale shall be removed completely by chipping, scraping and wire brushing back to the bare metal touched in with primer as described.

Upholstery

This will be of first class standard workmanship with webbing, no sag springs, coiled springs, padding and as specified on drawing. Covering fabrics will be soon tufted and corded as shown on drawing and as approved by the Employer.

“Cushion Vents” should be installed at the back or under side of seat cushions(especially those covered in leather, vinyl plastic or very tightly woven fabric) to allow air to escape and to prevent torn steel.

Finished timber shall be of the type specified, furnishing fabrics, colour, pattern, substance to be as specified and manufactured or supplied by the Company specified, no variations of this will be permitted unless with prior approval of the Employer.

Polish

French polish: The basic material shall be shellac dissolved in methylated spirit.

Preparation: The timber must be well sanded and cleaned and the grain filled with grain filler. Any staining must be done before applying the polish.

Equipment: The polishing rubber, the most important implement in Fresh polish shall consist of a pad of cotton wool, which acts as a reservoir for the polish, and a cover of a soft white linen or cotton fabric similar to a well worn handkerchief, which acts as filler. The rubber must never be dipped into the polish on to the pad with the cover removed.

Application: Work evenly over the surface with a slow figure of eight motion until the timber is coated with a thin layer of polish. The object is to apply a series of thin coats, allowing only a few minutes for drying between the coats. When a level and even bodied surface is obtained the work is ready for the second stage i.e., spiriting off.

Allowing the work to stand for at least eight hours, then take a fresh rubber with double thickness of cover materials and charge it with methylated spirit. The object of spiriting off is to and remove the rubber marks and to give the brilliance of finish.

Finally, work in the direction of the grain and continue until the surface is free from smears and rubber marks then leave to harden off.

Wax polish: Wax polish shall contain sillicons and driers. A good silicon wax is to be used, not a creamy or spray. The timber shall be sealed first with another finish such as Ronseal, before applying the wax.

Application: Apply a light coat of the sealer by brush or cloth direct to the unfilled timber, working it well in and finishing evenly with the grain. Allow to dry thoroughly then sand lightly with fire abrasive paper. Apply a heavy coat of wax by cloth or on flat surfaces, with a stiff brush. Work well into the timber and finish off by stroking with the grain before leaving to harden. Leave for several hours before rubbing up with a soft brush. Finally, buff the grain with a soft cloth.

Melamine: This shall be applied where natural grain of the wood is required to be shown. Melamine gives uniform surface, which resists boiling water.

Application: Clean off all grease and wax with an abrasive and white spirit, this should not be applied in humid conditions.

Apply the same coat, preferably of clear hard glaze with a cloth pad. Leave this is to dry for at least six hours, then applied for the coat with paint brush-off you wait for longer than 24 hours between coats, rubbed down the previous coats with fine glass paper or medium grade of steel wool. Obtain a matt finish, if required, by giving a final coat of clear Ronseal Matt Coat.

Timber

Wherever specified internal frame works shall be of central province teak wood (C.P.T.W.) unless otherwise specified.

Al exposed woodwork shall be of first quality B.T.C. grade teak only or as specified.

All the wood shall be properly seasoned, natural growth and shall be free from worm holes, loose or dead knots or other defects, saw die square and shall not suffer warping, spitting or other defects.

The moisture content shall not exceed 12%.

All internal frameworks shall be treated with approved wood preservative.

All wood brought to site shall be clean, should not have any preservative or Other coating/covering.

All rejected, decayed bad quality wood shall be immediately removed from site.

All wood brought to site must be stacked stored properly as per instruction.

PLYWOOD

Fire Retardant Plywood/medium density fibre board/block board/teak particleboard/veneered board, etc., as specified in the approval list of manufacturers shall only be used. Fire Retardant Plywood shall confirm to I.S. 5509

Marine plywood shall generally confirm to I.S. 710-1980 and also to Defence/Navy specification, bonded with phenol formaldehyde treated with Wood preservative.

Only teak wood particle board shall be used, particle board shall be phenol formaldehyde and generally confirm to I.S. 3087-1965.

Only 3mm to 4mm thick straight grained group matching approved veneers shall be used. Only veneers laminated from species like teak, maple white cedar, rosewood, white cedar, walnut, mahogany shall be considered for approval and use.

Block board shall be equal or superior quality to that laid down in B.S. 3444 with one of the following I.S. Specifications or such approved adhesives;

I.S.I. 851-1957: Synthetic resin adhesive for construction works in wood.
I.S.I. 849-1957: Cold setting case in glue for wood.
Block board shall be generally conforming to I.S.I. 1659-1960 or as per approved sample.

Laminates

High Pressured Laminates where specified shall be of approved brand, type, texture and thickness and manufactured as per IS: 2046-1969. Fixing of laminates shall be done as per best trade practices and strictly as per printed instructions of the manufacturers using Phenol Formaldehyde Synthetic Resin Adhesive of approved make. Unless otherwise indicated laminates shall be 1.5 mm thick for horizontal surfaces, 1.0 mm thick for vertical surfaces and 0.8 mm thick on internal surface.

G.I. Frame Work for Partitions:

G.I. frame work shall be made of special section power pressed /roll from G.I. Sheet with Zinc coating of 120 gms/Sqm (both side inclusive) of 0.5 mm thick section.

Iron Mongery

All finish hardware shall be well made, reasonably smooth and free from sharp edges and corners flaws and other defects and shall be as per relevant Indian Standard Code. Unless otherwise required, all finish hardware shall be polished brass.

All hardware shall be of approved make and shall be specifically got approved by the Employer before ordering. No fittings and fixtures shall be fixed before all major work is over. While fixing correct handling of fixtures shall be ensured.

All finish hardware shall be fixed by skilled Carpenters experienced in this work. Work shall be done as per manufacturers printed instructions and to the satisfaction of the Employer.

All hardware fixed to respective locations shall be adequately protected from damage and splashes of mortars and paints by covering suitable with Jute Cloths/Black PVC sheet till handing over the work to the Employer to his satisfaction. The finished hardware shall be absolutely clean without any foreign materials and fully showing the original finish in its best condition.

==========

Calcium Silicate Boards Description (Internal wall)

Calcium Silicate Board is manufactured from a mixture of Portland cement, fine silica, special cellulose fibers and selected fillers to impart durability, toughness, and fire and moisture resistance. Calcium Silicate Sheet is cured by an autoclaving process whereby the ingredients are reacted together under the effects of super-heated steam and high pressure. The synthetic cement silicate binder provides exceptional dimensional stability and an unrivalled resistance to movement due to effects of moisture or heat.

Calcium Silicate Board does not contain any soluble ingredients or free alkali which could be dissolved by moisture or condensation and causing unsightly marks. If exposed to moisture, the board will completely recover on drying out, with no permanent loss of strength. Calcium Silicate Panels will not degrade with time and within normal applications, the life of the product is limited only by the durability of the supporting structure and materials used in fastening. Calcium Silicate Board will not rot or support fungal growth and is unaffected by sunlight or steam.

Calcium Silicate Sheet is specially designed for applications which impact resistance, fireproof, waterproof, sound adsorption and heat isolation are required, and products are suitable in a high humid environment.
Calcium Silicate Board Features

Fireproof (A1 Class)
Waterproof
100% Asbestos Free
Sound Adsorption
Heat Isolation
Impact resistance
Easy to install

2. CONDITIONS FOR CHAIRS AND MODULAR FURNITURES

1. All quantities in the schedule are provisional. Payment will be made at the accepted percentage rate for the material actually supplied and ascertained by actual measurements at site.

2. The percentage quoted by the contractor shall include all the materials, all lead and lifts, labour, equipment, all accessories including all taxes etc. needed for the job unless otherwise stated.

3. Before executing the supply order, the contractor is required to produce sample of all different items of Chairs and Modular Furniture to be provided for the above work for which they have quoted, without any additional cost, for Chef Engineer's approval.

4. In case of any dispute, the decision of Chief Engineer shall be final and the same shall be binding on the contractor.

5. Sample of chairs made shall have to be got inspected either at venders show room / manufacturer's assembly place before taking up manufacturing of entire lot. If any correction or amendment in type / design is required, the same shall be incorporated without any extra cost.

6. The department shall be at liberty to dismantle any part / component or to cut sample at any place for checking / verification of quality of material used. The sample may be sent for testing in the laboratory to confirm the quality. The expenditure on this account should be borne by supplier / manufacturer.

7. All the Chairs and Modular Furniture supplied shall be got approved by LIC and the contractor shall replace the defective Chairs and Modular Furniture immediately.

8. The quantities shown in the schedule are provisional and are likely to increase or decrease. Some of the items may be omitted altogether. No claim whatsoever shall be entertained on this account.

9. **The Chairs and Modular Furniture to be manufactured and supplied by one of the registered manufactures with "Business and Institutional Furniture Manufacturer's Association" (BIFMA) India and having valid registration certificates.**

Before placing order for Chair and Modular Furniture, the contractor has to get approval of the manufacturer along with sample from the Chief Engineer of LIC of India.

10. All furniture /chairs shall display the "Logo" / "Monogram" of the Manufacturer / Supplier.

11. Purchase bills to be submitted for Leatherette tapestry where Basic rates are specified.

EAST CENTRAL ZONAL OFFICE, PATNA

SPECIFICATION FOR SUPPLY OF CHAIRS

1. The contractor shall inspect the site to ascertain the nature and scope of work.

a) The quantities given are provisional and likely to vary up to any extent.

b) The guarantee period shall be **TWO YEAR** after the date of supply of chairs. Guarantee shall cover all parts. In case of defects during the guarantee period the defects shall be rectified free of cost. Guarantee shall be on stamp paper by the contractor and manufacturer jointly.

c) Welding done for stand and other parts shall be done by electric welding with approved welding rods of 12 gauges.

d) Unless otherwise mentioned, handles shall be of Injection Moulded Polypropylene (PP handles).

e) **Foam**: Unless otherwise mentioned, chair cushion for seat and back shall be made up of flexible polyurethane foam Moulded to have consistent density of around 45 $\pm$ 2 kg/m^3.

f) **Castor**: Heavy duty, non skid, twin wheel, swivel P.P.C.P. (Poly Propylene Co-Polymer) or Nylon (snap type).

g) **Revolving & Tilting**: Gas lift with 100mm adjustment of seat height along with a 360 degree swivel mechanism with tilting mechanism. The pneumatic operated mechanisms are mild steel powder coated with an additional M.S. galvanized rod.

h) PVC profile shall be provided by stapling for seat and back rest.

i) **Hardware**: All hardware should be of ISI quality.

j) **Upholstery:** The approved colour, texture, design and manufacturer of leatherette shall be used.

k) **Stand:** Unless otherwise mentioned, stand shall be of 10 to 12 gauge M.S. sheet, properly welded with powder coating of minimum 50 microns.

l) **Adhesive:** Fevicol SR – 505, synthetic rubber adhesive shall be used for fixing of various items for chairs.

m) **Flame Retardant Leatherette :** Flame Retardant Leatherette shall be at a cost of Rs 350/- to Rs.400/- per meter minimum (purchase bill to be submitted)

n) 12 mm thick hot pressed ply shall be used for seat and back rest.

o) Minimum 10-14 no Tee nuts shall be provided per chair for 12 mm thick ply for back rest.

p) Spring shall be of 7 mm dia “C” class spring quality wire with minimum 5 spiral rings.

q) Pipes for S type/C type chairs shall be ERW pipes of 16 gauges with reinforcement.

r) One sample of each chair shall be delivered after taking the acceptance letter.

3. Technical Specifications for Factory made Modular Furniture

1. GENERAL:

The hardware shall be of approved manufacturer or supplier well made and equal to in every respect to the samples deposited with LIC of India.

Screws shall match the finish of the article to be fixed and to be round or flat headed or counter sunk as required.

The contractor should cover up and protect all surfaces with suitable protective material, renew as necessary and subsequently clean off and clear away on completion.

Aluminum, CRC steel and stainless steel shall be of approved manufacture and suitable for its particular application. Generally the surface of Aluminum shall have an anodized finish and both shall comply with samples approved by the LIC Of India. The surface of A11, MS/CRCA components shall undergo 7 stage pre- treatments.

All Steel, brass, bronze, Aluminum and stainless steel articles shall be subjected to a test for strength, if so required by the LIC of India.

The modular furniture shall be manufactured as per manufacturing process as per ISO Standards for repeatability.

2 The Work Station Components shall be of following Specifications.

Low height Partition Panels:

Height: 1200 mm approximately.
Thickness: 65mm minimum (Overall)
Finish: Part Laminate and part fabric finish.

- Shall be tile partition system with provision for height enhancement.
- There shall be provision in the partition to allow for passage of wire throughout the length and height of the partitions and switches /sockets could be incorporated at any location within the panel. This is to allow separation of data and power cables by a minimum specified distance of 300 mm.
- Shall have 100% wire management through framework.

2.1 FRAME WORK:

- The framework shall be made from 16 gauge thick roll- framed MS sections for core frame & for intermediate members. The core frame consist of a welded rectangular frame made of vertical roll- framed sections (max spacing 150mm) welded to a horizontal sections to form a rigid structure with a hinged raceway at the base & below worktop level. The intermediate horizontal members shall fit into slots on the vertical members of the frame to accommodate the tiles of different sizes. The members shall have slots at regular interval. The slots should serve the double purpose of horizontal modularity as well as allowances for passing the cables throughout the height of partition. These slots shall be provided with plastic rings for a softer edge where wires are being passed.

- Pre-treatment: All MS and CRC components shall undergo 7 stage pre treatments.
- Powder Coating: Shall have Electrostatic powder painting with epoxy polyester powder having minimum thickness of 50 microns. Powder painted surface shall be free of blisters and should be tested for impact resistance, Hardness against scratch as per relevant IS standards.
- In Case of Aluminum framework, it shall be of minimum 2mm thick (14guage), duly powder coated as mentioned above.
- Stability: Stability of the partition shall be independent worktops, etc. cantilevered to it. A stable configuration shall be confirmed with layout. The partition configurations are to be free standing and not require any indentation to be done in the floor, walls or ceiling. The extruded frame should be sufficiently rigid such that worktops and other accessories can be cantilevered at any desired point without affecting the overall stability.
- The partition panes shall have levelers in the bottom with a allowance for adjustment of up to +/_ 25mm.

2.2 **End Trims / Top Cap/ Exposed Corners:**

- End trims/ Top Cap/ Exposed Corners shall be of extruded sections of Aluminum (2.0 mm thick) with epoxy powder coating finish of thickness not less than 50 microns. These shall be accurately fixed by means of hidden connections.

Intermediate Raceways / Bottom facias for Electrical Wiring & Wire Management:

- All partition panels shall be provided with hinge type bottom raceway (100 mm high) & intermediate raceway below work top level. The bottom raceway accessible from both side & intermediate raceway shall be accessible from inner side only. The cover plate shall be of 1mm thick MS sheet duly powder coated of thickness not less than 50 microns. Necessary slots shall be provided on the facia / cover plate as per the sample provided for fixing switches. Provision shall be made for fixing the sockets on the inside of the frame with plastic snap off strips on the hinged raceways to allow wires to pass through. The ends of raceways shall be slotted for incoming & outgoing. Wires.

2.3 **Facia Tiles:**

a) Pre- laminated Tiles

- The laminated tiles shall be of 12mm th Pre-laminated particle board (interior grade) of approved shade, fitted with clips on rear side. The pre-laminated particle board shall be OSL of interior grade bonded with BWR grade phenol formaldehyde synthetic resin, confirming to IS: 12823. The edges of the tiles shall be lipped with PVC edge lipping. All tiles should be gasketted to their frames to minimize sound and dust transmission.

b) Tackable tiles / Pinup board.

- The tackable, tile shall be made up of 0.6mm thick GI sheet with an inlay of 6mm thick cross link foam having density of 50-60 Kg/m3. Fabric shall be with fire retardant coating and scotch guard for strain resistance, glued to the GI sheet.

c) Fabric finish panel/ Non tackable Tiles:

- The tackable tiles shall be made up of 0.6mm thick GI sheet with an inlay of 8mm thick poly urethane foam having density of 20 Kg/m3. Fabric shall be with fire retardant coating and scotch guard for strain resistance, glued to the GI sheet.

2.4 Work Top

- Work top shall be of 25mm thick plain particle board interior grade confirming to IS: The front edge with PVC flat lipping. Bottom shall have baker lamination of 0.6mm thickness.
- Non Working edges of the work surface shall be provided with machine pressed 2mm thick PVC lipping.
- Work tops shall be mounted onto the partition panels for workstations by means of cantilever brackets made from minimum 18 gauge CRCA steel duly powder coated or by powder coated MS brackets or by any other means as per manufacturer's specifications. The worktops shall be sufficiently supported / reinforced to take weights of computers, printers, person etc…
- Work surfaces shall be provided with circular cut outs as per the requirement. These cutouts shall be provided with ABS covers.
- Vertical supports shall be gable end finished same as tops in post formed laminations particle board.

2.5 Key board pullout tray:

- Key board shall be made from 1.2 mm thick CRCA steel duly powder coated with in built LHS/RHS mouse pad as per approved sample. The dimensions shall be as per specifications/ drawing. The tray shall have facia of laminated particle board. The key board tray shall have locking as well as tilting arrangement.

- It shall be mounted on MS powder coated telescopic channels for noiseless and smooth sliding.

2.6 Pedestal Drawer Unit:

- The carcass shall be made from 0.8 mm thick Galvanized MS sheet & drawers shall be made from 0.6 mm thick Galvanized MS sheet duly powder coated. The drawer unit shall have two drawers at top & one filing drawer.
- Pre treatment: All MS components shall undergo 7 stage pre- treatment & powder coating.
- Drawers shall be mounted on GI telescopic channels for noiseless and smooth sliding.
- Shall be provided with anti tilt mechanism with the help of counter weight to avoid the unit from tilting when drawers are in use.
- Shall be provided with master key/ lock with minimum 2 set of keys.
- Shall be stationary and necessary rubber bushing at bottom/ glide screws with height adjustment upto +/- 10 mm.
- On completion of the project, the contractors shall have to hand over all the keys with individual key chain bearing respective key number and work stations number.
-

2.7 CPU shelf:

- Movable type MS powder coated adjustable CPU trolley of size as specified in drawing for placing any size of CPU unit, made out of 16 swg powder coated MS sheet with 4 nos lockable type castors etc… complete.

2.8 Power Strips:

- Cutouts shall be provided for electrical sockets above/below table tops as per drawings.

2.9 **Connectors:**

- Aluminum / CRCA steel/ MS connectors shall be supplied along with the frame.

3 FREESTANDING TABLES:

- The various components of freestanding table shall be connected with concealed type knockout fittings suitable for particleboards.

3.1 **TOP:**

- Tops shall be of 25mm thick plain particle board interior grade confirming to IS:. in one Piece with Front Edge with PVC flat lipping including MS Powder Coated Brackets to Fix With Gable Ends. Bottom shall have a baker lamination of 0.6mm thickness. Non working edges of the work surface shall be provided with machine pressed 2 mm thick PVC lipping.

3.2 **Gable End:**

- Shall be made out of 25mm thick plain particle board interior grade confirming to IS. All edges shall have 2mm th PVC lipping, with leveling bolts. The gable end shall have in the bottom with a allowance for adjustment of upto +/- 25 mm.

3.3 **Modesty Panel**:

- Modesty panel/Apron shall be made out of 18mm thick particle board in one piece interior grade confirming to IS :. The Particle board shall be laminated with laminate of 1 mm thickness of approved shade. The edges shall have 2mm thick Hot Pressed PVC lipping of Matching Color.

4 Side Board/ Credenza.

- The various components of side credenza shall be connected with concealed type knockout fittings.

4.1 **Top:**

- Tops shall be of 25 mm thick plain particle board in One Piece Interior grade confirming to IS. The front edges of work surfaces shall be with PVC flat lipping including MS Powder Coated Brackets to fix with Gable Ends. Bottom shall have a baker lamination of 0.6mm thickness. Other edges of the work surface shall be provided with machine pressed 2 mm thick PVC lipping.

4.2 **Carcass:**

- The carcass & one shelf at middle shall be of 18 mm th. Pre laminated particle board(OSL) interior grade. The edges shall be finished with 2mm th PVC lipping.

4.3 **Shutter:**

- The shutters shall be made up of 18 mm thk. prelaminated particle board (OSL) interior grade with sliding channel with double ball bearing for smooth operation. The edges shall be finished with 2 mm th PVC lipping.

4.4 **Locks/ Hardware:**

- The unit shall be provided with 7 lever central lock, one tower bolt & Two handles of approved make & type.

ALUMINIUM SLIDING WINDOWS SECTION

Jindal Cat Main-2016

Frame	Bottom Section No. 21139	62mmX29.5mmX1.5mm	Wt. ₹ 0.902 Kg/m
	Side & Top Section No. 21138	62mmX29.5mmX1.5mm	Wt. ₹ 0.807 Kg/m
Shutter	Side Rail Section No. 20530	50mmX20mmX1.5mm	Wt. ₹ 0.571 Kg/m
	Top &Bottom Section No. 20529	50mmX20mmX1.5mm	Wt. ₹ 0.642 Kg/m
	Lock Rail Section No. 20531	50mmX29mmX1.5mm	Wt. ₹ 0.697 Kg/m

1. **METHOD OF FIXING :**

a) Aluminium members coming in contact with masonry shall be fixed by means of slotted steel lugs, not less than 100 mm x 16 mm, 3mm with counter sunk galvanized machine screws and nuts 19x 6.3 mm and to concrete works by means of 45 mm No.10 galvanized wood screws.

b) Fixing screws and lugs

Outer frame/sub frame shall be provided with fixing holes centrally in the web of the section at approved intervals. Any steel lugs coming in contact with Aluminium should be either galvanized or given one coat of bituminous paint. After fixing the members in position as stated above, the space between the concrete surface and the frame of Doors, windows, ventilators, etc. shall be pressure grouted with CM 1:4 so as to achieve absolute water tightness between the frame and inside surface. Care shall be taken that exposed surface of opening is not damaged while fixing Doors, windows, ventilators, etc.

Further, all vertical, horizontal members of Doors, windows, ventilators, etc. shall be provided with Neoprene/ EPDM weather stripping.

The contractors shall design, fabricate and fix in position, sub frames, Doors, windows, ventilators, etc. in such a way that water penetration is totally and effectively sealed and any dampness on inner surfaces is totally eliminated. The shop drawing submitted by the contractor shall show the method of sealing the water penetration also.

Doors, windows, ventilators, etc. shall be fixed to sub frames by means of screws of adequate size and numbers, which shall be cadmium plated brass.

The method of fixing as above shall generally be followed and members used in the manufacturing of units shall be designed accordingly. However, contractors are free to adopt any other equivalent, approved method of fixing. In no case, fixing shall be allowed over wooden runners.

Doors, windows, ventilators, etc. shall be designed not only for their strength, stability, stiffness against all odds but also for easy operation, water tightness, easy replacement of glass and cleaning from inside.

2. **GLASS & GLAZING :**

Glass shall be of specified thickness and shall be ASAHI or MODI float waveless glass or equivalent, approved, clear sheet glass or tinted as specified in schedule of quantities.
Before installation of glass, contractor shall ensure the following:-

a) All glazing rebates shall be square, plumb, true in plane, clear, dry and free of dust.

b) Glass edges shall be clear and cut to exact size, glass with chipped or damaged edges shall be rejected.

c) Glass shall be set in glazing clips and so installed as to achieve proper water tightness.

d) Suitable Neoprene, EPDM gaskets shall be used for fixing glass so as to prevent rattling.

e) Beading shall be of anodised Aluminium section as per schedule of quantities.

f) Putty shall be applied to beading face in contact with glass and if necessary also filled at back-conforming to the latest version of IS-420-1953. On completion of job, all glass shall be thoroughly cleaned and freed from dirt, putty or other adhering material.

g) Wastage in cutting shall be to contractors' account. Frosted/Ground glass shall be set with smooth surface outside.

3. Contractors shall submit detailed drawings showing various members of Aluminum Doors, windows, ventilators, etc. which they propose to use, along with their filled in tender.

4. **MODE OF MEASUREMENTS:**

Aluminium Doors, windows, ventilators shall be measured in Kg. Any fixture or projection embedded in concrete/masonry work shall not be measured. Samples of all sections, accessories, beadings, etc. shall be got approved, weighed and preserved at site.
Rate shall include for fittings and fixtures shown on the shop drawings approved by the Chief Engineer.

5. RATE TO INCLUDE:

Part from other factors mentioned elsewhere in this tender document, rates for the items for supplying and fixing aluminium doors, windows and ventilators shall also include for the following:

a) All accessories, for fixing doors, windows and ventilators to concrete/masonry surface as described in the trade.
b) Filling sealants as per details to ensure water tightness. All the sealants must be permanently resilient and of non-bleeding nature.
c) EPDM weathering strips as directed.
d) Drip strip to drain out water falling on the members of the frame.
e) Pressure grouting in CM 1:4 the space between the concrete surface and the frame of windows and ventilators, or sub frames, as per site conditions.
f) EPDM gaskets for fixing glass.
g) Cadmium plated brass wood screws wherever specified.
h) Galvanized/ Aluminum channels pieces, coach screws, raw plugs, etc. of required size and nos. for fixing doors, windows and ventilators frames in position.
i) Necessary scaffolding/cradle for erection of aluminum doors, windows and ventilators in position.
j) Rates for sliding/ doors/ windows and ventilators to include for adequate arrangements for draining out water collected in the channels of the outer frame.
k) For all Doors, windows, ventilators, etc. openings, contractor shall prepare MS retrieval template frames with necessary tolerance for obtaining correct dimensions of openings in masonry/concrete works.
l) Suitable, approved cleats, etc. at every joint of outer frame.

6. VARIATION OF WEIGHTS:

The contractors shall base their quoted rates on total weight of Aluminium content for Doors, windows, ventilators units excluding hardware and glass, proposed by LIC in the items

Notes;

- Wherever laminate, fabric, powder coated metal sections are mounted it shall be of approved shade and make.
- The physical parameters and the functional requirements are indicated in the drawings.
- In each wing there are different combinations of partition to any desired configuration such as straight T,L,U,C,+ etc. The tender is instructed to carefully go through the layouts and provide the same.

- Minor layout modifications if required should be allowed at no additional cost, after placement of order.

- The contractor shall furnish shop drawings for the entire scope including sample to be used for various material within seven days of the receipt of instruction.

- Dimensional accuracy and discrepancy in the fit out of the work station shall be highlighted immediately.

- The contractor shall make necessary arrangement and erect Mockup Configuration for at least two alternatives at site at his own cost. Same shall be dismantled on receiving of instruction.

- Necessary As built drawing shall be furnished indicating workstation with its designated number.

- Necessary list shall be furnished in a tabular form indicating workstation numbers with respective key Nos.
- All the workstations should have provision for fixing master switch and one socket for telephone line on top of table for control of switches provided below table top.
- **All Furniture including pedestal drawer units shall display the "LOGO"/MONOGRAM of the manufacturer.**
- **All post formed laminate wherever mentioned in the tender shall be of 0.8 mm thickness.**
- **All Particle boards/pre laminated particle boards wherever mentioned in the tender shall be of INTERIOR GRADE of approved make.**

TECHNICAL SPECIFICATION FOR ELECTRICAL WORKS

SPECIFICATION FOR ELECTRICAL INSTALLATION WORKS IN L.I.C.I. BLDGS. SUBJECT TO THE GENERAL CONDITION OF CONTRACT IN FORCE

(A) GENERAL

1. The installations shall generally be carried out in conformity with the Code of Practice for electrical wiring installation (system voltage not exceeding 650 V. viz I.S. 730. 1963 or the latest revision thereof.

2. **Definition:**

As given in I.S. Code of Practice shall apply.

3. **Pressure and frequency of supply :**

All current consuming devices shall be suitable for 433 V., 3phase, 50cycle A.C. supply.

4. **System of wiring :**

i) The wiring shall be carried out as per schedule. Power wiring must be in separate PVC conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution board at convenient centers and without isolated fuses. All conductors shall run as far as possible along the walls and ceilings so as to be easily accessible and capable of being thoroughly inspected. The contractor shall arrange beforehand the balancing of circuits in consultation with Electrical Engineer of L.I.C.I.

ii) Within one month of taking over of the installation, the contractor shall submit to L.I.C.I. 3sets of completion drawings of the Electrical Installation in corpora ting all modifications made from time to time including cable & conduit lay-outs to the satisfaction of the Electrical Engineer of L.I.C.I. & the wiring plans shall be deemed to be “Drawings” within the meaning of the term as used in the general conditions of contract.

5. **Conductor :**

The conductors shall be of copper or otherwise stated in tender and shall be either PVC insulated or PVC insulated PVC sheathed. The minimum sections of conductors used for wring of light and plug points shall be 1.5 sq mm. Single core wires shall only be used.

6. **Cables:**

i) All cables including flexible cables used shall be ISI approved and confirming the ISI specifications.

ii) Twin flexible cable shall be of minimum section area of 14/0.0076 and PVC insulated.

iii) Wires as per specification of materials.

7. **Fall of Potential**:

The cross sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in pressure between the main fuses and their furthest point shall not exceed two percent, with all the consuming devices in use.

8. **Rating of Lamps and Fans:**

In estimating the current to be carried by any conductors glow lamps are to be rated, as of 4 and 1.25 watts per candle power for carbon and metallic filament lamps respectively where the conditions are known, otherwise at 40 watts except in the case of gas filled lamps. Ceiling fans are to be rated 60 watts; table fans at 60 watts unless actual values, are known or specified.

9. **Test :**

The installation with fittings complete shall before current is switched on satisfactorily pass the following tests:

The whole of the lamps and appliance having been connected to the conductors and all switches and fuses being 'on', a pressure not less than twice the intended working pressure subject to a limit of 500 volts shall be applied and the insulation resistance of the whole or any part of the installation to earth must not be less in Mega ohms than 25 divided by the number of points as defined above. With all lamps and appliance removed from the circuits a similar test between poles may be demanded, provided that during the rainy season half the above test value will be accepted. Where any appliance referred to is a motor larger than one-half B.H.P. the insulation resistance of that particular circuit must be greater than one Meg ohm.

10. **Joints and Looping Back**:

No joints shall be allowed in conductors. Neutral shall be looped from point to point whereas the live wires shall be looped in the switch board only from switch to switch.

11. **Switches:**

i) All main switches (other than those of iron clad pattern) carrying over ten amperes shall be fitted for back connections.

ii) All switches and circuit breakers shall be constructed in accordance with the I.E.E. 'wiring rules' 8th, edition no 67, or its latest version, provided also that springs shall be either of phosphor bronze, or if of steel, shall be copper or nickel plated; & that handles shall be so fastened that do not tend to unscrew or become loose (see clause 16).

12. **Control at point of Entry of Supply**:

There shall be one main switch and one main fuse on each pole of each main circuit (other than the neutral conductor of a 3-wire circuit) at the point of entry of the supply. The switches must be linked.

13. **Distribution Boards**:

i) Main distribution board shall be metal clad and shall be provided with an iron clad switch and fuse on each pole of the circuit (MCCB / Switches).

ii) Branch distribution board shall be provided with one fuse/ MCB for each circuit and one common neutral bar. Maximum number of points to be wired on each circuit shall be 6.

iii) Switches and fuses of opposite polarity shall be mounted on separate bases with a shield of non-ignitable insulating material between the bases when placed one above the other.

iv) In wiring a branch distribution board the total number of points shall be divided as far as possible evenly between the numbers of ways of the board. A spare circuit shall be left for future extensions.

v) MCB / Fuses shall be of approved materials and each circuit shall be clearly numbered from left to right in conspicuous figures to correspond with the wiring plans.

vi) Two spare fuse carriers / MCB per main branch board shall be supplied for replacements.

14. **Passing through the walls**

I) Except as laid down in clause 87 where conductors pass the walls, one of the following alternative methods shall be used.

A hole of suitable area shall be made in the wall through which the casing or conductor shall be carried so as to allow of an air-space of not less than one inch on three sides of the casing or conductors as the case may be or the conductors shall be carried in approved heavy gauge solid drown or lap welded conduit tube on porcelain ducts. Where the supply is alternating current, the conductors of the circuit must be bunched.

ii) Where a wall tube passes outside a building so as to be exposed to the weather, the outer end shall be bell mounted and turned downwards.

15. **Branch Switches** (see clause – 11) – In installation supplied from a three wire system, all branch switches shall be placed on the outer wires, switches (Other than those for multiple control) controlling not more than 10 amperes shall be of the Modular type switches shall be 'ON' when knob is down. Where the specified position of branch switches is altered, any such alterations of position after fixing will be paid for.

16. **Ceiling Rose and Wall Sockets** – Three pins Ceiling roses, and wall sockets shall not contain fuse terminals. Wall sockets shall comply with the requirements of the Bureau of Indian Standards.

17. **Fittings.** Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings, these must be free from sharp angles or projecting edges and of such a size as will enable them to be wired with the conductors used for the final sub-circuits without removing the braiding taping or outer covering. As far as possible all tubes or channels should be for sufficient size to permit of 'looking back'. Where with approval of the Electrical Engineer of L.I.C. 'Electrolytic copper' wire is used for wiring fittings. The sub-circuit leads must terminate in a ceiling rose or connector from which this wire will be carried into the fittings. Flexible wire must not be used for wiring fittings, except portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas fitted lamps shall be adequately ventilated.

18. **Lamp holders**-Lamp holders for use on brackets, etc. shall have not less than a half inch female nipple and all those for use with flexible pendants shall be provided with cord grips. All cases must be solid and substantial thin case export type not being admissible. Edison screw holders will not be accepted for lamps below 100 watts.

19. **External and Road lamps** ; External and Road Lamps shall have weather proof fittings of approved design so as to effectually prevent the admission of moisture. An insulating distance piece of moisture proof materials must be inserted between the lamp holder nipple and that of the fitting. Flexible cord conductors and cord grip lamp holders must not be used where exposed to the weather. In verandahs and similar exposed situations rod pendants or ceiling plates shall be used.

20. **Lamps:** All glow lamps unless otherwise specified in the special conditions of contract shall hung at a height of nine feet above the floor level. Metal filament lamps shall be made of drawn wire only.

21. **Fans and Regulators**

(I) (a) All ceiling fans shall be suspended from a hook or shackle and insulated from the same. All joints in the suspension rod shall be screwed and all joints or bolts in connection therewith shall be additionally secured by means of split pins.

(b) The canopy and wood block at the top of the suspension rod shall effectually hide the suspension.

(c) The leading in wire shall be not smaller than 3/22 S.W. G. and shall be protected from being cut.

(d) All fans shall be free from sparking, noise oil throwing and excessive heating.

(ii)(a) All fans shall be hung nine and half feet above the floor or as directed by the supervising officer.

(b) All fans shall be capable of running at full speed for one month without additional oiling and shall not overheat after eight hours continuous run at full speed.

(c) Each fan shall have a speed regulator of Electronic type.

22. Attachment of Fittings and Accessories :

i) In other than conduit wiring all ceiling roses, wall sockets, switches, regulators, brackets, pendants and accessories attached to walls or ceiling shall be mounted on suitable PVC Base plate.

23. Interchangeability :

Similar parts of all the switches, lamp holders, distributing boards, ceiling roses, brackets, pendants fan and all other fittings of the same type shall be interchangeable.

B. CONDUIT SYSTEM

1) **Conduit to be continuous** – Conduit shall be of approved pattern and manufacture and in accordance with the specification of the Bureau of Indian Standards & relevant IE rules.

2) **Bunching of Wires** – The wires of a circuit may be bunched together in a conduit, and if the supply is alternating current, they must be bunched

3) **Junction in Conduit** – The lengths of conduit shall be joined by means of push fit joints or other approved joints. The greatest care shall be taken in preparing the conduit that no sharp edges or burrs are left which could damage the Insulation. The Elec. Engineer with a view to ensuring that the above proviso has been carried out, may require (if he should consider if necessary) that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed.

4) **Fixing of Conduit –** The PVC conduit shall be fixed to the surface of walls, secured to plugs, arranged as in clause 15 by saddles and round-headed screws. No conduit shall be buried beneath the surface of the masonry unless so specified or approved by the Electrical Engineer, L.I.C.

5) **Bends of Conduit –** The conduits shall be brought round the angles of walls by means of bends or elbows as may be directed.

6) **Outlets-** All outlets for fittings, switches, etc. shall be equipped with an approved outlet box.

7) **Conductors –** All conductors used in conduit wiring shall be stranded

8) **Erection and Earthing of conduit** – The whole system of conduit shall be erected and completed before the conductors are drawn in. In conduit system, the pipe must be continuous when passing through walls or floors, and no other form of insulating or protecting tube is required.

==========

Specifications for the Concealed Conduits in slab /wall columns etc. for electrical main / sub main / point wiring; will be as under :

i. Rigid PVC conduit of Medium class ISI marked and corresponding PVC conduit accessories.

ii. Special deep junction boxes – 75 mm deep to be laid in the slab / ceiling.

iii. The rectangular junction boxes wherever provide shall be made out of 16 gauge M.S. Sheets and painted with two coats of ready mixed oil paint of approved shade over a coat of red oxide primer.

iv. Make of conduits to be used should be of ISI marked and as per list of Electrical Materials.

v. **The electrical installation work shall be carried out through a Licensed Electrical Contractor. The name of licensed electrical contractor shall be get approved from the competent authority well in advance before commencement of the work.**

vi. **INSTALLATION OF CONDUIT:**

All conduits including bends, unions, junction boxes, etc. shall be cleaned before they are fixed in position. Conduits which are to be taken in the ceiling slab shall be laid on the prepared shuttering work of the ceiling slab before concrete is poured. The conduits shall be properly fixed into the sockets, bends, junction boxes, outlet boxes and shall be made watertight by using proper sealant recommended by the manufacturer. The conduits in ceiling slab shall be straight as far as possible, to facilitate easy drawing of wires through them. Before the conduits are laid in the ceiling, the positions of outlet points, point control junction boxes shall be set out clearly so as to minimize offsets and bends.

Conduits recessed in walls shall be secured rigidly by means of steel hooks/staples at not more than 0.6 meter intervals before conduit is concealed in the walls. All chases, grooves shall be neatly made to proper dimensions to accommodate the required number and size of conduits. The outlet boxes, point control boxes, inspection and draw boxes shall be fixed as and when conduit is being laid. The recessing of conduits in walls shall be so arranged as to allow at least 12 mm plaster to cover the same. All grooves, chases, etc. shall be refilled with cement mortar and finished up to the wall surface before plastering of walls is taken up by the Contractor. Where conduits pass through expansion joints in the buildings, adequate expansion fittings or other approved devices shall be used to take care of any relative movement. Wherever conduits terminate into points control boxes, distribution boards, etc, conduits shall be rigidly connected to boxes, boards, etc. Running joints in conduits wherever necessary shall be rigidly held in aligned position. After conduits, junction boxes outlet boxes, etc. are fixed in position their outlets shall be properly plugged with PVC.

Stoppers or with any other suitable materials so that water, mortar, vermin or any other foreign material do not enter into the conduits system.

Draw box junction box, point control boxes, etc, shall be provided with bushes of PVC or rubber, after the conduit ends are properly filed to remove the burrs and sharp edges. Concealed conduit laying above false ceiling shall be executed in a similar manner described above. Wherever called for, surface conduit system shall be adopted with PVC conduits being fixed on to the wall surfaces, ceilings, etc., with saddles, clamps and screws.
Conduit shall be run in square and symmetrical lines with proper drawing and ventilation. Before surface conduits are installed, the exact route shall be marked at site and the approval of the Employer's Engineer shall be obtained.

Conduit shall be concealed wherever specified in ceiling, walls, etc. as required. The conduits shall be laid in ceiling slab before pouring of Concrete. Care shall be taken to ensure that conduits are not displaced during the process of pouring and consolidating the Concrete.

The following precautions shall be observed while installing the conduits:-

a. As far as possible bending shall be done at site in a proper manner.
b. Where a number of conduits converge, a large M.S. box shall be used to avoid crossing of conduits. Where conduits are installed in straight runs, draw boxes will be provided at centers not greater than 15 meters on straight runs and at every change in direction. No boxes will be provided in voids where access cannot be readily obtained.
The rate for rigid P.V.C. conduit sleeves shall include for recesses and holes, etc. in brick work for electrical conduits as shown on drawings and as directed on site and making good the same.

Section-I

Specifications for LT (1.1 KV Grade) Cables

1 Scope:

This specification covers supply, testing at works, supply at site, installation, termination, jointing, connection, testing at site, commissioning and handing over of 1.1 KV grade Cables.

2 System :

The 1.1 KV grade cables are to be used in under ground distribution system with normal system voltage of 415 V, 50 Hz, 3 phases, 4 wire systems.

3 Applicable standards:

Cables to be supplied under this specifications shall be with Copper or Aluminum conductor as specified, in drawings or Bill of Quantities, PVC insulated and PVC sheathed, armored and with an outer PVC protective sheath, heavy duty type and shall confirm to,

IS 1554 (Part I) 1976: PVC insulated electric cables.

IS 1753: Aluminum conductors for insulated cables.

IS 3961: Recommended current ratings for cables.

4 General requirements:

4.1 All cables shall be new without any kinks or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on surface of the cable at distance not exceeding 1 M.

4.2 Procurement of cables shall be on the basis of the actual site measurements and the quantities given shall be regarded as a guide. Before procurement of the cables, the contractor shall submit the detailed measurement sheet, based on site measurement showing the various cable lengths and after approval of the same place orders for the cables.

4.3 Cables shall be tested at factory as per IS requirement. The tests shall incorporate routine tests, type tests and acceptance test. The Contractor shall produce the certificate for type test.

4.4 The cables shall be of one of the makes mentioned in the list of approved materials and with ISI mark.

4.5 The cables shall be supplied and delivered at site in original cable drums with manufacturer's name, cable size, type and length all clearly indicated on each drum.

4.6 The unit rate shall include loading, unloading, transport, storage, handling, unwinding the cable from cable drums and laying in the cable trench or erected on cable trays etc.

4.7 The cables shall be laid by skilled and experienced labour.

4.8 Where the cable route intersects roads, streets or pathways, RCC spun pipes shall be laid in the trenches to serve as cable ducts. The pipes shall be joined by RCC spun collars. The RCC pipes shall project at least 150 mm on either side of road crossing.

4.9 The cable loops shall be kept at both ends of the cable length. Minimum 3 meters long loop shall be provided.

4.10 The contractor shall take care to see that the cables received at site are apportioned to various locations to ensure maximum utilization and cable joints are avoided. This apportioning shall be got approved before the cables are cut to lengths. Straight joints are permitted only under exceptional circumstances.

5 Storage and loading, unloading of cables. :

5.1 Cable drums shall not be stored one above the other. Sufficient space between cable drums shall be left for air circulation and the drums shall stand on battens placed directly under the flanges.

5.2 Cable drums shall be stored preferably on a plain ground without having any hard stones or any other sharp materials projecting above the ground surface. The drums shall be stored preferably in the shed or otherwise they shall be covered by tarpaulin.

5.3 Drums shall be stored and kept in such a way that bottom cable end does not get damaged.

5.4 Drums shall be rotated only in the direction marked on the drum.

5.5 Loading and unloading shall be done with material handling equipments only.

6 Erection and laying of cables:

6.1 General:

6.1.1 All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of service.

6.1.2 When cables pass through holes in metal work, precautions shall be taken to prevent abrasion of the cables on any sharp edge. Cables passing through walls, ceiling or floor shall run through sleeves of Hume pipes of adequate dia. & after pulling of the cables both ends of the sleeve shall be sealed with fire resistance material to prevent spread of fire.

6.1.3 In every vertical channel, duct, trucking or cable trench, containing cables and exceeding three meters in length, internal barriers shall be provided so as to avoid heating of the air at the top of the unit.

6.1.4 In every vertical cable shaft, cable trench or any passage of cable through wall, ceiling, floor etc. Barriers against spread of fire and smoke shall be provided.

6.1.5 In fire hazard areas extra care shall be taken to prevent spreading of fire in case of cable failure. Cables in these areas shall be covered by glass wool or embedded in sand in appropriate trenches. The cabling in such areas shall be done as per FIA approval and IEE regulations.

6.1.6 Communication cables should be laid away from the power cables to avoid electromagnetic interference. Minimum clearance of 300 mm shall be maintained.

6.1.7 Control and power cables shall be laid on separate trays.

6.1.8 The maximum number of power cables on a tray should be limited to six.

6.1.9 Every cable shall be installed where it will not be exposed to direct sunlight, rain, dripping water, oil or any corrosive substance.

6.1.10 The cables shall be erected and laid by either of the following methods and as specified in Bill of Quantities or specifications or drawings.

6.2 Cables laid in excavated trenches:

6.2.1 The cables for external electrification work shall be laid in specially prepared cable trenches as specified under the section for cable trenches.

6.2.2 While laying cable in the trench the cable end shall be pulled with pulling eye only after mounting the drum on the jacks.

6.2.3 Care shall be taken in laying cables to avoid forming kinks. The drums shall be unrolled and cables run over wooden rollers, placed at intervals not exceeding 2 Mts.

6.2.4 High voltage cables are to be laid separately from other cables. HV, MV cables shall not be laid in the same trench and /or alongside of water main.

6.2.5 The cables shall not be laid directly in such soil, which is corrosive, and having components, which react with the insulating layer or amour of the cable. In such case it should be laid in pipes or concrete trenches.

6.3 Cables laid in built-up trenches:

6.3.1 For the cable route passing through the area which is proposed to be covered with concrete/tiles etc. the cables shall be laid in the R.C.C./brick masonry cable trenches as specified in the items. This arrangement shall be generally inside the building.

6.3.2 For the area outside the building but covered with concrete /tiles etc. the cables shall be laid through R.C.C. pipes laid in ground with brick chambers at both ends. The chambers shall be covered with C.I. heavy-duty covers if the area is prone for vehicular traffic otherwise medium duty C.I. covers should be provided.

6.3.3 Cables laid in the built-up cable trenches within the building shall be raised so as not to lay at the trench bottom. Cables shall be either secured to the wall by saddles or laid on hot dip galvanized angle iron brackets or cable trays, ladder, rack, trough etc.

6.3.4 Where cables are clamped to the wall a minimum clearance of 100 mm shall be maintained between wall and cable and minimum 150 mm vertical clearance shall be maintained between two cables. Where cables are laid on cable brackets, the brackets shall not be fixed more than 500 mm apart to avoid sag in the cables. Where cables are laid on cable tray /ladder /troughs /racks, minimum 300 mm distance shall be observed between adjacent tier of tray/ladder /troughs /racks, and cable shall be fixed minimum 25 mm away from wall and minimum 150 mm distance shall be observed between two adjacent cables. Cable shall be properly fixed with the tray /ladder /troughs /racks with cable tie or saddles.

6.3.5 The dimensions of the trenches shall be determined depending upon the maximum number of cables that is expected to be accommodated. Wherever specified, trenches shall be filled with fine sand and covered with RCC or steel chequered trench covers.

6.3.6 Where cables are to be installed under floors or above suspended ceilings or below ceiling, they shall be laid on a cable tray and shall be run in such positions that they are not liable to be damaged by contact with the floor or the ceiling or their fixture. The cable tray shall be properly fixed with tie rod to the ceiling. The concrete inserts for fixing the tie rod shall be put in place while casting the slab. The cable tray route shall be co-coordinated with other services. While laying the cables on the tray minimum 150 mm distance shall be observed between two adjacent cables. At least 25 % space shall be kept spare for any future installation.

6.3.7 The cable reaching for the motors in the mechanical room or plant room or machine room or service area shall be laid on cable tray. The cable reaching to motors shall be protected by rigid galvanized conduits up to a height of 300 mm above the floor. Above that height, the cable shall be protected by means of oil tight flexible metallic conduits fixed to the terminal box of the motor. The connection between the rigid conduit and the flexible conduit shall be done by a screwed coupling of an approved type. The flexible conduit shall be properly fixed with the terminal box of the motor by means of double hexagonal check nut.

6.4 Duct System:

Wherever specified cables shall be laid in underground ducts. The duct system shall consist of a required number of reinforced Hume pipes with simplex joints. Wherever asbestos cement pipes are used, the pipes shall be encased in concrete of 75 mm thick. The ducts shall be properly anchored to prevent any movement. The top surface of the cable ducts shall not be less than 60 cm below the ground level. The duct shall be at a gradient of at least 1:300.

The ducts shall be provided with inspection manholes at all direction changes and at required regular intervals for drawing the cables. The manholes shall be of reinforced concrete either cast-in-situ or precast. The manhole covers shall be cast iron and machine finished to ensure a perfect joint. The manhole covers shall be installed flush with the ground or paved surface. The ducts shall be properly plugged at the ends to prevent entry of water, rodents etc. Suitable duct markers shall be placed along the run of the cable ducts. The duct markers shall at least be 15 cm square embedded in concrete, indicating the voltage, number of ducts and the direction of run of the cable duct. Suitable cable supports made of angle iron shall be provided in the manholes for supporting the cables. Proper identification tags shall be provided for each cable in the manholes.

6.5 Cables on Trays / Racks:

6.5.1 Cable shall be laid on cable trays/racks wherever specified. Cable racks/trays shall be of ladder, trough or channel design suitable for the purpose. The nominal depth of the trays/racks shall be 150 mm. The width of the trays shall be as per the design shown on drawing.

The cable trays shall be made of steel or Aluminum as specified. The trays/racks shall be completed with end plates, tees, elbows, risers, and all necessary hardware. Steel trays shall be hot dip galvanized. Cable trays shall be erected properly to present a neat and clean appearance. Suitable cleats or saddles made of Aluminum strips with PVC covering shall be used for securing the cables to the cable trays. The cable trays shall comply with the following requirements.

a. The tray shall have suitable strength and rigidity to provide adequate support for all contained cables.
b. It shall not present sharp edges, burrs or projections injurious to the insulation of the wiring/cables.
c. If made of metal, it shall be adequately protected against corrosion or shall be made of corrosion resistant material.
d. It shall have side rails or equivalent structural members.
e. It shall include fittings or other suitable means for changes in direction and elevation of runs.

6.5.2 Installation of cable trays/racks:

a. Cable trays shall be installed as a complete system. Trays shall be supported properly from the building structure. The entire cable tray system shall be rigid.

b. Each run of the cable tray shall be completed before the installation of cables.

c. In portions where additional protection is required, non-combustible enclosures to be used.

d. Cable trays shall be exposed and accessible.

e. Where cables of different system are installed on the same cable tray, non-combustible, solid barriers shall be used for segregating the cables.

f. Cable trays shall be grounded by two nos. earth continuity wires. Cable trays shall not be used as equipment grounding conductors.

7 Cable trenches (excavated):

7.1 The cable trenches shall be excavated 60 cms below the finished ground level and shall have a minimum width of 300 mm for laying of single cable. When more than one cable are laid in the same trench, the width of the trench shall be increased such that the spacing between the cables is 200 mm and the end cables are at minimum 100 mm from the side of the trench. At the turning of the cable route the trench shall be dug with radius equal to 15 times the cable diameter.

7.2 The trenches shall be cut square with vertical sidewalls and with uniform depth. Suitable shoring and propping may be done to avoid caving in of trench walls. The floor of the trench shall be rammed and leveled. The bottom of the cable trench shall be prepared with 100 mm sand bed for laying the cables.

7.3 The cables shall be laid in trenches over the rollers. After the cable is laid and straightened it shall be covered with sand, and bricks shall be placed on top and at the side of the cable.

7.4 Wherever specified, half round RCC pipes shall be placed above the cables.

7.5 The cable trench then shall be refilled with excavated materials after removing the stones and other sharp materials and the refilled materials shall be compacted with light ramming.

7.6 Approved Cable markers made of Aluminum or CI with 15 cms crown shall be provided along the route of cables at a spacing of 25 - 30 meters and also at both ends of crossings or at the cable turning point. The class, type, No. of cables shall be indicated on markers.

7.7 Cable shall be laid in Hume pipes at all road crossings and in GI pipes at the wall entries or at the crossing of the drains/gutters.

8. Cable jointing:

8.1 The straight joint in cable shall be avoided as far as possible by correctly apportioning the cable lengths. If unavoidable following precautions shall be taken while jointing.

8.2 Cable jointing shall be done as per the recommendations of the cable manufacturer. Jointing shall be done by qualified cable jointer. The location of the cable joint shall not be where the cable takes a bend also where the soil is loose and shows signs of subsidence.

8.3 Cable jointing boxes shall be of appropriate size suitable for PVC insulated cables of particular voltage ratings and shall be of approved make.

8.4 Jointing of cables in the joint boxes and the filling of the compound shall be done in accordance with the manufacturer instructions and in an approved manner. All straight or T joints shall be done in epoxy mould boxes. All terminal leads of conductors shall be heavily soldered up to at least 50 mm length.

8.5 All cables shall be joined colour-to-colour and tested for insulation resistance and continuity before commencing the jointing. The seals of cables shall not be removed until preparations for jointing are completed. Joints shall be finished on the same day, as commenced and sufficient protection from the weather shall be arranged.

8.6 Joints shall be made by means of suitable solder for conductor, the conductors being firmly bolted into the connections or ferrule and the whole end soldered with proper solder and flux or resin. Conductors shall be properly insulated with high voltage insulating tape and by using separators of approved size and pattern. The joints shall be completely filled with epoxy compound (with necessary tapping) to ensure proper filling of the box.

8.7 Epoxy compound shall be prepared as per manufacturer instructions. Oil, water or any other liquid shall not be added to the mixture and which shall be used within 30 minutes of mixing. The surface on which epoxy is to be used shall be free from dust, rust, oil, grease and shall be dry. Joint shall not be moved or disturbed until the epoxy has completely hardened.

9 Cable Termination. :

9.1 All cable terminations for conductors' upto 4 sq.mm may be insertion type and all higher sizes shall have tinned copper compression lugs.

9.2 Cable termination shall be done in cable end box or in terminal box or in pillars etc. The end terminations shall be insulated with a minimum of six half lapped layers of PVC tape.

9.3 Cable terminations are to be made with flange type brass cable glands so as to grip inner and outer PVC sheaths and also the cable amour. Cable gland shall be bonded to earth.

9.4 The cable conductor ends are to be connected by crimping tinned heavy-duty copper lugs. Hydraulic crimping tool shall be used.

9.5 Every connection at a cable termination shall be mechanically and electrically sound and protected against mechanical damage and any vibration liable to occur shall not impose any harmful mechanical damage to the cable conductor.

10 Testing of cable before laying and commissioning:

All tests shall be carried out in accordance with relevant IS codes of practice, IE rules and specifications.

10.1 100% cable drums shall be checked for continuity and cross continuity tests to ensure that there is no internal damage to the cable during transportation.

10.2 Prior to burying of cables, insulation resistance shall be measured with 500 V megger between the cores and all the cores to earth (amour) and results shall be recorded.

10.3 On completion of cable laying work, all the tests such as insulation resistance test, continuity test, sheathing continuity test, earth test etc. shall be conducted in the presence of the Employer.

10.4 After the cables are installed, before commissioning it shall be tested for high DC voltage test. The recommended volts and duration of the test between each core and metallic amour (earth) at 3 KV DC is for 5 minutes. During high voltage test all electrical equipments related to the cable installation must be earthed and adequate clearance shall be maintained from the other equipments and from work to prevent flash over.

SECTION – II

Specifications for Earthing and Lightning Protection

1 Scope:

This specification covers supply of necessary materials, and erection at site, of complete earthling system including earth pits at the locations indicated, earth conductors from earth pit to the respective equipments, switchgears, pillars etc. and making connections, testing at site, commissioning and handing over.

2 Applicable standards:

The entire work of earthing system, shall confirm to IS 3043, Indian Electricity Act and Rules and relevant regulations. The work of Lightning protection shall conform to IS 2309.

3 General requirements:

3.1 The earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules 1956 as amended from time to time and relevant regulations. Following IE rules are particularly applicable. IE Rule Nos. 32, 51, 61, 62, 67, 69, 88(2) & 90.

3.2 All earth connections shall be carefully made, visible for inspection, and the testing of individual earth electrode shall be possible.

3.3 All materials, fittings etc. used in earthing shall conform to IS specifications and in the absence of which the approval of competent authority shall be obtained.

3.4 The earthing electrode shall be at a minimum distance of 2 metres away from the outer face of the building wall. A minimum clearance of twice the depth of the electrode shall be maintained between two earthing stations.

3.5 A brick masonry chamber to facilitate easy identification and for carrying out periodical tests and inspection shall be constructed on top of the earth pit.

3.6 All metal conduits, trunkings, cable sheaths, HT and MV switchgears, Transformers, distribution boards, meters, light fixtures, fans, and all other metal parts forming part of the work shall be bonded together and connected to earthing network as specified.

3.7 Earthing system shall be mechanically robust and the joints shall be capable of retaining low resistance even after passage of fault currents.

3.8 Joints shall be soldered, tinned and double riveted. All the joints shall be mechanically, electrically continuous and effective. Joints shall be provided against corrosion.

4 Earth Electrodes:

4.1 The materials of earth electrode and earth conductors shall be galvanised iron unless specified otherwise in Bill of Quantities, specifications or drawings.

4.2 The earth electrodes shall be free from paint, enamel, grease etc.

4.3 The earth electrode shall be embedded as far as practicable in a moist soil and below permanent moist level.

4.4 The earth electrode shall not be installed in the proximity of a metal fence.

5 Types of earth electrodes:

The earth electrodes shall be either a pipe electrode or plate electrode, the details of which are as given in the following sections of specifications, drawings and BOQ.

6 Pipe electrode:

6.1 Pipe electrode shall consist of 2.5 meter long single piece G.I. pipe of min. 40 mm dia. as specified and shall be cut tapered at the bottom. 12 mm dia. holes shall be drilled with 75 mm spacing between the holes and in a staggered manner as indicated in IS 3043.

6.2 The electrode shall be buried vertically in a specially prepared earth pit of size 35 cm x 35 cm and the earth pit shall be filled with alternate layers of charcoal, salt and fine washed sand for a minimum thickness of 150 mm. A funnel with wire mesh inside shall be fixed to the top of the GI pipe for watering purpose.

6.3 The earth conductor of 25 x 3 mm GI strip shall be connected to the electrode just below the funnel with proper terminal lugs and check nuts and the other end of earth conductor shall be connected to the equipotential bus of the equipments.

6.4 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of the masonry shall be constructed on top of the GI pipe to house the funnel and the earth connection. The approximate size of the chamber shall be 300 mm x 300 mm and 300 mm deep.

6.5. The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.

6.6 The top of the masonry chamber shall be 50 mm above the finished ground level.

7 Plate Electrode:

7.1 The plate electrode shall consist of either copper plate of size 60cm x 60 cm x 3.15 mm or GI plate of size 60 cm x 60 cm x 6.3 mm, and as specified in the BOQ or drawings.

7.2 The electrode shall be buried vertically in a specially prepared earth pit, which shall be dug up to required depth, from the ground level. The earth plate shall be placed in the earth pit with its face vertical and embedded in the alternate layers of coal and salt for a minimum thickness of 15 cms.

7.3 The earth conductor shall of same material as of the earth electrode. For copper earth electrode copper strips shall be provided as conductor and for GI earth electrode GI strips shall be used as earth conductor. The size and material of the earth conductor shall be as specified separately in the Bill of Quantities or drawings. The earth conductors shall be connected to the earth electrode (plate) with G.I. nut bolts, check nuts and washers and welded at the edges and shall be brought up in the masonry chamber at the ground level.

7.4 The earth conductor shall be extended via the earth link provided in the masonry chamber. This link shall be connected to earth conductors from the earth plate and earth conductor going to equipments with two Nos. of nut bolts, check nuts and washers (all of GI) to make secured connections. This link can be removed for testing the earthing.

7.5 A 20 mm dia. G.I. pipe shall be provided from the masonry chamber to the top of the earth plate for watering purpose. The G.I. pipe shall be provided with a funnel at the top with wire mesh inside.

7.6 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of masonry shall be constructed on top of GI pipe to house the funnel & the earth connection. The approx. size of the chamber shall be 300mmx300mmx300mm deep.

7.7 The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.

7.8 The top of the masonry chamber shall be 50 mm above the finished ground level.

8 Earth conductor:

All earthing conductors shall be of high conductivity copper and or GI as specified and shall be protected against mechanical injury or corrosion. The connection of earth continuity conductors of earth bus and earth electrodes shall be strong and sound and shall be rigidly fixed to the walls, cable trenches, cable trays or conduits and cables by using suitable clamps made of non ferrous metals.

8.1 The cross-sectional area of earthing conductor shall not be smaller than half that of the largest current carrying conductor, subject to the minimum size being not less than 1.5 sq.mm for copper and 2.5 sq.mm for Aluminium conductors and the upper limit being 70 sq.mm for copper and 120 sq.mm for Aluminium. The size of the galvanised iron earth continuity conductors may be equal to the size of the current carrying conductors with which they are to be used.

8.2 As a guideline the following sizes of earth continuity conductors shall be used for earthing installation

8.2.1 Size of earth conductors for lighting and power circuits.

Cross sectional area of current carrying Cu conductor	cross sectional area of earth continuity Cu conductor
Size in sq.mm	Size in Sq.mm
1.5	1.5
2.5	1.5
4.0	2.5
6.0	4.0

8.2.2 Size of earth conductors from main switchboard to sub main switches or distribution boards.

Cross sectional area of current carrying conductor Copper/Alum.	Cross sectional area of earth continuity conductor Copper/Alum.
Size in sq.mm	Size in sq.mm
4	2.5
6	4
10	6
16	10
25	16
35	16
50	25
70	35
95	50
120	70

8.2.2 The size of an earth continuity conductor contained in a flexible cable or flexible cord shall be equal to that of the current carrying conductor.

9 Earth connection:

9.1 All metal clad switches and other equipment carrying single-phase current shall be connected to earth by a single connection. All metal clad switches carrying three-phase medium voltage and high voltage shall be connected with earth by two separate and distinct connections.

9.2 The earthing conductors inside the building, wherever exposed shall be properly protected from mechanical injury by running the same in G.I. pipe of adequate size. Earthing conductors outside the building shall be laid 600 mm below the finished ground level.

9.3 The over lapping of strips at joints where required shall be minimum 75 mm. The joints shall be revetted in an approved manner. Lugs of adequate capacity and size shall be used for all termination of wires above 6 sq.mm size and bare copper wire above 2.5 mm dia. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substance and properly tinned.

10 Connection of earthing conductor:

The earthing conductors are broadly divided in the following categories:

10.1 Main earthing conductor shall be taken from the earth electrode to the earth bus/connection at the main switchboard.

10.2 Sub-main earthing conductor shall run from the main switchboard to the sub-distribution boards.

10.3 Final earthing conductor shall run from the sub distribution boards to the final distribution boards.

10.4 Circuit earthing conductor shall run from the final distribution board to the exposed metal of the equipment to be earthed. This may run directly from final distribution boards or through earth leakage circuit breaker.

10.5 Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate or at the commencement of the run by an earthing conductor.

10.6 Earthing conductor enclosed with the current carrying conductors within the flexible cord shall be used only in case of equipments connected by flexible cord.

10.7 Lighting fittings, switches and accessories shall also be provided with an earthing conductor even though they may be rigidly secured / fixed with metallic conduit.

10.8 The electrical resistance of earthing conductors shall be low enough to permit passage of fault current necessary to operate a fuse, protective device or a circuit breaker.

11 **Prohibited Connection**:

Use of following as earth conductor is not recommended, and strictly prohibited for earthing an installation or even as a link in an earthing system. Neutral conductor, sprinkler pipes or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures or amour of cables and conductors, metallic conduits and lightning protection system conductors are all prohibited to be used as earth conductor.

12 **Earth Resistance:**

The earth resistivity of the soil where the earthing stations are located shall be submitted to the Architect before the earthing work starts and the approval shall be taken. If the earth resistance is too high and multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

13 **Testing:**

On completion of the entire installation, the earthing network shall be tested for their resistance to earth in accordance with IS 3043. The contractor shall provide all meters, instruments & labour required for the test. The test results shall be submitted in triplicate to the Employer for approval. The following tests shall be conducted.

a. Earth resistance of electrodes
b. Impedance of earth continuity conductors.
c. Effectiveness of earthing.

14 **Lightning Protection:**

Lightning protection network shall be provided for the specified buildings and locations for protection against lightning strikes. The network shall essentially consist of Air-termination units, down conductors, roof conductors, test terminals and earth electrodes etc. The entire system shall conform to IS requirements.

14.1 **Air-terminations**:

a) An air-termination shall consist of a 1200 mm long, 25 mm dia 14 SWG Cu tube with 100 mm dia Cu sphere fixed at the top of the tube. The Cu sphere shall be fixed with 5 nos. 125 mm long and 12.5 mm dia threaded Cu spikes.

b) The complete assembly shall be fixed at a highest possible location and shall project at least 1500 mm above the network on which it is fixed.

c) All air termination shall be effectively secured against overturning by means of rod brackets and additional supports as required, which shall be permanently and rightly attached to the building. The method and nature of fixing should be simple, solid and permanent.

14.2 Down Conductors and Roof Conductors:

a) GI strip of specified size shall be used as down / roof conductors and the conductors shall be without sharp bends, upturns and kinks.

b) As far as possible, the joints shall be avoided in down/roof conductors. In down conductor below ground level there shall be no joint. However in a total system where joints are unavoidable, the jointing shall be with approved method only. The joints shall be mechanically and electrically effective. The joints may be clamped, screwed, bolted, but preferably welded. The length of overlap at the joints shall not be less than 200 mm. Contact surface at joint shall be cleaned and then inhibited from oxidation with suitable non corrosive compound.

c) The conductors shall be adequately protected against mechanical damage but for which metal pipes shall not be used.

14.3 Test Links and Testing:

Each down conductor will be provided with a testing point in a position convenient for testing but inaccessible for interference. No connection other than one direct to an earth electrode shall be made below a testing point. Testing points shall be with Copper. The ohmic resistance of the lightning protective system with air termination but without earth connection shall be measured and should be a fraction of an ohm. Earth resistance shall be measured in accordance with IS: 3043.

14.4 Earth Terminations and Electrodes:

Each down conductor shall have an independent earth termination. It should be capable of isolation for testing purposes. Earth electrodes shall be constructed and installed in accordance with IS: 3043.

SECTION – III

Specifications for MCB DB, MCB and RCCB

1 Miniature Circuit Breaker Distribution boards:

1.1 Miniature circuit breaker distribution boards shall conform to IS 2675, IS 8623 and shall be suitable for operation on three phase, 4 wire, 415 V, 50 Hz, AC supply or single phase, 2 wire, 230 V, 50 Hz, AC supply.

1.2 The MCB distribution board shall be in sheet steel enclosures with removable type cover with additional door for protecting accidental operation.

1.3 Enclosure and door shall be made out of 16 SWG CRCA sheet steel and powder coated and of approved shade. The interior shall be off white finish. The DB shall be totally enclosed with dust and vermin proof construction and shall be of double door type. The DB boxes shall be as supplied by the original manufacturer.

1.4 Where distribution boards are specified to be complete with an isolator as incomer, the isolator shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.

1.5 Where distribution boards are specified to be complete with MCB + ELCB as incomer, the MCB + ELCB shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.

1.6 Bus bars shall be tinned copper. The internal connections in the DB shall be by using stranded copper conductor, PVC insulated wire with copper lugs crimped at both ends. Neutral busbar and earth busbars shall also be provided in the enclosure. Neutral busbar shall have equal rating of phase busbars.

1.7 Distribution boards shall be provided with circuit identification by means of directory on the front cover. Upon completion of the works, the contractor shall provide and fix accurate framed circuit lists for all distribution boards. These shall consist of perspex envelopes, fixed securely by an approved method on the inside face of each distribution board front cover into which shall be inserted a neatly typed list of circuits, indicating the number of circuits, phase, cable, size, number of points connected, circuit rating and the loading. The contractor, shall also provide and fix by means of brass screws tapped into the D.B. cover, labels, with black letter on a white background for all distribution boards, MCB + ELCB, Isolators etc. The engraving on the labels and the inscription on the circuit lists shall be approved by the Employer before the work is carried out.

1.8 All incoming terminals shall be fully shrouded.

1.9 The conduit entry plates shall be removable type and shall be provided at top and bottom. All the conduits shall be properly terminated using glands, grips, checknuts, female adapters with bush etc.

1.10 Wiring shall be terminated properly using crimping type copper lugs/sockets. Identification ferrules shall be provided on all wires. Each circuit shall have an independent neutral.

1.11 Two No. Earth terminals shall be provided on each Distribution Board.

1.12 Distribution boards shall be installed surface mounted or recessed mounted as specified and erected at the locations shown.

Surface mounted DB shall be mounted on a suitable size frame made out of GI ZED section. The hole fasts of the frame shall be grouted in the wall with cement mortar and the frame shall be painted with two coats of red oxide and two coats of enamel paint of approved shade. The DB shall be mounted on this frame with proper size nut bolts.

Recessed mounted DB shall be erected in the chase/cut portion of the wall. The cutting of the walls shall be done while constructing the wall and shall be of adequate size to comfortably accommodate the DB. The cut portion shall be smoothened and made plain and shall be fine finished. The DB shall be fixed in this chased portion with suitable clamps and bolts. The top cover of the DB cabinet shall be projecting out of the wall surface and free from any obstruction so as to open the same smoothly.

2 Miniature Circuit Breakers:

2.1 MCB's shall be manufactured in accordance with IS 8828 having a short circuit breaking capacity category 10 kA at both 240 volts 50 Hz. and 240/415 V, 50 Hz and complying with the test requirements for both reference calibration temperatures of 20 degree C and 40 degree C.

2.2 All miniature circuit breakers shall be rated to withstand the fault currents of the circuits they protect without causing any interference in any other protective device associated with the distribution system. At the same time the design of the circuit breakers shall be such that, it will protect the circuit for which it is intended and not cause or allow other protective devices to operate when fault conditions apply.

2.3 Miniature circuit breakers shall be capable of carrying its full rated current continuously without tripping out.

2.4 All the miniature circuit breakers shall be fitted with a magnetic undelayed tripping mechanism. These shall have overload and short circuit elements.

2.5 Time current characteristic of the MCB shall match with that of HRC fuses..

3 Residual current operated circuit breakers (RCCB)

3.1 RCCB's shall be manufactured in accordance with IS 12640 and IS 8828 having a short circuit breaking and earth fault protection up to 9 KA at both 240 Volts 50 Hz and 240/415 V, 50 Hz and complying with the test requirements as per IS 2640.

3.2 RCCB shall be designed to interrupt the circuit during an earth fault, overload or short circuit. All RCCB shall be high sensitive and calibrated to trip the power supply when the residual current is more than 50 % of its calibrated rating. This means that a 30 mA sensitivity RCCB should trip when the residual current is in the range of 15 to 30 mA and a 300 mA RCCB should trip when the residual current is in the range of 150 to 300 mA.

3.3 The RCCB's shall be truly current operated, which means that it shall be totally independent of the main voltage for tripping. RCCB must operate for nominal voltage well below the maximum safe value of 10 volts. RCCB shall interrupt the circuit within 30 milisec at a leakage current of 30 mA.

3.4 RCCB shall be provided with a neutral advance mechanism. RCCB shall be functioning even in the event of failure of neutral and/or any one or two of phase supply conductor. RCCB shall be provided with trip free mechanism ensuring that the device cannot be reclosed / reset if the fault persists. RCCB shall be functioning even in the case of interchange of load and supply side connections.

3.5 Test button shall be provided to check he correct operation of the unit.

3.6 RCCB shall be designed for a very long life of a minimum of 20,000 operations and shall be capable of withstanding inrush current of 4 to 8 times the rated current. For the proper functioning the RCCB should not require any connection of earthing on the device.

3.7 The device should have high tripping accuracy of less than 5% of rated tripping current. The RCCB shall be provided with clear indication to show whether the tripping is due to current leakage or overload/short circuit.

3.8 The MCB section of RCCB shall be provided with arc chambers and vents are also to be provided to release the arcing products in the atmosphere, so as to increase contact lift and to prevent damage to the insulation. The self-extinguishing thermoset plastic material shall be used for body and shall have a modular construction. The device should be vibration proof.

4 **Moulded Case Circuit Breakers (MCCB)**

MCCB's used shall be suitable for 440 V, AC, 50 Hz supply and shall be capable of withstanding electrical and mechanical stress due to short circuit capacity as specified for individual requirement. The MCCB shall be compact in size, dust and vermin proof with quick make and break operating mechanism. The construction shall be such as to ensure maintenance and current setting adjustment without removing the MCCB from the panel. The MCCB shall be suitable for interlock with panel door on which it is mounted.

SECTION - IV

Specifications for Medium Voltage Distribution Panel Boards

1 **Scope:**

This section shall cover supply, assembly, installation, connection, testing and commissioning of medium voltage distribution panel boards as described in this specifications, drawings and schedule of quantities.

2 **System:**

All the medium voltage distribution panel boards shall be suitable for operation on three phase, 4 wire or single phase, 2 wire with normal system voltage of 415/240 volts, 50 Hz, A.C. supply with solidly grounded neutral system.

3 **Weather condition at site:**

The panel boards shall be suitable for continuous operation and designed to withstand heaviest conditions at site.

a) Temperature range: 40 to 45 ^{0} C

b) Relative humidity: 50 to 80 %

c) Weather: Dusty

4 **Applicable IS Standards:**

The panel boards to be supplied under this specification shall confirm to latest editions of relevant Indian Standards and Indian Electricity rules and regulations. The following Indian Standards shall be complied with.

IS 4237: General requirements for switch gear and control gear for voltage not exceeding 1000 V.

IS 2208: HRC cartridge fuse links upto 610 V.

IS 2705: Current transformers

IS 1248: Electrical Indicating Instruments.

IS 375: Switch gear bus-bars, main connection and auxiliary wiring, marking and arrangement for.

IS 2147: Degree of protection provided by enclosures for low voltage switchgear and control gear.

IS 2675: Enclosed distribution fuse boards and cutouts.

IS 2557: Danger notice plates.

IS 1567/4047: Specifications for switch fuse units.

IS 3072 (I): Installation and maintenance of switchgears.

TECHNICAL CONDITIONS ELECTRICAL

5 General:

5.1 Shop drawing:

Prior to fabrication of the panel boards, the contractor shall submit for the approval of the Employer, the shop / vendor drawing and design calculations indicating type, size, short circuit rating of all the electrical components used, busbar size, internal wiring size, panel board dimension, colour, mounting detail etc. The contractor shall submit manufacturer's catalogues of the electrical components installed in the panel boards.

5.2 Inspection:

At all reasonable times during production and prior to transport of the panel boards to site, the contractor shall arrange and provide all the facilities at manufacturer's plant for inspection and testing and any stage inspection agreed upon.

5.3 Test certificates:

Testing of panel boards shall be carried out at factory or at site as specified in Indian Standards in the presence of Employer. The test results shall be recorded on prescribed forms. The test certificates for the test carried out at factory or at site shall be submitted in duplicate to the Employer for approval.

6 Cubical type Panel boards:

6.1 Construction:

6.1.1 Structure

The panel board shall be metal enclosed sheet cubical, compartmentalised suitable for indoor or outdoor installation having dead front, floor mounting type. All M.S. sheets used in the construction of panel boards shall be 16 SWG (1.6 mm) thick unless specified otherwise in the item and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam welded, all welding slag ground off and welding pits wiped smooth with plumber metal.

The panel boards shall be totally enclosed, completely dust and vermin proof. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. All doors and covers shall be lockable and fully gasketed with foam rubber or neoprene rubber strips. All panels and covers shall be properly fitted and secured with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with bolt and nuts. Self-threading screws shall not be used in the construction of panel boards. Suitable base channels (min size 75 mm x 75 mm x 5 mm thick) shall be provided at the bottom. A Clearance of 300 mm between the floor of the panel board and the bottom of the lower most units shall be provision Panel boards, if necessary shall be preferably arranged in multitier formation. The panel boards shall be of adequate size with a provision of spare space (as jointly decided with the Employer to accommodate possible future additional switchgear. The size of the panel boards shall be designed in such a way that the internal space is sufficient for hot air movement, and the electrical component does not attain temperature more than 40 degree Celsius. Opening for natural ventilation shall be provided and shall have screens or grills made of brass or stainless steel wire mesh.

The panel boards shall be provided with removable sheet steel plates at top and bottom with knockout holes of appropriate size and number in conformity with the number, and size of incoming and outgoing conduits /cables.

The panel boards shall be designed to ensure maximum safety during operation, inspection, connection of cables, maintenance and repairs etc. with busbar system energised. Means shall be provided to prevent shorting of power and /or control terminals due to accidental drop of maintenance tools etc. inside the panel board. Partitions between feeder compartments, busbar chamber, cable alleys, vertical panels etc. shall be provided to take care of this aspect. The panel boards shall be sufficiently rigid to support the equipment without distortion under normal and short circuit condition; they shall be suitably braced for short circuit duty.

For buses and cables, access shall be limited from front and top only. All other equipment shall be mounted on the front side, (unless specified otherwise for any specific panel) and shall be accessible from the front. All joints and connections shall be made by cadmium plated high tensile steel bolts, nuts and washers secured against loosening.

It shall be possible to insert any new cable and to connect all load side wiring with the busbar energized, without any special precautions. Opening of the busbar chamber shall be possible with special tools only.

6.1.2 **Protection clause:**

All the outdoor panel boards shall have protection clause of IP 55. The complete board shall be double jacketed with insulation material to withstand outdoor temperature. All the indoor panel boards shall have protection clause IP 52.

6.1.3 **Powder coating**:

All sheet steel work shall undergo a seven tank process of degreasing pickling in acid, cold rinsing, phosphatising, passivating and then treated with powder coating treatment. The finishing shall be of shade as approved by the Employer. The interior surface shall have similar finish.

6.1.4 **Circuit compartments:**

Each switch fuse units and meters shall be housed in a separate compartment and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly inter locked with the breaker/switch fuse units in "ON" and "OFF" position. However it shall be possible to bypass this interlock for inspection purpose.

6.1.5 **Instrument compartment:**

Separate and adequate compartment shall be provided for accommodating instruments, indicating lamps, control contactors /relays, and control fuses etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker/switch fuse units busbar and connections.

6.1.6 **Busbars and wiring**:

The busbars shall be of three-phase four wire system with separate neutral and earth bar. The busbar and interconnection between busbars and various components shall be with high conductivity, hard drawn, electrolytic copper strips.

The busbar shall be of rectangular cross section designed to withstand full load current for phase busbars and full rated current for neutral busbars and shall be extensible on either side. The busbar shall have uniform cross-section through out the length. The rating of the busbars shall be as specified in BOQ and/or drawings.

The busbars and interconnections shall be insulated with color coded insulation tapes/covers. The busbars shall be supported on unbreakable, non-hygroscopic insulated supports at sufficiently close intervals to prevent sagging and shall effectively withstand electromagnetic stresses in the event of short circuit. The busbars shall be housed in a separate compartment. The busbar shall be isolated with 3 mm thick hylum sheet to avoid any accidental contact. All busbars connection shall be done by drilling holes in busbars & connecting by chromium plated brass bolt and nuts. Additional cross section of bus bars shall be provided in all distribution

boards to cover up the holes drilled in the busbars. Spring and flat washers shall be used for tightening the bolts. All interconnections between busbars and circuit breakers/switches and between circuit breakers/switches and cable terminals shall be through solid copper strips of proper size to carry full rated current. These strips shall be insulated with insulating tapes/covers.

All interconnections in the panel shall be with Cu busbars for switchgears of ratings 63 A and above. For switch gears below 63 A, flameproof Cu wires to be used with lugs crimped at both ends.

All busbars shall be tinned copper strips of the given cross section. Unless otherwise specified all bus bars are to be designed taking maximum current density of 800 Amp per sq inch.

All busbars are to be covered with heat shrinkable PVC sleeves of red, yellow, blue and black colours to indicate various phases and neutral bar clearly.

6.1.7 Terminals:

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the terminal blocks. No direct connection of incoming or outgoing cables to internal components of the panel board is permitted. Only one conductor may be connected in one terminal. Adequate no of spare terminals of required size shall be left in each compartment.

6.1.8 Wire ways:

A horizontal wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

6.1.9 Cable compartments:

Cable compartments of adequate size shall be provided for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate proper supports shall be provided in the cable compartments to support cables. All outgoing and incoming feeder terminals shall be brought out to terminal blocks in the cable compartment.

6.1.10 Earthing:

Tinned copper earth bars of suitable size shall be provided for the entire length of the panel. Provision shall be made for connection from this horizontal earth bar to the earth pit on both side of panel board. The earth continuity conductor of each incoming and outgoing feeder shall be connected to the vertical earth bar.

All non-current carrying parts and the framework of panel board shall be connected to this earth bar. All doors and movable parts shall be connected to earth bus with flexible copper connections.

Armour of the cable shall be properly connected with earthing clamp, and the clamp shall be bonded with the earth bar.

6.1.11 Name plate, labels and directory:

A nameplate with switchgear designation shall be fixed at the top of the panel board. A separate nameplate giving feeder details shall be provided for each panel.

Engraved nameplates shall be of 3-ply (red-white-red or black-white-black) lamicoid sheets. Size of the letters shall be 5 mm. Nameplates shall be fastened by screws and not by adhesive. Size of letter for Main nameplate shall not be less than 20 mm.

Engraved PVC labels shall be provided on all incoming and outgoing feeders. Single line circuit diagram showing the arrangements of circuit inside the panel board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet. PVC labels shall be provided for spare circuits also.

Panel boards shall be provided with a directory indicating the area or loads served by each circuit breaker, the rating of breakers, size of conductors, etc. The directory shall be mounted in metal holder with a clear plastic sheet on inside surface of the front door.

6.1.12 Danger notice plates:

Danger notice plates with symbol as per IS shall be provided on panel boards.

6.1.13 Fuse puller etc:

One set of fuse puller (for various amps of fuses), panel keys and special tools etc. shall be supplied with each panel board.

6.1.14 Internal components:

The panel boards shall be equipped complete with all type of required number of circuit breakers, switch fuse units, contactors, relays, fuses, meters, instruments, indicating lamps, push buttons, equipment, fittings, busbars, cable boxes, cable glands etc., and all the necessary internal connections/wiring as required and as indicated on relevant drawings.

Components necessary for proper complete functioning of the panel boards, but not indicated on the drawings and specifications shall be supplied and installed.

All part of the panel board carrying current including the components, connections, joints and instruments shall be capable of carrying their specified rated current continuously, without

temperature rise exceeding the acceptable values of the relevant specifications at any part of the panel boards.

The derating of the different items resulting from the prevailing conditions like room temperature shall be allowed for while selecting the components.

All units of the same rating and specifications shall be fully interchangeable.

1. **Switches:**

Switches shall be air break type as per IS 4047. The switch operating handle shall be front mounted and interlocked with the door when the switch is in ON position. The live parts shall be shrouded with suitable insulating barrier so as to prevent accidental contact with the live parts after opening the cubicle front door.

2. **Fuses:**

All power and control fuses shall be link type. Screw type fuses are not acceptable. All fuse links shall be HRC type and shall generally conform to IS 2208. Rewirable fuses are not acceptable. All fuses shall be readily accessible for replacement. It shall not be necessary to remove any piece of equipment or to disconnect wiring before replacing fuses using fuse puller.

3. **Control switches:**

Ammeter selector switches shall have make before break feature on its contacts. The selector switches shall generally have four positions for reading three phase currents and neutral. The voltmeter selector switch shall also have four positions and the fourth shall be OFF position. Remote trip /off selector switch shall be lockable in OFF position.

4. **Indicating lamps:**

The indicating lamps shall be LED type.

5. **Measuring and Indicating instruments:**

All measuring and indicating instruments shall be Digital type, in square pattern moving from 90 deg. scale, 96mm x 96mm, flush mounting type. Instrument shall be of accuracy clause 1 as per IS 1248. Ammeters for motor and other feeders shall be graduated for full load current of motor with a compressed scale at the end for at least 6 times full load current. The KW meter and PF meter shall be suitable to measure unbalanced loads on 3-phase 4 wire system. PF meter shall be in 0.5 - 1 - 0.5 range. CT's shall be resin cast, with class 1 accuracy and 15 VA burden. The energy meters shall be CT operated electrolytic type.

6. **Push buttons:**

Push buttons shall be suitable for panel mounting type and comprise of a contact element and an actuator. The contacts shall be of silver alloy and of 10 A continuous current rating. Each push button shall be provided with 1 NO + 1 NC contacts, but if required 2 NO + 2 NC contacts be provided. Colour of the knob shall be as per IS.

7. **Packing and transport:**

The bigger size panel boards shall be shipped to site in wooden crates. They shall be wrapped with polythene sheets before being placed in crates to prevent damage to the finish. Crates shall have skid bottoms for handling. All panels shall have one set of two silica gel bags, which shall be checked periodically both while in storage and while in service. The smaller size panel boards shall be transported to site with polythene sheets wrapped all along and wooden frame to cover the same.

8 **Storage at site:**

The panels shall be stored in a well ventilated, dry place and suitable polythene covers shall be provided for necessary protection against moisture.

9 **Installation:**

The panel boards shall be installed at the location as indicated in the drawings. The contractor shall submit for approval a shop drawing indicating room size, panel size and method of installation prior to installation.

The cubicle type panel board shall be installed on suitable foundation. Foundation shall be as per the dimensions supplied by the panel manufacturer. The foundation shall be flat and level. Suitable grouting holes shall be provided in the foundation. Suitable MS base channel shall be embedded in foundation on which the panel can be directly installed. If the panel is provided with an angle iron pedestal or base plate the same shall be grouted firmly in the floor. The panel boards shall be properly aligned and erected in plumb and bolted to the foundation by bolt parallel to the walls.

After installation of the panel boards, various components of the boards shall be checked and be put in working order. The cables laid through cable trench or on cable trays/racks etc. shall be terminated on the bottom plate or top plate as the case may be, by using siemens type brass compression glands. The individual cables shall then be led through the panels to the required feeder compartments for necessary terminations. The cables shall be clamped to the supporting arrangement. The switchboard earth bus shall be connected to the local earth grid. Connection of cables shall be by crimping type Cu lugs using hand operated or hydraulic crimping tool as per cable sizes.

10 **Testing:**

1) Testing at factory:

Panel boards shall be inspected at factory at pre-assembly stage and any modifications or changes as suggested shall be incorporated. The panel boards shall be again inspected and tested at the factory after assembly of all components and completion of all inter-connections and wiring. The tests shall include all routine and type tests as per relevant ISS.

2) **Testing and pre-commissioning checks at site:**

Panels shall be commissioned only after the successful completion of the following tests. The tests shall be carried out in the presence of the Employer.

2.1 Precommissioning checks:

1) Check all panels are aligned in line and properly erected in plumb.
2) All withdrawals portions shall be capable of smooth extraction and isolation.
3) All main and auxiliary bus bar connections shall be checked and tightened.
4) All wiring terminations and bus bar joints shall be checked and tightened.
5) Wiring shall be checked to ensure that it is according to the drawing.
6) Before fitting the covers, all chambers, compartments, cable alleys etc. shall be checked for complete cleanliness and removal of foreign matter if any, particularly the tools used for erection, cut pieces of cable armour etc. Covers shall be properly fixed with all fixing screws in places.
7) All mechanical interlocks shall be checked and all fuses and links shall be inserted.
8) Earthing connections shall be checked.
9) Operational checks on all circuit breakers or switchgear shall be carried out, both mechanically and electrically to check that correct indications are provided for closed and open positions.
10) The panels shall be checked to ensure that moisture ingress has not taken place during transit and storage.

2.2 Testing at site:

1) Insulation of the main circuit, that is, the insulation resistance of each pole to the earth and that between the poles shall be measured.
2) All wiring shall be tested for insulation resistance by a 1000 volts megger.
3) All relays and protective devices shall be tested for correctness of settings and operation by introducing a current generator and an ammeter in the circuit.
4) Insulation test shall be carried out both before and after high voltage test.

5) A high voltage test with 2.5 KV for one minute shall be applied between the poles and earth. Test shall be carried out on each pole in turn with the remaining poles earthed, all units racked in position and the breakers closed. Original test certificate shall be submitted along with panel.

POINTS TO BE TAKEN CARE AT ELECTRICAL INSTALLATION, FIRE ALARM, DATA CABLING & PUBLIC ADDRESS SYSTEM WORKS : -

1. The quantities indicated in the schedule of quantities are only provisional and payment will be made only as per actual as ascertained by joint measurements.

2. Single pole flush type accessories are to be provided for light, fan 6 Amps pin socket and 15A 6 pin socket points and the same is mentioned in the schedule also. For the light and fan points, provision of 3 way plated rose / pattern holder (straight or slant) is included in the specification on the wiring.

3. Earthing from D.B. to switch Board and from thereon to the 5 Amps and 15 Amps pin socket points is to be extended and the same is mentioned the schedule. For light and fan points also earthing has to be extended a indicated in the Schedule and nothing extra will be paid for this work.

4. During execution of the electrical, Fire , Data, AC works like laying the conduit, AC drain pipe, Cables, Distribution board, point wiring, fire alarm & PA work etc, cutting and chasing of wall /flooring is to done carefully and has to be restricted to the minimum and the rates quoted for the respective items of work should include for patch – filling, plastered and finishing, including painting to match the colour of wall & flooring, if required.

5. Jumper holes for taking the wiring from one room to the other are to be made to the exact requirement and FRLS sleeves of required size are to be provided for crossing the brick work and nothing extra will be paid for this work.

6. It is the responsibility of the contractor to prepare the necessary drawings, test reports, etc., that are to be submitted to the Local Electricity Board.

7. The contractor has to sign the declaration given below, agreeing to execute the service connection works at the standard schedule rates of the Local Electricity Board.

8. If the contractors have to offer any suggestion or if their rates are based on any presumption, not spelt out specifically anywhere in the tender documents they should necessarily make a suitable mention about the same, while forwarding the tender. Any such statement, after submission of the tender, will not be entertained.

9. All necessary electrical layout/fitting fixture layout/Telephone & Data cable network/,Fire Alarm layout etc shall be got approved from LICI before execution of work.

10. As built drawing layout of electrical, telephone, data cabling , Fire Alarm shall be submitted to LICI after execution work

11. Manufactures certificate/Guarantee or Warrantee certificate/ Manual of Electrical installation shall be produced as desired by LICI.

12. For structural cabling work, Fire alarm work & Public address system the experienced agency has to be engaged. Approval of agency to be obtained from LICI before execution of work.

13. All items of works are to be carried out strictly as per I.E.rules1958I.S.732,I.S.3043/1966 or their latest version. In case the tenderer observes any deviation in the provision made in the schedule of works, vis-a-vis provision of the above given publications he is advised to ;bring it out clearly while making his offer.

14. Main switches beyond 63 amps should be provided with H.R.C. fuse units. Rewirable switch fuse units beyond 63 amps will not be accepted.

15. Rates quoted by the tenderer should include for the following works unless stated otherwise:-

i) Installation of switches on slotted angle iron frame work of adequate section. The main panel board is to be installed on the floor with adequate supports from wall at the back to make the entire arrangement adequately sturdy

ii) Connecting the main switch with meter, busbar distribution board with adequate length and section of FRLS insulated leads in MS conduits or flexible conduits as per requirement of site.

iii) Labeling of the switches to indicate clearly the areas or the load being controlled by them.

iv) Connecting the earth wire run along with mains/cables etc. to the earth link by providing a suitable socket etc.

16. All busbars are to be made of tinned copper flats of given section.

17. Unless specified otherwise all busbars are to be designed taking maximum current density as 800 amps. per sq. inch.

18. All busbars are to be covered with PVC sleeves of red, yellow, blue and black colours etc indicate various phases and neutral bar clearly. Alternatively, PVC insulation tape of the aforementioned colours is to be used for identification of phases and neutral as indicated above and required holes are to be drilled and brass bolts and nuts are to be provided for tapping connections as required.

19. All locally fabricated elements of the main panel boards (such as angle iron frame work, busbar chamber, distribution board etc) should be provided with the final coat of battleship grey synthetic enamel paint after erection and all switches, busbars, distribution boards provided to main panel boards are to be labelled.

20. Drawing showing details of installation indicating very clearly the sections of slotted angle iron proposed to be used , the depth to which the members are to be grouted inside the wall, mode of their support at the floor level including grouting inside the floor should be got approved by the contractor before actual execution of work.

21. The drawing showing the arrangement of the main distribution board, floor distribution boards showing the actual dimension of switch gears, busbar chambers, distribution boards etc. should be got approved by the contractor before fabrication.

22. After execution of the work, the contractor has to submit completion reports with drawings of the entire installation showing the manner in which the work has been actually carried out in triplicate to LIC of India. This is in addition to the drawings which the contractor is required to submit with completion report/test reports he has to submit as per the requirement of the local electric supply authority.

23. It is the responsibility of the contractor to attend to the inspection of the installation if carried out by the inspecting authority of the state government as mentioned in TD 1 since the works are to be carried out strictly as per IE rules and relevant Indian Standard specifications, the defects indicated by the above given inspecting authority will have to be rectified by the contractor at no extra cost to LIC of India.

24. It is responsibility of the contractor to obtain electrical service connection to the premises. In case it is observed that the contractor is lacking in efforts to obtain electrical service to the premises the Chief Engineerat his discretion may recover liquidated damages at the rate as mentioned in the respective clause of the general conditions of contract for delay in availability of electrical service and consequent delay in commissioning of the installation.

25. It will be the contractor's responsibility to check the concealed conduit work carried out by the building's contractor within a period of one month of taking over the site and to certify that the concealed conduit work is in order . In case the contractor fails to point out any defect within this period, it will be taken for granted that the concealed conduit work has been found by the contractor in order and no further complaints in this regard will be entertained. After this, all rectification work will have to be carried out by electrical contractor at his cost.

26. Insulated cables are to be laid on the walls, beams, ceilings etc. by providing plugs of well seasoned wood, cemented into the walls to within 6.5 mm of the surface. Within the electrical shaft, the cables are to be run on MS clamps made out of angle, channel or flat section of required thickness grouted in the wall securely. The cable trenches in the meter room in which the cables have been laid are to be filled up with sand.

27. The underground cables laid in the trenches are to be laid in suitable dia. Hume pipes at all road crossings. The rates quoted should include for providing Hume pipe unless specified otherwise. Cable in underground is to be laid with necessary excavation of trench of size 600 mm deep and 450 mm width and refilling up to 80 mm of the trench with sand, laying the cable and covering the cable with bricks on the three sides and back filling the excavated materials and making good the same and consolidating the excavated area complete in all respects.

28. All cable terminations inside switches, busbars, distribution and switch boards should be made in a workman like manner by providing sockets of suitable amperage, compression glands of suitable dia. porcelain connectors etc. as required. Rate quoted should be inclusive of all these accessories and nothing extra will be considered on this account.

29. Measurements for mains and cables will be taken as per IS 5908-1979 or its latest version.

30. Conduits containing FRLS insulated wires for mains/submains/circuits/point wiring are to be painted with two coats of synthetic enamel paints or British paints/Jenson & Nicholsons / Shalimar / Asian brand to match with the finished wall surface. The rates quoted should be inclusive of the cost of paintings as mentioned here.

31. All rates quoted for point wiring shall be inclusive of necessary circuit wiring with 3 x 2.5 sqmm copper conductor FRLS insulated wires of 600 V grade with distinct colours for phase, nutral and earth in appropriate size 25mm dia FRLS heavy gauge conduit and accessories concealed in beams/column/walls from the distribution board to switch board location as directed.

32. M.S. switch boxes of suitable sizes to accommodate ceiling fan regulators are to be provided on wall in concealed manner and hence the rates quoted should include for the switch boxes provision with adequate size of 3 mm thick laminated sheet cover to be fixed on suitable size concealed M.S box with steel screws and washers.

33. 15 A power plugs are to be directly wired from the DBs and not to be looped under any circumstances.

34. The work of providing earth electrode is to be done strictly according to IS 3043-1966 or its latest version.

35. At G.I. Plate Earthing, G.I. Plate of size 600 x 600 x 6.30 mm is to be burried 2.5 mtrs below ground level. Necessary watering arrangement with suitable size G.I pipe and funnel is to be made. 2 Nos of 25 mm x 6mm G.I flats from the bottom of the plate are to be taken out and terminated to the main panel board.

36. Suitable size G.I protection pipe for GI earth flats is to be provided directly from the earth pit and upto 3 mtrs height on wall and necessary masonry chamber with hinged type lockable cast iron inspection cover of 300 x 300 mm is to be provided. Necessary alternate layers of charcoal/coke and salt are to be provided. The earth stations are to be provided with minimum 4.5 mtrs away from the foundation of the building.

37. At G.I. pipe earthing, Same as above as in G I plate earthing but with 38 mm G.I. pipe of minimum, 2.75 mtr length.

38. At copper plate earthing, Same as above as in GI plate earthing but copper plate of size 600 mm x 600 mm x 3.15 mm is to be used and 1 No of 25mmx3mm thick copper strip from the bottom of the plate to be provided as specified in the schedule.

39. For pump set motors, pipe electrodes are to be provided whereas for other electrical installation plate earthing can be provided unless stated otherwise.

40. The work of provision of earth station should include in addition to provision of earth electrodes bringing the earth leads upto test terminal block installed at a height of 2.75 mts from ground level in case of lightning conductors. The measurement for earth leads if included in the schedule of work and payable separately, the above measurement will be excluded from the separate measurement.

41. The earth resistance is to be tested with suitable earth megger and the earth electrodes are to be installed minimum 4.5 mtrs. away from the premises.

42. Street light lamp posts are to be made of 50 mm dia. G.I Pipe of 'medium' or 'B' Class of specified length with MS base plate of size 300 mm x 300mm x 10 mm welded at the bottom of the lamp post. Street light pole should be painted with two or more coats of Aluminium paint of approved make.

43. Tube light fittings on ceiling are to be fixed with suspension rods not exceeding 750 mm made out of minimum 16 gauge HGBE conduit of suitable size with necessary ball and sockets, chuck nuts etc.

Ball and sockets are to be fixed to TW round blocks securely fixed on the ceiling. The down rods are to be painted with two coats of synthetic enamel paint of approved colour.

44. Fittings on the wall are to be directly fixed on the wooden round blocks of suitable size as mentioned above.

45. Ceiling fans supplied by LIC are to be assembled, tested and erected on the ceiling fan hooks already provided. FRLS insulated copper conductor wires of size 1.5 sqmm are to be used for making connection for the ceiling fans. Regulators are to be fixed on the concealed switch boards and connections given as directed.

46. Exhaust fans supplied by LIC are to be fixed at the location as directed and the balance opening if any is to be closed properly with 6 mm thick Teak Wood ply as directed. The exhaust fans are to be provided with necessary mechanical support. When installed on walls directly, the exhaust fans are to be fixed on the four bolts securely grouted on the walls suitably.

47. The open end of the concealed conduit shall be closed with plastic plug and should flush with the plaster surface.

48. Earth studs (screws) are to be provided in switch boxes on either side of the box for earthing.

49. DETAILS FOR FIXING DBs & SWITCH BOXES :

Sl.No.	Item	Height in **mm** from F.F.L. to the bottom of the SB/DB (preferably as directed at site)	If wall glazed tiles are used in walls
1.	Distribution works	1800	
2.	Switch Box	1250	
3.	Power Plug box in bath room	1800	Clear 50mm above the wall glazed tiles levels whichever is higher is to be followed.
4.	Power Plug box for water cooler	1200	-do-
5.	Independent Power Plug point box	300	-do-
6.	Power Plug Box in kitchen	1250	-do-
7.	Power Plug Box in Tea Room	1200	-do-

TECHNICAL SPECIFICATION FOR FIRE ALARM SYSTEM

1.0 GENERAL:
1.01 DESCRIPTION:

The work shall consist of furnishing, installation, testing & commissioning of a complete high quality advanced technology early detection Intelligent Soft Addressable fire alarm system as shown on the drawings and specified herein.

1.02 REFERENCES FOR INSTALLATION:
NFA- National Fire Protection Association NFPA 72 British Standard Institute / European Standards

All Applicable codes and standards including BS EN 54
Underwriters Laboratories Inc. (UL) – USA

1.03 SUBMITTALS:

A. Product data for fire alam system components including dimensioned plans, sections, and elevations showing minimum clearances, installed features and devices, and list of materials and data.

B. Shop drawings.

C. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs. Description shall cover this specific project.

Product certification signed by the manufacturer of certifying that their products comply with any one of with specifications and Vds approval or equal the fire alarm system components the referenced standards, completely

1.04 TRANSPORTATION, HANDLING AND STORAGE:

A. All the components of fire alarm system shall be provided in manufacturer's original new and unopened packing bearing manufacturer's name and label.

B. Store materials, not in actual use, in covered and well ventilated area and protect them from dirt, dust, moisture, direct sunlight and extreme temperatures.

C. For further requirements follow manufacturer's wrtten instructions regarding storage and handling.

1.05 WARRANTY

Submit written guarantee signed by the contractor or manufacturer or installer of fire alarm system for the period of 2 year from the date of substantial completion. The guarantee shall cover the repair and replacement of material with manufacturing defects and workmanship as directed by the engineer.

1.06 QUALITY ASSURANCE:
1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fire alarm systems and components, whose products have been in satisfactory use in similar services for not less than 3 years period, and be subject to approval of engineer.

2. Installer Qualifications: An experienced specialist sub-contractor who is authorized by the system manufacturer, and subject to approval of the engineer.

3. All the components and installations shall comply with the requirements of DIN VDE 14675 & VDE 0833 for design & installation.

4. Provide system and components specified in this section that are listed and approved by Vds & conform to equivalent DIN/EN standards.

5. Single source responsibility: All components and accessories shall be product of signle manufacturer.

1.07 NATIONAL BUILDING CODE – 2005 LOCAL BUILDING BY-LAWS

The Video Display Terminal (VDT) shall comply with Swedish magnetic emission and X-radiation guidelines MPR 1990:10.

APPROVALS:
The system shall have proper listing and/or approval from the following nationally recognized agencies:
UL Underwriters Laboratories Inc (9thEdition)
The fire alarm control panel shall meet UL Standard 864 9th Edition (Control Units)
The system shall be listed by the national agencies as suitable for extinguishing release applications. The system shall support release of high and low pressure CO2 / Other gas flooding systems etc.

PRODUCTS

EQUIPMENT AND MATERIAL, GENERAL:
All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.
All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.0 PRODUCTS:

2.01 SYSTEM DESCRIPTION:
A. The fire detection and alarm system shall comprise of Automatic Soft Addressable Modular design main fire alarm control panels, Dual optical smoke & heat MULTI Sensors , Blue LED Optical Smoke & Heat MULTI Sensors, Optical Smoke / Heat/ CO Gas MULTI sensors, Loop powered Dual Optical Smoke/Heat sensor with integral Sounder / Flasher / Speech units, manual call points, electronic wall mounted Alarm sounder/flasher/speech combined devices, Transponder interface units, each with its own short circuit built-in isolators. All loop cabling and any other components and accessories deemed necessary for a safe, reliable and satisfactory system shall conform to the relevant and applicable requirements and recommendations of DIN EN 54. The system shall be fully programmed to accommodate fire alarm zones. The system shall be configured to allow on site modifications with the minimum of disruption using the PC based software to facilitate future changes or alterations to existing buildings/network on site.

B. The fire alarm and detection system shall provide the following facilities as a minimum:

The system shall be intelligent in operation with advanced decentralised intelligence technology. Each detector shall have its own processor with algorithms built in the device to take a fire or fault decision. System with centarlised intelligence by providing signal levels to the control panel are not acceptable.

The system will be capable of providing fire, fault disablement and supervisory monitoring facilities as required by DIN EN 54 Pt 2. All devices on a loop shall have built in SHORT CIRCUIT LINE ISOLATORS

for wiring fault isolation to protect the system. “Group Circuit Monitors” which isolate/protect sections of a loop circuit, i.e. a group of field devices are not acceptable.

All system components and devices shall be connected to two-wire loop circuits (as shown in the typical schematics) with each component having its own individual built-in isolator, should have sensors with integrated sounder in a same unit and no extra cabling should require to power up the sounder. Removal or disconnection of any component from the loop shall not affect the functioning and performance of other components and the system. Please note that the group isolators, which are used to isolate a section of a loop in case of fault, are not acceptable.

System shall be of automatically addressable type i.e. all the devices on the loops of the FACP shall be allocated addresses automatically from the PC / panel at the time of system power. The loop devices shall also be able to commission by using PC interface without the need of FACP.

And also given an address during commissioning, the value of which shall be stored in non-volatile memory, within the electronics module of the outstation. This value shall be read during loop allocation and provided it is valid shall be used to setup the outstations primary address.

Automatic Addressing shall cover the benefits of Soft Addressing and also overcome the limitations of Hard Addressing. This means that If the devices are inserted or removed all the existing devices shall keep the same address and programmed activations and use labels remain unchanged. The panel with PC shall allocate the address to ensure that it is impossible for two devices to have the same address. Fire Detection and Alarm Systems, which rely only on Coding , Programmer or hard addressing techniques are not acceptable.
Facilities shall be provided to constantly monitor and check the following circuits and fault conditions:

*The power supply to the loop /s;
*For open-circuit, short-circuit, earth fault and any other fault condition in the loop wiring;
*For communication failure and errors in all cards and loops
*For faults in keyboard and printer circuits
*All devices, etc. shall be installed on the same loop.

All devices shall be assigned a maximum of 25 character or 2 lines of max. 30 characters each with a ¼ VGA Display. In case of fire, fault or warning, the label of device sensing threshold shall appear on visual display unit of the panel.
Any event i.e. Fire, fault or warning shall be recorded with time, date and place of occurrence in the memory of FACP. These events can either be displayed on normal or ¼ VGA Dislay of the FACP or printed, as required. Provision shall be done at the fire alarm control panels to silence the loop powered alarm sounders but the visual indication shall remain until the system is reset. The detectors shall have auto learn sensitivity adjustments.

The main fire alarm control panels shall be located as shown on the schematics and the floor drawings.

2.02 GENERAL: All major component of fire alarm system shall be product of a single manufacturer and shall conform to the requirement of EN54, Vds approved and be designed acc. to DIN VDE14675 and VDE

0833 Fire Alarm Systems CODE OF PRACTICE FOR SYSTEM DESIGN, INSTALLATION AND SERVICING.
The power supply breakers for FDA system shall be marked “DO NOT DISCONNECT. FIRE ALARM SUPPLY”

2.03 ANALOGUE ADDRESSABLE FIRE ALARM CONTROL PANEL (FACP):

1. In the event of a fire being reported from the smoke/heat Detectors, activation of manual call points or sprinkler operation the sequence of alarm operation shall be as follows: If a fire condition is reported from a smoke detector then the evacuation will be done initially by the local integral sounder. Then after a certain delay (to be agreed at the time of commissioning) the evacuation message shall be announced on that fire zone only. If after 3 minutes the alarm has not been acknowledged, the evacuation message shall also be announced on the other adjacent zones. All other zones shall be given the Alert message. The evacuation of the building shall be staged in phases to allow orderly movement of people.
2. f a Manual Break Glass Unit is activated or a sprinkler flow switch is operated, then the evacuation shall be transmitted immediately to the affected fire zone plus the adjacent zones.

1. Activation of the fire alarm system shall directly initiate some or all of the following to be agreed as a part of the overall engineering policy.
a. Signal to all elevator machine rooms indicating fire status (to control lifts)
b. Release doors normally locked by magnetic devices.
c. Release doors normally held open by magnetic devices
d. Shutdown mechanical equipment ventilation plant
e. Shutdown general exhaust fans
f. Start up smoke extract fans
g. Start up exhaust make up fans
h. Start up stair vestibule pressurization fans
i. Automatically operate fire dampers
j. Initiate alert signals to panels in the adjacent office tower.
k. Sprinkler valves, flow switches and other monitored valves shall be directly supervised by the fire alarm systems.

These shall include but not limited to the following:

i. Building automation system via WINMAG OPC

ii. Emergency lighting system

iii. Security system.

2.04 SYSTEM COMPONENTS AND DEVICES
2.04.1 FIRE ALARM CONTROL PANEL:

The panel shall be modular Multifunctional computer controlled using 32 bit processor. De-centralized control and monitoring functions to be realized on the loop and spur. The panel shall be complete with, but not limited to, the following elements:

1. Visual display unit capable of displaying 8 lines 40 characters backlit display / ¼ VGA display as optional.

2. Built-in optional 40 character internal protocol thermal printer or external.

3. Built-in full numeric keyboard with function keys.

4. 64 Single Zone Indicator expandable upto 192 SZI

5. SMART Card media slot.

6. Key-switch to prevent unauthorised operation of keypad.

7. Integral sealed lead acid battery and charger, with 24 hour back up in the event of supply mains failure.

8. Essential controls – Delay, panel reset, Audible alarm off, Disconnect master box, additional messages, verify/cancel fault buzzer. Fire, Pre-Alarm, Trouble, Disconnection lamps. Each lamp shall also have appropriate indication (Releasing Systems activated, Master box, Delay , Verify, CPU failure, In operation normal condition & failure of power supply / battery) Simple menu driven function keys with password protection shall allow users to an extensive range of software based features such as:
a. Overview
b. Service
c. Time functions
d. Information
e. Last 2000 system eventsCurrent fault and warning logs.
f. Interrogation of sensor cleanliness On/Off, Enable / disable sensors, zones, sounders, interface unit channels.
g. Status of detectors
h. Alarm counters
i. Printer on, off, line feed and test facilities.
j. All control buttons and keyboard shall be enclosed behind a lockable cover, Upto 127 device capacity per 3.5km loop and a TTY/ RS 485 communication option.
k. In addition to the above, all other necessary controls, elements and accessories shall be included to provide a complete and efficient panel conforming to the requirements of DIN EN 54.

LOOP PARAMETERS:

Individual loop circuits will be capable of accommodating the following.

i. Up to a maximum of 127 addressable devices on 3.5 kms loop length
ii. Up to 32 loop powered IQ8 Alarm addressable Sounders.

iii. Up to 32 loop powered IQ8 Alarm electronic Strobes.

iv. Up to 32 loop powered combined electronic sounders and strobes

v. Up to 80 sensors with integral alarm sounder
vi. The detection loop shall have the ability to support both sensors and sounders connected on the same 2 core loop circuit.
vii. Up to 127 loop powered input modules.
viii. Should have the ability to spur off the detection loop without using ‘T’ breaker devices, without any degradation.

SYSTEM EVENT PRINTER:
The system printer shall be 40 character thermal printer optional in-built on the main control panel, and shall log all events, change of status, alarm and fault messages along with time of the day and date. An external 80 column dot matrix printer along with system PC is also recommended.

The printer shall provide the following:

a. Hard copy of every event occurring
b. Status read out of every addressable point
c. Devices tested on a walk test
d. Contaminated detectors needing replacement
e. Single point scan printout of analogue values
f. Hard copy of historic log.

==========

2.06 FIELD DETECTION DEVICES

GENERAL: ANALOGUE DETECTORS & BASES

All analogue detectors and bases shall be provided by the same manufacturer of the control system. No other make of detectors will be permissible.

All analogue detectors shall have real intelligence itself. This means even without control panel the detector can make decision, adapt to different environmental condition and diagnose itself. They shall have decentralized intelligence , automatic function self test, CPU failure mode, alarm and operating data memory and integrated short circuit line isolators. The detector bases for interfacing between the loop wiring and the detector head shall be manufactured by means of injection moulded ABS plastic coloured white and shall not contain any electronics for addressing. The base fixings should be suitable for any industry standard BESA or conduit boxes. All bases shall include the option to provide a programmable relay output for interfacing, providing a dry contact for third party.

All bases shall be provided with a plastic removable dust cover for protection during site construction as well as an IP rated sealing gasket to prevent dirt and moisture from entering through from the fixing surface.

Each base shall include a lock and removal of locked detectors shall be achievable only through the use of the appropriate removal tools as specified by the manufacturer of the detectors. Detectors removal tools are to be handed over on completion of the contract as part of the spare parts to the client.

Removal of a detector from it's associated base shall not affect the continuity of the detection loop.

The Fire alarm manufacturer shall have the complete range of following analogue ADDRESSABLE automatic / manual detectors with decentralized intelligence as standard so as to meet the specific applications of the site.

1. Heat Detectors (fixed & ROR temperature)
2. Optical Smoke Detector
3. Optical Smoke & Heat Detector
4. Dual angle Optical/Heat Detector
5. Blue Light Optical / Heat Smoke Detector
6. Optical Smoke, Heat & CO gas Detector
7. Optical Smoke detector with integral Sounder
8. Dual angle Optical/Heat detector with integral Flasher
9. Dual angle Optical/Heat detector with integral Sounder
10. Dual angle Optical/Heat detector with integral Speech Sounder
11. Dual angle Optical/Heat detector with integral Flasher and integral speech sounder
12. Duct mounted sensor
13. Radio Frequency wireless analogue detectors
14. Manual Call Points

All of the above shall be compatible with the aforementioned base providing inter-changeability between detector heads, without the requirement for switch settings. All detectors shall also have an integral short circuit isolator, which in the event of a single cable fault will isolate the "culprit" piece of cable and retain all devices on the loop operationally.

Each detector shall possess two integral LED giving a red flashing indication for fire and green for normal operation. For remote locations, each detector shall be capable of connection to a remote LED unit by means of 2 core wire connection.

Detectors shall be white in colour and manufactured from ABS plastic. All electronics and associated sensing elements will be housed within this unit, these components being hermitically sealed to prevent their operation from being impaired by dust, dirt and humidity.

The sensitivity off all detectors shall be adjustable from a software. It shall be possible to programme detector sensor sensitivity directly on the loop using interface with a laptop PC and appropriate programming software from manufacturer.
For MULTI SENSOR detectors, disablement of each sensor element shall be possible individually or for whole loop. Also this disablement feature shall be possible to have manually or time / event controlled.
All detectors shall be provided with a plastic removable dust cover for protection during site construction.

A semi-flush recessing kit for analogue detectors shall be available for each detector type incorporating the standard detector base.

2.06 (a) HEAT DETECTORS
Install as shown in the drawings.These shall comply with the requirements of EN 54: Part 5 and shall be VdS approved. This shall be a dedicated heat only detector to provide fixed temperature heat as well as rate of rise sensing. It should be fully compliant with EN54 part 5 to provide grades of A1.

2.06 (b) OPTICAL SMOKE DETECTOR:
Install as shown in the drawings .Analogue Addressable Optical Smoke Detectors. These shall be of Automatic addressable Optical type with inbuilt isolator in a single head. The optical element shall detect visible smoke from slow smoldering fires. Smoke sensing design shall comply with EN 54 part 7 and shall be VdS approved. It shall have microprocessors, short-circuit isolators and all electronic components and circuitry suitable for an Analogue addressable system. The detectors shall also have 360 degree viewing LED fire indicator.
Detectors mounted in the false ceilings shall be provided with semi flush mounting kits
.
2.06 (c) MULTI-SENSOR(OT) OPTICAL SMOKE /HEAT DETECTOR
Install as shown in the drawings .These shall comply with the requirements of EN 54: Part 5 & 7 and shall be VdS approved. These detectors shall have combined two individual sensing elements to provide excellent cover for both types of fires (slow smoldering & fast free burning fires). These detectors shall be of Automatic addressable Combined Optical/Heat type.

Optical sensing shall be carried out by means of an Infra-red LED transmitting a pulse of light across an obtuse angled chamber & heat sensing shall be carried out by a thermistor, sampling the surrounding environmental temperature.

2.06 (d) MULTI-SENSOR(O2T) DUAL ANGLE OPTICAL/HEAT DETECTOR
Install as shown in the drawings .These shall comply with the requirements of EN 54: Part 5 & 7 and shall be VdS approved. This device shall combine two individual sensing elements to provide excellent cover for both “types” of fires. (Slow smouldering and fast free burning).
OPTICAL SENSING: Shall be carried out by 2 infra-red LED transmitters across 2 separate Optical detection angles. This sensor shall process both the forward and backward scattered Light caused by entering the detection chamber of device, allowing the detector to Differentiate between real smoke and non-smoke particles e.g. Steam & Dust.

HEAT SENSING: Shall be carried out by a thermistor, sampling the surrounding environmental temperature.

2.06 (e) MULTI-SENSOR (OT) Blue-light OPTICAL SMOKE / HEAT DETECTOR:

Install as shown in the drawings. These shall comply with the requirements of EN 54: Part 5 & 7. The optical measurement chamber shall be provided with latest developed blue LED sensor technology, enabling the detection of open fire, smoldering fires and fires with high heat generation (Invisible smoke sensing). These detectors shall be capable of identifying the TF1 & TF6 test fires described in EN 54-9 specifications. These detectors shall be intelligent with time related signal analysis, signal correlation of sensor data & decentralized

HEAT SENSING: Shall be carried out by a thermistor, sampling the surrounding environmental temperature.

2.06 (f) MULTI-SENSOR (OTG) OPTICAL SMOKE / HEAT / CO DETECTOR

Install as shown in the drawings. These shall comply with the requirements of EN 54: Part 5 & 7.
The sensor element of the optical/heat detector with CO shall be as per the specification for the optical/heat detector.
The CO element shall be incorporated into the optical chamber to sense the presence of carbon monoxide gas emissions from smouldering fires. In normal environments the CO element shall have a life expectancy of a minimum of 5 years.

2.06 (g) MANUAL CALL POINTS
Install as shown in the drawings. The manual initiation devices shall be electrically compatible with all of the aforementioned detector types and shall be complete with all-electronic components and circuitry for an automatic safe addressable device. The manual call point shall have an inbuilt short circuit isolator and an inbuilt microprocessor to ensure a response time of less than 1 second.
The MCP unit shall also handle all communication to the control panel. All electronic devices contained within the MCP shall be hermetically sealed so as to prevent damage from hostile environment conditions: e.g dust with minimum rating of IP43.
The MCP operating voltage shall be 8-42 volts DC, RED similar to RAL 3020. If the MCP are located in public areas a transparent cover shall be provided as a protection to prevent inadvertent activation. MCP shall be available in two designs Large & small for aesthetic purposes to architects.
The MCP shall have an input faclity to connect conventional devices. It should have an option of using either frangible glass allowing for complete removal upon operation or plastic pane resettable function. There shall be no text but SYMBOLS on the MCP (burning house /press to break).
The device can be tested functionally without the need to either remove the front cover and/or breaking the glass, with a special test key (supplied as standard). The key shall insert the underside of the MCP ensuring easy access of the key at all times.
These devices will comply fully with EN 54 part 1.
The network shall be able to accommodate intruder alarm panels.
There shall be extensive diagnostic functions on the panel to be used to localize faults caused by interference or wiring, Networking shall be capable of carrying out using a data cable e.g IBM type 1 or CAT5. The distance between each panel shall be standard 1200 meters and capable of extending upto 3000 meters using booster repeaters.

2.07 NETWORKED LCD OPERATING PANELS / REPEATER PANELS

The Repeat Panel shall be sited at the Rear Entrance, guard house or location where it is manned 24 hrs.. It shall provide system repeat facilities to repeat all of the liquid crystal display messages as well as the common indications. Repeat panel shall be interfaced for network fire alarm control panels, designed for standardised display and operation as per DIN EN 54 part 2 and DIN VDE 0833 part 2. Installation and connection to FACP shall be via the short circuit and open circuit resistant essernet. System network. RS 485 interface or TTY interface for connecting remote printers, and fire brigade shall be available. The repeaters shall have minimum three common relays freely programmable, monitored, potential free upto 24 VDC.

2.08 BATTERIES:
Batteries shall be provided and shall be the dry sealed lead-acid type. The batteries shall have ample capacity. With primary power disconnected, to operate the fire alarm system for a period of 24 hours with an optional 72 hours battery backup. Following this period of operation via batteries. The batteries shall have ample capacity to operate all components of the system, including all alarm signaling devices in the total alarm mode for a minimum period of 30 minutes.

2.09 WIRING

All cables associated with Fire Alarm installation shall be of fire resistant 2 core 1.5 sq. mm twisted pair. Cables or other wise specified shall comply with BS 6207 Part 1. The cable is to BS 6207: Part 1 having, Typically no more than 2 cores each core having 1.5 sq. mm cross sectional area, A red cover sheath (preferred for alarm applications), Having continuous metal sheath encapsulation, Fire resistant tested to BS6387 categories CWZ.

3.0 EXECUTION

3.01 INSTALLATIONS

The entire fire alarm system shall be installed in accordance with DIN / BS EN54 Standards and manufacturer's approved shop drawings, written instructions and recommendations.

3.02 TESTING

Fire alarm system shall be tested in accordance to Local Fire Authority regulations and put into operation by the manufacturer or his authorized representative in the presence of engineer. Fault and alarm conditions shall be simulated and all data and alarm indicators checked with full events recorded on system printer according to the testing procedure.

GENERAL CONDITIONS FOR SUPPLY, INSTALLATION,TESTING AND COMMISIONING OF AIRCONDITIONING SYSTEM.

1. **General**

1.1 The equipment for variable refrigerant volume/flow (VRV/VRF) system shall be air-cooled consisting of Outdoor units and multiple Indoor units for cooling the space in summer and heating in winter (whenever Heat pumps are specified).
1.2 The system shall consist of suitable Outdoor units, Indoor units as required, interconnecting refrigerant piping, control cabling and accessories as required.
1.3 It shall be possible to connect multiple Indoor units on a single refrigerant circuit. The Indoor units on any circuit may be of different type and should allow individual control.
1.4 The condenser coil and condenser fans shall be sized to work even at **52°C** ambient without tripping.

2. **Outdoor Unit**

2.1 The Outdoor unit shall be a factory assembled unit housed in a sturdy weather proof casing, constructed form rust-proofed mild steel panels complete with powder coated finish.
2.2 Each module of Outdoor units shall consist of scroll compressor(s), air-cooled condenser as Heat Exchanger, high efficiency propeller fans with low noise motor, internal Refrigerant piping, safety controls, Air Inlet grilles, fan protection grille etc. all enclosed in weather proof housing.
2.3 The Outdoor unit shall have multiple scroll compressors and shall be able to operate even in case of breakdown of one of the compressors. (The smallest capacity unit may have only one compressor).
2.4 The Outdoor unit shall be suitable for mix and match connection of various types and capacities of Indoor units as per demand.
2.5 The noise level shall not be more than 62 dB(A) under normal operation, measured horizontally, 1 m away and 1.5m above ground.
2.6 The Outdoor unit shall be modular in design and shall allow for side by side installation of multiple Outdoor units, to match the requirement.
2.7 All the units shall be provided with built-in microprocessor control panel, for automatic operation and capacity control.
2.8 The units shall be suitable for Refrigerant R-410A.

3. **Compressor**

3.1 Each unit shall have single/multiple hermetically sealed scroll compressor.
3.2 The scroll compressor shall consist of two spiral disc, where one is fixed and the other rotate. The disc shall be mounted eccentrically to allow orbital movement. This shall permit compression of Refrigerant gas, as it move up between the eccentric discs.
3.3 Both the spiral disc out rotor shall be mounted on a common shaft with antifriction bearing, suitable for handling both radial and axial thrust.
3.4 The compressor casing shall be fabricated from mild steel of thickness capable of withstanding the working pressures. The casing shall have built-in oil reservoir with a sump of adequate capacity.
3.5 The compressor shall be complete with a suitable High efficiency motor hermetically sealed within the compressor housing.
3.6 The compressor housing shall also have oil reservoir for lubrication and suitable means like an oil pump or pressure differential device shall be provided to lubricate all moving parts.
3.7 One or more compressor shall be provided with suitable sine wave or equivalent DC Inverter for capacity modulation.

4. **Condenser / Heat Exchanger and Fans**

4.1 The condenser shall be air-cooled type, where heat exchanger shall be fabricated from copper tubes, mechanically bonded to aluminum fins to form a cross fin coil. The aluminum fins shall be given anti-corrosion treatment. This treatment shall be suitable for areas of high pollution, moisture and salt laden air.
4.2 The condenser fans shall be with multi blades of aerofoil design for low noise level, high efficiency and fitted with a high efficiency fan motor.
4.3 The fan outlet shall be protected by a suitable wire guard on the outside.
4.4 Suitable devices and heat exchanger means shall be built-in the unit to provide maximum super-cooling of refrigerant to increase system efficiency.
4.5 The unit shall be complete with safety controls and suitable microprocessor based master control module.
4.6 The module should be capable of connecting to web or to other devices through common Bacnet or LAN networks or any other suitable networking protocol..
4.7 All the above component shall be housed in a compact mild steel cabinet having air Inlet louvers, safety guard on the condenser fan. The ambient shall be mode weather proof using suitable anti corrosion treatment and finishing point.

5. **Indoor Units (IDU)**

5.1 The system shall permit connection of a variety of non ductable or ductable Indoor units on to single refrigerant piping circuits, as per description given later.
5.2 The capacity of the IDU shall vary as per the requirement of the given area.
5.3 The types of IDU which may be connected may be any of these given below:
5.3.1 High Wall mounted Unit.
5.3.2 Cassette type of different configuration.
5.3.3 Concealed Ceiling suspended units.
5.3.4 Ceiling Suspended High static Unit.
5.3.5 Ceiling Mounted Exposed unit.
5.3.6 Floor standing (exposed or concealed) units.
5.3.7 Ductable ceiling mounted High Capacity units.

5.3 Common features of Indoor Units

5.3.8 The cooling / heating evaporator coils of the various types of Indoor Units shall be of direct expansion type.
5.3.9 The coils shall be fabricated from copper tubes of min 8 mm dia. with extended aluminium fins and designed for low velocity.
5.3.1 The fins shall be bonded to the tube using hydraulic expansion of tubes ensuring tight bonding between tube and fins for efficient heat transfer.
5.3.2 The coils shall be complete with well-designed tube circuiting and liquid distributor.
5.3.3 All types of units shall have a built in electronic expansion valve and suitable control units.
5.3.4 The control units shall control temperature, fan speed and features specific to each unit such as night mode, set back, etc.
5.3.5 Suitable drain pan and drain arrangement shall be part of all IDUs.
5.3.6 The control units shall permit control from a corded or a wireless remote controller.

6. **High Wall Mounted units**

6.1 The high wall mounted units will be complete with cross flow fan, vertical DX coil, filters, control units and plastic outer cabinet.
6.2 The cross flow fan should be of generous dia. and length to deliver the required air quantity at high speed and be very quiet with Noise level below 38 dbA.
6.3 The fan assembly shall be directly mounted on a low noise, high efficiency motor.
6.4 The DX evaporator coil and other common features shall be as given under para 5.3.
6.5 The air filter shall be electrostatic type to remove dust, pollen and other impurities.
6.6 The outer casing shall be made of high grade plastic, complete with return air grille, motorized supply air louvered opening and suitable metallic back panel for mounting all items.

7. **Cassette type units**

7.1 The cassette type Indoor Units may be of any of the three configurations, as given below and as may be mentioned in Bills of quantity.
7.2 Four way or circular air distribution arrangement whichever is specified or is available.
7.3 2-way air distribution arrangement.
7.4 1-way or corner type air distribution arrangement.
7.5 The unit shall be complete with turbo fans of multi-blade type, duly statically and dynamically balanced to give the required air flow.
7.6 The filter shall be of synthetic type to suit the configuration.
7.7 The unit housing shall have provision for connecting fresh air duct, wherever required.
7.8 The unit shall be complete with built-in high head fail-safe pump with safety cutouts.
7.9 The unit shall include all items as given in 5.3
7.10 Each type of unit shall be supplied complete with **Air distribution panel** whether specified or not.
7.11 The panel shall have removable return air core for cleaning air filter and maintaining motor etc.

8. Ductable Units

8.1 The ductable indoor units shall be ceiling suspended type, complete with fan assembly, DX coil, air filters, control units and outer casing.
8.2 The fan shall be centrifugal suction type with fan casing and direct driven motor. The fan shall have a minimum external static pressure of 100 Pa.
8.3 The air filter shall be cleanable type with mold resistant resin net fixed to an integrally moulded plastic frame. The filter shall be sliding type with frame for ease of insertion and removal.
8.4 The outer casing shall be of heavy gauge galvanized duly treated for corrosion resistance and finished with powder coated paint. It should have internal insulation to prevent condensation and absorb fan noise.
8.5 There shall be suitable deep drawn insulated drain pan.
8.6 All other component shall be as in para 5.3.

9. Indoor Control Unit

9.1 All types of indoor unit shall have one of the following controllers:
9.1.1 Cordless Type
9.1.2 Corded Type
9.2 Unless otherwise specified the controller to be provided shall be as follows:
9.2.1 **Cordless Remote:** Wall units or other units which are located in an enclosed cabin.
9.2.2 **Corded Remote:** in open offices or and areas not covered above.
9.3. The unit shall be equipped with a self-diagnosis for easy and quick maintenance and service.
9.4 The LCD (Liquid Crystal Display) remote controller shall memorize the latest malfunction code for easy maintenance.

10. Refrigerant Piping Capabilities

10.1 The unit shall be capable of long length of piping and for providing lift of Refrigerant due to level difference between the Outdoor unit and Indoor units at the highest levels.

11. Refrigerant Piping:

a. All refrigerant pipes and fittings shall be type `L' hard drawn copper tubes and wrought copper fitting suitable for connection with silver solder phos copper.
b. All joints in copper piping shall be sweat joints using low temperature brazing and/or silver solder. Before joining any copper pipe or fittings, its interior shall be thoroughly cleaned be passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while construction the joints. Subsequently, it shall be thoroughly blown out using carbon dioxide/nitrogen.
c. Refrigerant lines shall be sized to limit pressure drop between evaporator and condensing unit to less than 0.2 kg per Sq.cm.
d. Removable type combination drier and filter shall be installed in liquid line of the refrigeration system incorporating a three way valve bypass.
e. After the refrigerant piping installation has been completed the refrigerant piping system shall be pressure tested using, Freon mixed with nitrogen/carbon dioxide at a pressure of 20 Kg per Sq. cm. (High side) and 10 Kg per Sq. cm (Low side) pressure shall be maintained on the system for a minimum of 12 hours. The system shall then be evacuated to a minimum vacuum of 70 cm. of mercury and held for 24 hours, during which time; change in vacuum shall not exceed 12 cm of mercury. Vacuum shall be checked with vacuum gage.
f. All refrigerant piping shall be installed strictly as per the instructions and recommendations of air conditioning equipment manufacturers.

11. Testing & Balancing:

a. All piping shall be tested to hydrostatic test pressure of at least two and half times the maximum operating pressure, but not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified and gotten approved at site.
b. Piping repaired subsequent to the above pressure test shall be retested in the same manner.
c. System may be tested in sections and such sections shall be securely capped, then retested for entire system.
d. The contractor shall give sufficient notice to all other agencies at site, of his intention to test a section or sections of piping and all testing shall be witnessed and recorded by Owner's site representative.
e. The contractor shall make sure that proper noiseless circulation of fluid is achieved through all coils and other heat exchange equipment in the system concerned. If proper circulation is not achieved the contractor shall rectify the defective connection. He shall bear all expenses for carrying out the above rectifications, including the tearing up and refinishing of floors and walls as required.
f. The contractor shall provide all materials, tools, equipment, instruments, services and labour required to perform the test.
g. Complete certified report shall be submitted for evaluation and approval. Upon approval, four copies of the balancing report shall be submitted with complete drawings and documents.
.

12. Refrigerant Piping

12.1 All refrigerant piping for the VRV/VRF system shall be carried out using hard drawn seamless copper pipe using either soft, half hard or hard pipes as per chart below:

12.1.1 The piping thickness shall be as follows:

OD(Inch)	OD(mm)	Min. Wall Thickness (mm)	Soft	Half Hard or Hard
1/4”	6.35	0.80	√	√
3/8”	9.52	0.80	√	√
1/2”	12.70	0.80	√	√
5/8”	15.88	1.00	√	√
3/4”	19.05	1.00	√	√
7/8”	22.20	1.00	X	√
1.1/8”	28.58	1.00	X	√
1.3/8”	34.92	1.10	X	√
1.5/8”	41.28	1.25	X	√

12.2 The branching of refrigerant piping from the main line shall be carried out using either specially designed ‘Tee’ connectors or ‘Y’ joints. These joint should ensure that each branch receives the required refrigerant flow.

12.3 All pipe sizing shall be on the basis of sizing data of the concerned manufacturer and should ensure adequate oil return back up to the compressor.

13. **Pipe Insulation**

13.1 **Refrigerant Pipe Insulation**

13.1.1 The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm thick Nitrile close cell rubber, so that condensation does not occur.
13.1.2 The joints shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

14. **Drain pipe insulation**

14.1 Drain pipe carrying condensate water shall be insulated with 6 mm nitrile rubber insulation having K value 0.037 W/mk at a mean temperature of 20oC at min.density of 55 kg. /m3.
14.2 The joint shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

15. **Centralized Intelligent Touch Remote controller**

15.1 A multifunctional compact centralized controller shall be provided with the system.
15.2 The Graphic controller shall act as an advanced air conditioning management system to given complete control of VRV/VRF air conditioning equipment. It shall have ease of use for the user through its touch screen. Icon display and colour LCD display.
15.3 It shall be able to control min. 21no. ODU and 80 nos. Indoor Units with the following functions:
15.3.1 Starting/stopping of air-conditioning as a zone or group of individual units.
15.3.2 Temperature setting for each Indoor units of zone.
15.3.3 Switching between temperature control modes, switching of the fan speed and direction of airflow, enabling/disabling of individual remote controller operation.
15.3.4 Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information, trouble shooting information.
15.3.5 Display of air conditioner operation history.
15.3.6 Daily management automation through yearly schedule function with possibility of varying schedules.
20.3.7 The controller shall have wide screen, user friendly colour LCD display which could be wired by a non-polar 2 wire transmission cable to a desired location from the Indoor unit.

EAST CENTRAL ZONAL OFFICE, PATNA

==========

TERMS & CONDITION OF CONTRACT FOR COMPREHENSIVE ANNUAL MAINTENANCE (CAMC) OF AIR-CONDITIONING UNITS:

1. GENERAL:

1.1 The CAMC contract will commence automatically after successful completion of **defect liability period of 24 months**. During CAMC period the AC units (Indoor & Outdoor) shall be serviced quarterly in a contract year.

1.2 In addition to the above scheduled services any complaint/breakdown call to be immediately attended and rectified within 24 hrs of receiving such complaint telephonically or through electronic mode.

1.3 The contractor shall provide its services available to the LICI during normal working hours of the corporation i.e. From Monday to Friday (9:00 AM to 6:00 PM) and 2nd & 4th Saturday (9:00 AM to 6:00 PM).

2. SCOPE OF WORK:

a. The contractor shall have to take up both preventive as well as break down maintenance jobs.. The Contractor shall have to carry out the jobs in consultation with Engineer-in-charge and have to be completed in all respect to the entire satisfaction of Engineer-in-charge, such as "Scheduled checking/servicing/overhauling of the machines as indicated in this tender document & attending the faults in the machines wherever these go out of order or work inefficiently".

b. The rates are all inclusive of establishment as well as spares and consumables likely to be required for replacement for keeping all the installations in good working condition including replacement of inverter compressors, regular compressors, refrigerant top up, condenser & evaporator coils, blowers, lubricating oils for compressor, filters, belts, valves, electronic controllers, PCBs, fuses, switches, installation of necessary software etc. if required. Nothing extra on any account shall be payable over and above the approved all-inclusive comprehensive rates of the contract

c. The replacements of all parts if any should be original, genuine make and old discarded part should be handed over to the concerned department.

d. All tools & tackles, manpower, transportation and other resources required for executing the job shall be in the scope of the contractor. No extra charges will be paid by the authority regarding tools & tackles, manpower, transportation etc.

e. The Vendor has to maintain a maintenance register during each visit mentioning what kind of job has been done during that visit. Contractor also has to provide maintenance report.

f. Scheduled maintenance work must include the following;

1. Maintenance of all filters, fans, diffusers, cooling coils, Refrigerant Gas make up etc.
2. Tightening of belts, foundation bolts of equipment, alignment of belt pulleys and couplings.
3. Examining indoor/outdoor units & operating linkage for smoothness.
4. To check the gland /seal, coupling of units.
5. To check the safety controls mechanical, Electrical/ Electronics and inter-locking of the various equipments.
6. To check all piping/insulation/proper positioning/damage and rectifying the same where ever required.
7. Inspect/check entire line for leakage and rectification of leakage, if any.
8. To check and lubricant (if required) the bearing of the fans/motors and keep the proper

record.

9. To check the foundation bolts of the units/motors and to take the necessary action if required.
10. Check the quantity of Air flow from various out lets in each room/ Area and do adjustment of dampers etc as and when required.
11. Check the performance of equipment of VRF plant for proper functioning.
12. Any other job required to be attended during course of Checking and to keep the plant in perfectly working conditions.
13. Checking / setting / rectification of all safety and automatic controls.
14. Complete Overhauling of indoor/outdoor units, FCU, Fans.
15. Maintenance of Fresh Air & Exhaust Air Fans and their Balancing, if required. Observe the operation of all the dampers and make necessary adjustment in linkage and blade orientation for proper operation.
16. Functional checks & calibration of all switches, thermostats, humidistat and other instruments rectification of the same if required.
17. Any other job required to be attended during course of checking / as per OEM and to keep the plant in perfectly working conditions.
19. Maintenance of all Electrical equipment Feeders, Panels, Bus Bars, Cubicles, Motors, Heaters, Circuit Breakers, Power Points, etc. pertaining to HVAC as per standard electrical maintenance practice and as directed by concerned maintenance engineer. The maintenance and repairing of motors, Software re installation (if required) etc. are also within the Vendor's scope of work.
20. The gas charging in VRF system will be executed by vendor, whenever required.

NOTE: All the equipments/installations shall always be kept in good and trouble free operating conditions. All the required record for break-downs/repairs and maintenance etc. shall be maintained in the form of history books and logbooks etc. as per directions.

3. SPECIAL TERMS & CONDITION:

a. If closing the Air-Conditioning units for more than one day becomes necessary for major repairs/replacements/overhauls etc. the same should be pre-arranged with consultation with the concerned department and engineer in charge.
b. The contractor will be responsible for the security/insurance of their staff working at site and LICI will not be responsible in any manner in case of any accident / miss-happenings.
c. Contractors should follow all safety norms and provide necessary safety equipment at their own
cost. In case of any accident during the maintenance of the equipment or unsafe operation of air-conditioning units or its accessories leading to injuries / damages to human beings equipment and / or loss of life, the contractor shall be fully responsible for setting all claims and indemnify the Centre against any claims arising out of such accidents. Consequent damages to other systems will however be recoverable from the contractor.
d. This contract can be terminated by the LICI without assigning any reasons by giving a notice period of 30 days at any time during the period of contract. No claim for any compensation will however be entertained due to such termination prior to the expiry of stipulated period of contract.
e. The contractor has to submit a **performance security** for CAMC of the AC units in the form of bank guarantee to be valid for a period of six years from the date of expiry of defect liability period until the expiry of CAMC period. If the contractor fails to submit the BG before expiry of defect liability period then the amount will be retained from the security deposit of the contractor until expiry of CAMC period. Performance guarantee will be released to the contractor on successful completion of the CAMC period.
f. All equipment taken for CAMC during the contract period shall be handed over back to LICI in good working condition well before the end date of contract period for successful completion of the CAMC.

g. In case any equipment not handed over to LICI in good working condition, then LICI may get them repaired/procured on its own from other sources at the risk & cost of the contractor. The cost incurred shall be deducted from any payment due to him/performance security deposit.

4. PENALTY:

1. If the contractor is not able to attend and resolve the fault/complaint/breakdown calls and the reasons attributable to non performance of contractor as assessed by officials nominated by LICI then a penalty @ rate of Rs.500 /- per day may be imposed on contractor and the same will be deducted from the CAMC amount due to the contractor. The penalty clause is applicable if the air-conditioning unit remained non-functional **for 4 hrs or more**. The penalty will be Rs.500/- per day.
2. If contractor is not able to rectify the fault then the same may be got done through some other agency at the risk and cost of contractor failing which the same amount will be deducted from AMC bill in addition to the penalty as stipulated above will also be imposed. However, the decision of the Chief Engineer, LICI in this regard shall be final and binding.

3. If unsatisfactory performance is continued for more than two days as felt Chief Engineer, LICI then CAMC is liable to be terminated and final decision for this shall rest with the Chief Engineer, LICI. No claim for any compensation will however be entertained due to such termination prior to the expiry of stipulated period of contract.

5. PAYMENTS:

a. Payment shall be made on quarterly basis after completion of service and submission of bills along with service report duly certified by the concerned department officials or Engineer-in-Charge at the end of each quarter after due scrutiny and examination.
b. CAMC charges are inclusive of all taxes excluding GST which shall be paid extra as per prevailing rates at the time of billing.

6. CONTRACT PERIOD:

The CAMC will be valid for a period of six years starting from date of completion of defect liability period.

The supply, installation, testing and commissioning of Air conditioning work is to be carried out by the manufacturer of approved makes or their authorized dealers only. The approval of the agency for AC work is to be obtained from competent authority before commencement of work.

DEFECT LIABILITY PERIOD:

The contractor shall be responsible for any manufacturing defect or defects in installation & performance and the same will be rectified immediately at his own cost to the entire satisfaction of Engineer-in-charge during Defect Liability Period of 24 months, reckoned from the date of virtual completion.

TRAINING TO STAFF:

During the erection and testing the contractor will have to train personnel of LICI regarding operation and preventive maintenance of the AC units. Operating & maintenance instructions shall be supplied at the time of delivery of equipment at site without any extra charges.

==========

SPECIAL NOTE FOR CONTRACTORS;

1. Refrigerant piping wherever used shall be properly installed & bends shall be made using tube bender.
2. Where pipes & / or cables pass through walls or ceilings, proper G.I. pipe sleeves shall be provided whether the same is specifically mentioned or not, no separate rates will be applicable.
3. Refrigerant pipes shall be mounted on teak wood gutties / other suitable material to avoid physical contact with structure & shall be properly clamped & neatly laid, no separate rates will be applicable.
4. All tools & tackles, instruments & manpower required for testing (including witness test by LIC Engineers) shall be arranged free of cost by the contractor as & when required including for re-test if any.
5. Free periodic services for maintenance shall be provided by the contractor not less than ONE SERVICE IN THREE MONTHS to ensure efficient operation of the system.
6. Grouting for supports of contractors equipment shall be carried out by the contractor.

.

7. The contractor shall carry out the tests on different equipments as specified in various sections, in the presence of LIC Engineers in order to enable them to determine whether the plant & equipments & installation in general comply with the specifications.
8. The Installation shall be handed over to LICI after satisfactory testing & after necessary rectifications as required along with one document of each comprising:-
   - Detailed equipment data as approved by LIC;
   - Manufacturers maintenance & operation manuals;
9. In case the test readings are not satisfactory, the contractor shall carry out all modifications to achieve the specified conditions within a period of 3 months from the test date.
10. On completion of DLP the AC units have to be handed over to LIC/New appointed agencies in proper working condition. Failing to so the units will be repaired at contractors risk and cost.
11. Contractor has to submit the layout, Location of indoor and outdoor unit along with heat load before commencement of work.
12. LIC of India will provide supply with MCCB/MCB control of adequate rating to each outdoor condensing units. Necessary cable for interconnection and switchgear is to be provided by contractor.
13. The rate quoted for the above shall include all necessary preparatory works for installing outdoor units and indoor units, chasing wall, flooring for drain pipes , refrigerant pipe etc and making them good to satisfaction of LIC. Nothing extra will be paid on this account.
14. TENDERERS ARE REQUESTED TO VISIT THE SITE BEFORE QUOTING
15. The rate quoted should include all electrical interconnections between control panel, indoor and outdoor units.
16. Any alternation, deviating tender will be summarily rejected under the discretion of the competent authority.
17. Tenders are requested to note that the final bills will be settled on completion of work in all respect of all trades.
18. containing to equipments, as built drawings, test certificate, inventory, etc.

24. The contractor shall submit drawing, Location of Indoor & outdoor unit, Layout of refrigerant pipe & Drain pipe for approval from LICI before commencement of work.

i. **Please note all the AC units are to be supplied must have copper condenser & copper cooling coil only.**

ii. The price quoted shall also be inclusive of followings :-

i) MS angle support for holding the AC units as per standard installation.

ii) Minor civil works like cutting holes, minor modification of extg pockets of ACs, etc. and throwing away any debris coming out of this work as per direction-in-charge of LICI and making good the same.

EAST CENTRAL ZONAL OFFICE, PATNA

==========

LETTER TO BIDDER FROM THE CHIEF ENGINEER

To,

_____

_____

Dear Sir / Sirs,

Re : E-Tender on Percentage Rate basis for Proposed Modernization of DEOGHAR Branch Office under DO Bhagalpur

1) We hereby publish the TENDER on e-Tendering Portal (Website) through **www.tenderwizard.com/LIC** in **Electronic Mode** hereinafter referred as "**e-Tendering**" and consisting of following :

   (a) **BID I : EMD BID**
   (b) **BID II : QUALIFICATION BID**
   (c) **BID III : FINANCIAL BID**

   Please note that copy of above e-Tender can be downloaded from above portal (website) and should be mandatorily submitted in **Online Electronic Mode** hereinafter referred as "**Online Offer**". The submission of Online offer duly Encrypted & Digitally Signed on above portal should be in prescribed Electronic Forms (Online) available on above portal for respective tender in Online Envelope(s) on or before **As per the Key Dates mentioned in the tender document and online portal for above tender.**

The bidders should submit required Tender document Fee and Earnest Money Deposit in a manner/mode as mentioned in e-Tender process (ref: 1.0 XI and XII of Qualification Notice). Tender document fee of Rs 500.00 plus 18% GST i.e. total **Rs 1180.00 (Rupees One Thousand One Hundred Eighty only)** and **Earnest Money Deposit of Rs 1,78,700.00 (Rupees One Lakh Seventy Eight Thousand Seven Hundred only)**
shall be submitted separately.

a) Tender Processing fee (non-refundable) of **Rs 1180.00 (Rupees One Thousand One Hundred Eighty only)**

(i) In the form of Cash depositing the same in LIC ECZO Zonal Office Cash Counter during Cash hours of working days and obtaining Receipt (MR) which has to be submitted with Bid – I

OR

(ii) In the form of Demand Draft/Pay Order/Banker's Cheque in favour of Life Insurance Corporation of India payable at Patna

OR

(iii) Payment through NEFT mode directly to LIC Account as detailed below :

Name of Bank :	: AXIS BANK LTD.
Branch	: Main Branch, Patna
Account No.	: 142010200012704
IFSC No.	: UTIB0000142
Account Type	: Current

b) Earnest Money Deposit of as mentioned above shall be submitted in the following form:-

(i) In the form of Cash depositing the same in LIC ECZO Zonal Office Cash Counter during Cash hours of working days and obtaining Receipt (MR) which has to be submitted with Bid – I

OR

(ii) In the form of Demand Draft/Pay Order/Banker's Cheque in favour of Life Insurance Corporation of India payable at Patna

OR

(iii) In the form of Bank Guarantee (as per proforma) issued by any Nationalised / Scheduled Bank preferably at Patna or where a Branch / Division exists.

OR

(iii) 50% amount In the form of Demand Draft/Pay Order/Banker's Cheque in favour of Life Insurance Corporation of India payable at Patna and 50% amount In the form of Bank Guarantee (as per Performa) issued by any Nationalised / Scheduled Bank preferably at Patna or where a Branch / Division exists

OR

(iv) Payment through NEFT mode directly to LIC Account as detailed below :

Name of Bank : : AXIS BANK LTD.
Branch : Main Branch, Patna
Account No. : 142010200012704
IFSC No. : UTIB0000142
Account Type : Current

(c) BIDs will be received at the office of Chief Engineer at above address on or before As per the Key Dates and the e-Tenders will be opened at As per the Key Dates in the presence of contractors or accredited representatives, who wish to attend the online Tender Opening process. The bidders can view the Tender Opening details through their respective Login IDs on the above mentioned e-Tender portal (Website). The Tenderer should ensure that their tender is received Online Electronically on or before the due date and time as specified in "Key Dates" in the Tender Document and above mentioned Portal (website). Please note that above e-Tendering System is an automatically time locked system which will be locked immediately as soon as due date and time is over and will not accept any offer after that. So, the tenderers are strictly advised to do their process well before the due date and time to avoid any such instances.

(iii) The Guidelines to Submit tenders on Electronic Tendering System (ETS) is part of **BID -I** of the Tender document. The tenderers are advised to carefully read the above document for understanding of e-Tendering System. The above Annexure will supersedes all the terms & conditions mentioned for submission of tender in document.

(iv) The Life Insurance Corporation of India does not bind itself to accept the lowest or any tender.

Yours faithfully,

EAST CENTRAL ZONAL OFFICE, PATNA

==========

LETTER FROM BIDDER TO CHIEF ENGINEER

TO BE SUBMITTED ONLINE ON OR BEFORE ON
As per the Key Dates

Date:

From:
……..

……..

……..

……..

To
The Chief Engineer,
Life Insurance Corporation of India
East Central Zonal Office
Jeevan Deep, Exhibition Road,
Patna - 800001

SUB: E-Tender on Percentage Rate basis for Proposed Modernization of DEOGHAR Branch Office under DO Bhagalpur

Dear Sir

1) Having examined the Qualification Form, Selection Criteria , Technical Specifications, schedule of Quantities, Detailed Drawings, Specifications, Conditions of Contract etc. included in the tender document for the **Percentage Rate Contract** relating to the above work, having visited/examined the site of the existing premises, having acquired the requisite information relating thereto as effecting the tender invited by you on behalf of the Life Insurance Corporation of India, I/We, the undersigned hereby offer to carry out the above mentioned work on Percentage Rate basis in strict accordance with the Contract Conditions and Specifications.

I/We, undertake to complete and deliver the whole of the works within a period as specified in Appendix to the Conditions of Contract from the date of issue of intimation from you that the tender has been accepted and upon receiving possession of the site. I/We shall be under the obligation to complete the entire work within the period of completion failing which to pay the sum as stated in the Appendix to the Conditions of Contract for every week that the works shall remain incomplete, damages as compensation subject to the conditions of contract relating to extension of time.

2) I/We enclose herewith my/our bid with an Earnest money remittance of as mentioned above in the appropriate format as specified in BID-I (Prequalifying Bid). I/We, hereby agree that part of this sum shall be forfeited by the Life Insurance Corporation of India in the event of my/our tender being accepted and I/We fail to execute Contract when called upon to do so.

3) In the event of the bid being accepted, I/We, agree to the retention of my/our EMD as a part of Security Deposit and the balance amount of Security Deposit to be recovered at 7.5% of Gross Value of work done from my / our Running Account Bills. If the total amount / 50% of EMD is

submitted by me/us in the form of Bank Guarantee and I/We want to avail cash option i.e. deduction of security deposit from the bills, then I/We have to deposit a Demand draft/Pay order in the name of Life Insurance Corporation of India payable at Patna amounting to total amount / 50% EMD in lieu of Bank Guarantee submitted towards EMD. Once this amount is deposited then I/We can avail cash option for Security deposit and the Bank Guarantee submitted towards EMD shall be returned to me/us.

OR

I/We, agree to furnish a lump sum Bank Guarantee for total Security Deposit or two Bank Guarantees each with 50% value (as per proforma) issued by any Nationalised / Scheduled Bank preferably at Patna or where a Branch / Division of LIC of India exists as per specimen given in **Annexure "B"** to Conditions of Contract, within 21 (twenty-one) days of acceptance of tender.

5) I/We, note that the Earnest Money Deposit of as said earlier would be refunded to me/us :

a) On expiry of the validity of the tender or earlier at the discretion of Chief Engineer in case my/our bid is not accepted and

b) In case my/our tender is accepted, after I/We, furnish Bank Guarantee as mentioned above.

6) I/We, agree,

a) in case my/our tender is withdrawn before expiry of the validity period or before the issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the Department, in such case 25% of the EMD will be forfeited by the department.

b) in case my/our tender is accepted and the Performance Guarantee, if applicable, is not submitted within the prescribed period or approved extended period, 50% of the EMD will be forfeited automatically without any notice.

c) in case of forfeiture of Earnest money as prescribed above [6(a) and 6(b)],the I/We shall not be allowed to participate in the retendering process of the work.

Yours faithfully,

(SIGNATURE OF THE CONTRACTOR)
Name and Seal
NAME OF THE PARTNER OF THE FIRM
OR
NAME OF THE PERSON HAVING POWER OF ATTORNEY TO SIGN THE CONTRACT
(CERTIFIED TRUE COPY OF THE POWER OF ATTORNEY SHOULD BE ATTACHED)

EAST CENTRAL ZONAL OFFICE, PATNA

APPENDIX TO CONDITIONS OF CONTRACT

SUB: E-Tender on Percentage Rate basis for Proposed Modernization of Ramgarh Branch Office under Hazaribag DO

ESTIMATED COST : Rs 89,33,320.00
PERIOD FOR COMPLETION : 120 days
EARNEST MONEY DEPOSIT : Rs 1,78,700.00 (To be submitted in Stipulated form)

Sl. No.	Clause Nos.	Description	Remarks
1	11	Minimum requirement of Technical staff ; Recovery for non-deployment	Non-Deployment of Engineer at construction site by the contractor shall attract recovery per month per Engineer Rs.30,000.00
2	13	Date of commencement	Either 10 (ten) days from the date of acceptance letter issued to the contractor **OR** The day on which contractor is instructed to take possession of the site, **whichever is earlier**
3	13 & 26	Date of completion	120 days from the date of commencement
4	19.1	Liquidated damages / Compensation in the form of Penalty	Compensation in the form of penalty for delay of the work: **Quantum of LD per week of delay will be 0.5% of the Contract sum, subject to Maximum of 10%.** Progress of the work will be reviewed according to the physical milestones in tune with the T&P Chart and should be ensured that actual progress of work corroborates with the anticipated progress of work during the particular period. If the progress of work is delayed due to lack of initiative by the Contractor, it will lead to imposition of LD, leviable at intermediate stages on failing to achieve milestones.
5	21	Period of final measurement	**60 (Sixty)** days from the date of completion of contract
6	22	Interim certificate	**Rs. 22.5 Lacs**
7	22	Period of honouring interim certificate	**20 (Twenty)** days
8	22	Period of honouring final certificate	**90 days** from the date of submission of final bill with details.
9	27.1	*Defects Liability Period (DLP)*	24 Months from the date of issue of Virtual Completion Certificate
10	35	*a) Security Deposit*	5% of the Accepted Tender Amount

Sl. No.	Clause Nos.	*Description*	Remarks
11	35	*Recovery of Security Deposit*	In case of Cash option, the Security Deposit shall be recovered from R.A. Bills at 7.5% of Gross amount of bill till the sum along with sum already deposited as EMD equals the total security deposit. If the total amount / 50% of EMD is submitted in the form of Bank Guarantee and the contractor wants to avail the cash option i.e. the deduction of security deposit from the bills, then the contractor has to deposit a demand draft /pay order in the name of Life Insurance Corporation of India payable at Patna amounting to the total amount / 50% of EMD in lieu of Bank guarantee submitted towards EMD. Once this amount is deposited the contractor can avail cash option for security deposit and the bank guarantee submitted towards EMD shall be returned. Alternatively, Security Deposit can be furnished in the form of one or two (of like amount) Bank Guarantee(s) as per specimen on any nationalized/ scheduled Bank preferably at Patna. If one BG is submitted for full amount, it shall remain in force till DLP is satisfactorily completed. If the Contractor furnishes two BGs of like amount, one shall remain in force till the period of virtual completion of work and issue of Virtual Completion Certificate and second shall remain in force till the Defect Liability Period. In all cases there shall be further provision of claim period of 6(six) months for the BG. The BGs must be deposited simultaneously within 21 days of intimation to the contractor orf acceptance to tender or date as may be extended by the Competent Authority. No deductions will be effected from the bills when total Security Deposit is paid in the form of BG(s) and EMD shall be refunded after acceptance of BG(s).
12	37	*Interest on Lump sum Advance*	10% simple interest p.a.
13	17.5	*Contractor's All Risk Policy inclusive of Third Party Liability*	The Contractor's All Risk Policy will be for full amount of the Contract Value and Third Party liability will be 7.50% of the contract value. Third Party liability Policy can be Standalone or can be along with CAR Policy for specified value.
14	17.6	*Workmen's Compensation Policy*	The contractor should obtain the Workmen's Compensation Policy as mutually decided by LIC of India and Contractor depending on labour (skilled/unskilled) involvement, approved by Competent Authority.

Sl. No.	Clause Nos.	*Description*	Remarks
15		*Penalty for Insurance Policies if policies not renewed*	The date for submitting the renewed Insurance Policy, if any will be 15 days prior to the last date of expiry of the existing policy, failing which LIC of India may insure/renew insurance and apply penal cost on the contractor i.e. Premium Charges + Rs. 10,000.00 as Admin charges + Rs 25,000.00 as penalty.
16	22.6	*No Claim Certificate*	To be given on Contractors letter head as per specimen given below.
17	35	*Claim for Refund of SD/ RMD*	3 Years from the date on which the due accrues.
18		*Water & Electricity Charges*	Deduction @ 0.5% on value of work done if provided by LICI.
19		*Validity of Tender*	03 Months from date of opening of Financial Bid
20		Performance Guarantee	In addition to Security Deposit if the contractor quoted rate is more than 20% below on our price schedule of rates, the contractor has to submit Rs: 1,00,000.00 (Rs. One Lacs) in the form of B.G of any scheduled bank as a Performance Guarantee as per enclosed Performa in the tender or DD and the same shall be refunded after virtual completion of the work.

NO CLAIM CERTIFICATE CUM RECEIPT
(To be given on Contractor's letterhead)

"Received Rupees _____ (Rupees_____) being the amount against my/our final bill dated _____ for_____ (Name of Work) in full and final settlement of bill.

Contractor
(Signature of Contractor on Revenue stamp)

Rubber stamp/seal of the contractor /company

NOTE:

1. The GST on works contract shall be paid by the Corporation over and above the value of work done, at the applicable rates during the contract period.
2. **Labour cess:** Rates are inclusive of Labour cess and labour cess will be deducted from contractor's bill.
3. Water charges, Electricity charges, penalty on account of non renewal of Insurance, liquidated Damages if imposed will attract GST at applicable rates during contract period.
4. TDS on GST would be deducted as per prevailing rules.

EAST CENTRAL ZONAL OFFICE, PATNA

==========

APPENDIX TO GENERAL INSTRUCTIONS TO CONTRACTORS

CLAUSE NO.2 OF CONDITIONS OF CONTRACT:

NAME OF WORK: E-Tender on Percentage Rate basis for Proposed Modernization of Deoghar Branch Office under DO Bhagalpur

---

LOCATION:

Proposed modernization works of Branch Office , LIC of India at Deoghar in the state of Jharkhand

(SIGNATURE OF THE CONTRACTOR)

SPECIAL CONDITIONS INCLD. TESTING OF MATERIALS:

1. PHOTOGRAPHS OF THE BUILDING

1.1 The contractor shall submit 3 sets of the prints of the photographs size 4"x6" to LIC of India at various stages:

a. Before commencement of the work.

b. During progress of work.

c. Completion before handing over the building

The photographs can also be submitted in CD/DVD in lieu of printed photographs.

One or more photographs shall be taken to have complete clear views of the modernization as directed by Corporation's Engineer.

1.2 The quoted **Percentage Rate** shall include for the same and no extra is payable to contractor on this account.

2 Contractors shall note that the site is in under construction of office building. Hence, contractor shall take into account this aspect and quote their rates accordingly.

3 Contractors are advised to inspect the site before quoting their **PERCENTAGE RATE.** The contractors shall also note that they have to co-operate with other agencies carrying out the work(s) of LIC of India in the same site.

4. The contractors shall not stack building materials on footpath and road margin.

5. The contractor shall thoroughly clean all the dust and dirt's, debris etc. and remove all the scaffoldings and other materials used for the works away from the site as and when needed. Disposal of the debris should be done in such a way that the site is kept free from such unwanted materials.

6. Noise pollution should be kept at minimum tolerance level.

7. Contractors to note that if hutments for labour provided at site all the necessary facilities etc shall be done as per statutory labour laws.

8. OTHER SPECIAL CONDITIIONS

i) Labourers may allow at site only after showing photo I Card issued by the agencies and duplicate of which is to be submitted to our office.

ii) Gate pass for daily labour may be issued by our Branch Officials.

iii) Every effort should be made to restrict the movement beyond working area.

iv) Materials can be taken away only after getting gate pass from Engg. Deptt.

v) Well co-ordination should be maintained with all agencies and designated coordinator from LICI side to avoid any kind of disturbances in office working.

vi) Every day, before the office starts the common area / working area should be cleaned in all respect if this area is used anyway for the work.

vii) LIC is no way responsible for issuing way bill or C – form to any agencies.

viii) During the execution of the work, the cleaning of pavements to be done on day to day basis.

ix) The contractor has to depute sufficient number of supervisory staff for making all arrangements and to ensure no disturbance to occupants.

x) It is responsibility of the contractor to adhere to all security measures for the workers.

xi) The Contractors has to ensure protection to building and other assets etc. in the campus. In case of any damages caused due to work or due to ignorance of ant worker, contractor has to make good the damages and / or compensate the LIC for the damages done.

xii) Contractor is advised to inspect the site before submitting the tender and examine all parts of the work.

xiii) Work should be done in such a manner that there should not be disturbance inside the office area.

9. **The quantities shown in the schedule i.e. Interior, Furniture, Chairs, Electrical Installation, DATA & Telephone cabling, Fire Alarm, Air-conditioning works are provisional and are likely to increase or decrease in any extend. Some of the items may be omitted altogether. No claim whatsoever shall be entertained on this account.**

10. All works in course of execution or after execution in pursuance of the Contract, shall at all times be open to the inspection and supervision of the Executive Director (Engineering) or his authorized representatives and the Contractor or his responsible agent, duly accredited in writing, shall at all such times, be present to receive instructions/orders. The work during the progress or any time before settlement of the final bill is also liable to be inspected by Chief Technical Examiner of the Central Vigilance Commission, New Delhi, on behalf of the Employer and this shall be also considered as an inspection by the Employer for all purpose.

11. **Contractors to note that the quoted rates shall be firm throughout the currency of the Contract. The escalation towards materials, labour etc. is not allowed and will not be paid.**

12. Price variation of materials shall not be allowed where the basic price of materials is mentioned in the respective items. However, if the purchase price of materials is less than the basic price of materials, the recoveries shall be made from the contractor bills.

1. **TESTING OF MATERIALS**

During the progress of work, tests as prescribed below for various materials of construction shall be conducted as per the frequency noted in the table below. **Contractor's attention is also drawn to Clause 9 of Conditions of Contract as well as Clause 9 of General Preambles to Schedule of Quantities.**

TESTING OF MATERIALS:

Following charts to be followed for the frequency of tests:

TABLE-A

Sr.No.	Materials	Test	Frequency
1	**Timber**	a) Moisture content b) Specific gravity c) Species in sample of teak wood.	One test for every 30cum or part thereof.
2	**Flush Door**	a) End Immersion b) Knife c) Adhesion	Destructive test based on no. of shutter. 1-100 one test, 101-200 two test 201-500 three test, 500 & above four test
3	**Ceramic Tiles / Vitrified Tiles**	Water absorption Crazing Test	One test for every 3000 nos. or part thereof.
4	**CHAIRS**	**Polyurethane Foam: Back & Seat** a) Thickness, mm b) Density, Kg/m3 c) Hardness, on Hamden Machine at 25% Compression **Polyurethane Arm Rest** a) Hardness (Shore A) **M.S. Black Powder Coating of Tube** a) Stroke Length, mm b) Pressure force applied 300N c) Thickness of powder coating, micron. **Flame Retardant Leatherette Tapestry** a) Colour fastness to rubbing b) Tear Strength, of **Hydraulic Cylinder** Pressure Testing	One test of each type of chair where tender qty. is more than 50 chairs.
5	**Fire Retardant Plywood**	a) Identification (Physical verification) b) Dimensional Tolerance c) Moisture content	One test from each Brand / makes.

Sr. No.	Materials	Test	Frequency
6	**Modular Furniture**	**M S Frame** a) Hardness, against scratch. b) Impact Resistance. c) Thickness of section, mm d)Thickness of powder coating, micron. **Particle Board 12 mm thick.** a)Thickness of Particle Board, mm b)Thickness of lamination, mm c)Moisture content, % **Particle Board 25 mm thick.** a)Thickness of Particle Board, mm b)Thickness of lamination, mm c)Moisture content, % **Aluminium Top Cap.** a)Thickness of powder Coating, micron.	One test from each source.

2. **APPLICABILITY OF MSME PROVISION ON WORKS CONTRACT**:

   Works contract does not falls within the ambit of Public Procurement Policy-2012 and MSME Act. Hence benefits under Public Procurement Policy for MSMEs shall not be extended against tender for "**WORKS CONTRACTS**".

3. .**REGISTRATION UNDER CENTRAL GOODS & SERVICE TAX ACT 2017 ON WORKS CONTRACTS**.

   "All the participating Bidders must have valid GST Registration Certificate ."

4. The contractor has to make his own arrangement for water and electricity to be used for construction work by following the rules, regulation and directives of local authorities. The water has to be tested to determine its suitability for concreting and construction work.

5. All the Rules, Regulations and Provisions of Government of India are applicable in this tender.

(SIGNATURE OF THE CONTRACTOR)

GENERAL PREAMBLES TO SCHEDULE OF QUANTITIES

These preambles apply to all the sections of the "Schedule of Quantities".

1. RATE TO COVER:

1.1 The rates quoted by the Contractor shall be held to include for providing and fixing, all conveyance and delivery, loading & unloading, carrying in, storing, hoisting, all labour, setting, fitting and fixing in position, making straight, cutting, waste, return of packing and all materials and labour and everything else necessary for the proper completion of each item of work to the approval of Corporation's Engineer and for Establishment Charges, overheads and profits. The Contractor shall provide at his expense all labour, materials and things required by the Corporation's Engineer for testing and measuring the work, for weighing, testing the efficiency of any portion of the work, all planking, gangways etc. necessary for affording access to every part of the work except where specifically stated otherwise.

1.2 The Contractor should also cover in his rates for the method of work, cost of materials, labour etc., to comply with the "Trade Specifications", General Instructions to Contractor", "Conditions of Contract", "Special Conditions", (if any), and all documents of this contract.

1.3 All the materials or procedures or specifications for work, unless otherwise stated, shall conform to the current Indian Standard whether or not specific mention is made thereof. The Contractor shall be responsible for and shall replace or make good at his own expense, any materials lost or damaged, or of quality not approved, temporarily disturbed roads, pavements, approaches, gates, walls or any such dismantling carried out to execute the work.

1.4 All rates quoted shall include for Supplying and fixing although the same may not have been mentioned in the item of the Schedule of Quantities. Words "Providing and Fixing where used shall have same meaning as "Supplying and Fixing".

1.5 **Rates quoted shall include for hoisting to any height and the work at all levels and lifting of Materials and working at any height shall not form any criterion for any extra claims, except where otherwise specified in Schedule of quantities.**

2. ANCILLARY WORKS:

2.1 The Contractor shall have to carry out all ancillary and connected work within and near vicinity of the plot of the proposed work and inside the Building if ordered to do so by the Chief Engineerat

the rates quoted in the Schedule of Quantities, at any time during the currency of this Contract including extension of time, if any granted.

3. PRICE FLUCTUATION / VARIATION:

3.1 Rates quoted by the Contractor shall be firm throughout the currency of the Contract including extensions of time, if any granted. No price adjustment due to variation in cost of materials or labour or any variation under any State or Central Legislation or any other reason whatsoever shall be allowed, except as stated in relevant clauses below with regard to variation in price on materials & labour and price fluctuation in Cement & Steel.

4. CEMENT:

CONTRACTOR'S QUOTED RATES:

4.1 Contractor shall quote his rates for various relevant items in the tender on the basis of provisions of this clause detailed hereunder and on the basis of the price of cement at site of work as mentioned in Annexure "P" attached herewith (hereinafter called the Basic Price of Cement).

APPROVAL OF SOURCE OF PURCHASE AND PRICE:

4.2 **Contractor shall purchase cement from approved reputed cement manufacturers such as ACC, UltraTech, J. P. Rewa, Vikram, Shree Cement, Birla Jute, CCI, Madras cement, Chettinad cement, India cement etc. as approved by Ministry of Industry, Govt. of India and having license to use ISI Certification mark for their products and from C&F agents and authorized_dealers (with dealership certificate).** Cement shall be Ordinary Portland Cement 33 / 43 Grade of fresh manufacture conforming to IS: 269/ IS: 8112 respectively; Portland Pozzolana Cement: IS: 1489 (Part 2): 1991; Portland Slag Cement: IS: 455 (1989) or relevant Indian Standards (latest revision**). Cement shall be purchased and transported to the work site by the contractor in bulk quantity required to achieve desired progress in next 3 months, from the above source of purchase (including brand of cement). At the time of starting the work, the request for approval shall be submitted within 15 days of receipt of tender acceptance letter. The contractor shall intimate the EE/SE the quantity of cement being procured, with the names, full addresses and telephone numbers of cement suppliers. For subsequent approvals the contractors shall approach Employer's Engineer at site at least 20 days in advance of the desired date of delivery of cement. The contractor shall submit his request for the approval through Employer's Engineer at site with one copy of the letter to EE/SE. The contractor's request letter shall mention the quantity of cement to be/ being purchased and also the quantity of cement in stock at site on the date of submitting the request.**

BASIC PRICE OF CEMENT:

4.3 The basic price of cement considered is inclusive of all taxes and costs upto the site of work (without GST), transportation charges including loading and unloading charges at all points (except unloading at site), transit insurance and any other expenses *(expenditure*) not mentioned above but required. All other costs such as unloading the cement at site, handling, stacking, storage, providing watch and ward arrangements, loss due to pilferage, theft, damages if any including cement which may become unfit for consumption due to prolonged storage or due to rains etc. shall be to contractor's account and shall be included by the contractor in rates quoted in the tender.

QUALITY OF CEMENT:

4.4 The contractor shall satisfy himself that the cement arriving at site is ordinary port-land cement conforming to the requirement of IS: 269/8112 for 33 / 43 Grade respectively; Portland Pozzolana Cement: IS: 1489 (Part 2); Portland Slag Cement: IS: 455 (1989) or relevant Indian Standard and shall procure Manufacturer's Certificate to this effect. In case the contractor has any doubt regarding the quality of cement, it is up to him to have it tested at his own cost and make sure before incorporation in the works that the cement is of right quality. Each consignment of cement supplied should have Test Certificate of the Manufacturer.

CONTRACTOR'S OTHER RESPONSIBILITIES / LIABILITIES:

4.5

(i) Contractor shall comply with all requirements/procedures etc. that may be stipulated if any, by Government /controlling authority from time to time and accordingly obtain the requisite supply of cement for the work.

(ii) Even though the source of cement is approved by the employer but the employer shall not be responsible for quality of cement or any loss/ damage in transit, delays due to non-availability of cement with the factory / C&F agents /authorized dealers and/or required transport etc. The contractor shall not be entitled to make any claim and Extension of time or Cost on the employer on such grounds.

(iii) Cement shall be kept in custody of the contractor at site. The contractor shall be responsible for the safety of the cement by providing watch and ward as is necessary and directed. In case any cement is damaged, unaccounted for or lost due to pilferage or any other reason either in transit or at site, the accountability will be with contractor. If any quantity of cement is found in excess of requirement or left over after completion of the work, same shall not be removed from site without the written permission of the Engineer-in-charge.

(iv)The contractor shall maintain a stock register at the site and shall record therein the receipt and consumption of cement, the same day it is received or consumed. He shall also get the

entries in the register for receipt and consumption of cement countersigned by Employer's Site Engineer, on the same day cement is received or consumed.

(v) Pozzolana/ Slag cement shall be used only if specifically permitted by the Chief Engineer. The Chief Engineer reserves the right not to allow the use of Pozzolana/ Slag cement. In case Pozzolana / Slag cement is used, the Contractor shall have to observe increased periods for striking form and additional period of one week for curing for which no claim shall be entertained.

(vi)The cement shall be got tested by the Engineer-in-charge of employer as and when new consignment comes and there is change in manufacturer's brand. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laboratories. The cost of tests shall be borne by the contractor/Department in the manner indicated below:-

(a)By the contractor, if the results show that the cement does not conform to relevant BIS codes.

(b)By the Department, if the results show that the cement conforms to relevant BIS codes.

(vii) The contractor is allowed to use reasonable quantity from the cement brought at site for constructing temporary water storage tank to store water for construction, site office and godowns at site. The quantity used for this purpose shall not be account for payment due to price variation defined elsewhere.

(viii) The actual issue and consumption of cement on work shall be regulated and proper accounts maintained. The theoretical consumption of cement shall be worked out as per procedure prescribed elsewhere in the contract. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment shall be made.

(ix) If the work executed is not conforming to acceptable standard as prescribed in the tender elsewhere, the work will not be considered for payment.

The damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Engineer-in-charge. If he does not do so within 3 days of receipt of such notice, the Engineer-in-charge shall get it removed at the cost of the contractor.

Chief Engineermay change the brand of Cement depending upon availability in local market, if needed. Instructions in this respect can be issued by them at regular intervals. The name of manufacturers should be finalized after taking into consideration the suggestions of contractors during pre bid meeting, if any.

Similar conditions for cement of other types like slag cement etc. may be incorporated wherever required by the authority by providing for relevant BIS Codes, suitable brands of cement and instructions issued by the department.

MILD STEEL BARS AND HIGH STRENGTH DEFORMED BARS FOR REINFORCEMENT IN R.C.C. WORK TO BE SUPPLIED BY CONTRACTOR:

CONTRACTOR'S QUOTED RATES:

5.1 Contractor shall quote his rates for relevant items in the tender on the basis of provisions of this clause detailed hereunder and on the basis of price of steel at site of work as mentioned in Annexure "P" attached herewith (hereinafter called the Basic Price of Steel).

5.2 APPROVAL OF SOURCE OF PURCHASE

(1) **The contractor shall procure TMT bars of Fe415/ Fe500 grade (the grade to be procured is to be specified) from primary producers such as SAIL or TISCO or RINL as approved by Ministry of Steel.** The TMT bars procured from primary producers shall conform to manufacturer's specifications. In case of non-availability of steel from primary producers, the approving authority may permit use of TMT reinforcement bars procured from secondary producers. In such cases following action is to be followed:

(a) The grade of the steel such as Fe415/Fe500 or other grade to be procured is to be specified as per BIS 1786 /2008.

(b) The secondary producers must have valid BIS license to produce HSD bars conforming to IS 1786: 2008. In addition to BIS license, the secondary producer must have valid license from either of the firms Tempcore, Thermex, Evcon Turbo & Turbo Quench to produce TMT Bars.

(c) The TMT bars procured from primary producers shall conform to manufacture's specifications.

(d) The TMT bars procured from secondary producers shall conform to the specifications as laid by Tempcore, Thermex, Evcon Turbo & Turbo Quench as the case may be.

(e) TMT bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 2008/2012 pertaining to Fe415D or Fe 500D grade of steel as specified in the tender (while preparing Tender the grade of the steel to be specified).

(2) The contractor shall have to obtain and furnish test certificates to the Engineer-in-charge in respect of all supplies of steel brought by him to the site of work.

(3) Samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications as defined under para (1)(d) & (1)(e) above, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the Engineer-in-Charge to do so.

(4) **The steel reinforcement bars shall be brought to the site in bulk supply required to achieve desired progress of the work in next 3 months, from the above source of purchase (including brand of steel) as decided by the Engineer-in-charge. At the time of starting the work, the request for approval shall be submitted within 15 days of receipt of tender acceptance letter. The contractor shall intimate the EE/SE the quantity of steel being procured, with the names, full addresses, and telephone numbers of steel suppliers. For subsequent approvals the contractors shall approach Employer's Engineer at site <u>at least 20 days</u> in advance of the desired date of delivery of steel. The contractor shall submit his request for the approval through Employer's Engineer at site with one copy of the letter to EE/SE. The contractor's request letter shall mention the quantity of steel to be/ being purchased and also the quantity of steel in stock at site on the date of submitting the request.**

(5) The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent their distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

(6) For checking nominal mass, tensile strength, bend test, re-bend test etc. specimens of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified in the tender.

<u>BASIC PRICE OF STEEL:</u>

5.3 The basic price of steel reinforcement considered is inclusive of all taxes and costs upto the site of work (without GST), transportation charges including loading and unloading charges at all points (except unloading at site), transit insurance and any other expenses *(expenditure*) not mentioned above but required. All other costs such as unloading the steel at site, handling, stacking, storage, providing watch and ward arrangements, loss due to pilferage, theft or any other reasons shall also be to contractor's account and shall be included by the contractor in rates quoted in the tender.

<u>QUALITY OF STEEL:</u>

5.4 The contractor shall satisfy himself that the steel arriving at site is TMT bars of Fe415/ Fe500 grade as per BIS 1786-2008/ 2012 or other grade bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786: 2008/ 2012 pertaining to Fe 415D or Fe 500D grade of steel as specified in the tender and shall be supported by test certificate from the suppliers. In case the contractor has any doubt regarding the quality of steel, it is up to him to have it tested at his own cost and make sure before incorporation in the

works that the steel is of right quality. Each consignment of steel supplied should have Test Certificate of the Manufacturer.

CONTRACTOR'S OTHER RESPONSIBILITIES/LIABILITIES

(i) Contractor shall comply with all requirements/procedures etc. that may be stipulated if any, by Government /controlling authority from time to time and accordingly obtain the requisite supply of steel for the work.

(ii) Even if the source of steel is approved by the employer, the employer shall not be responsible for quality of steel, correctness of diameter/ size or any loss /damage in transit, delays due to non-availability of steel with the manufacturer/suppliers and/or required transport etc. The contractor shall not be entitled to make any claim & Extension of Time or Cost on the employer on such grounds.

(iii) The contractor shall be responsible for proper storing arrangement at site. Steel shall be kept in custody of the contractor at site. The contractor shall be responsible for the safety of the steel by providing watch and ward as is necessary and directed. In case any steel is damaged, unaccounted for or lost due to pilferage or any other reasons either in transit or at site, the accountability will be with contractor. If any quantity of steel is found in excess of requirement or left over after completion of the work, same shall not be removed from site without the written permission of the Engineer-in-charge.

(iv) The contractor shall maintain a stock register at the site and shall record therein the receipt and consumption of steel (category wise), the same day it is received or consumed. He shall also get the entries in the register for receipt and consumption of steel countersigned by Employer's Site Engineer, on the same day steel is received or consumed.

(v) The wastage shall be to contractor's account and shall be taken away by the contractors after obtaining written permission from the **Engineer-in-charge** and the rates quoted shall allow for the same.

(vi) The payment of steel reinforcement shall be made on weight worked out on the basis of measurement of lengths of various categories as incorporated in the work and sectional weights mentioned in tender.

(vii) The contractor shall obtain a test certificate from the manufacturer for the lot of steel purchased for the work. The employer's site Engineer may also order testing of steel when new consignment comes and / or there is change in manufacturer's brand, by the contractor before allowing its use in the work irrespective of the test certificate and in such case the contractor shall supply free of charge the steel required for testing including its transportation cost to testing laboratories. The cost of tests shall be borne by the

contractor/Department in the manner indicated below but not any other incidental expenses for arranging the testing, which shall be to contractor's account and included in quoted rates:-

a. By the contractor, if the results show that the steel does not conform to relevant BIS codes.

b. By the Department, if the results show that the steel conforms to relevant BIS codes.

(viii) The actual issue and consumption of steel on work shall be regulated and proper accounts maintained. The theoretical consumption of steel shall be worked out as per procedure prescribed elsewhere in the contract. In case the steel consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment shall be made.

(ix) The substitution of any category of steel shown in drawing with any other category of steel shall be done only if permitted by the EE/SE in writing.

(x) The steel brought to site and the steel remaining unused shall not be removed from site without the written permission of the Engineer-in-charge.

6. WASTAGE OF CEMENT AND STEEL:

6.1 The wastage of Cement and Steel shall be to the contractor's Account and the rates quoted shall allow for the same.

7. BALANCE STOCK OF CEMENT / STEEL ON COMPLETION OF JOB:

7.1 Irrespective of what is mentioned anywhere else in this tender the surplus stock of Cement/Steel remaining at the site on completion of work, shall be the property of the Contractor. However, he shall remove the surplus stock only after furnishing the necessary details of such stock in writing to the Corporation's Engineer who shall give approval after satisfying himself that the amount advanced for the above stock has been fully recovered.

8. STEEL OTHER THAN USED FOR REINFORCEMENT:

8.1 Rolled steel sections such as angles, joists, channels, flats etc. and mild steel used for M.S. Grills, railing, gates and M.S. Plates etc., shall be procured by the Contractor and Annexure "P" will not apply for cost of these items.

9. TESTING OF MATERIALS INCLUDING CEMENT AND STEEL:

9.1 Testing of all materials including cement & steel during the progress of work shall be as per frequency given in Table A, clause 2 of Special Conditions.

9.2 Contractor shall facilitate testing of materials viz, cement, steel, cubes and any other material as per the frequency/sampling mentioned in Table-A, clause-2 of Special conditions. Contractor shall also facilitate testing of any material to be incorporated in work even if it is not specifically mentioned.

The testing charge against invoice shall be directly remitted by the Corporation to the test house wherever feasible. If the material/s fail/s to conform to the Standards , the test charges shall be recovered from Contractor's bill.

OR

The testing charge/s will be reimbursed to the Contractor on submission of original payment receipt / invoice of testing charge/s alongwith original test reports. The testing charges will not be reimbursed to the Contractor if the results are unsatisfactory.

9.3 For all other materials listed in Special conditions, expenses towards testing shall be borne by LICI. If the material fails to conform to the Standards (BIS), the test charge shall be recovered from Contractor's bill.

9.4 The Corporation's Engineer may get tested any material to be incorporated in work even if it is not specifically mentioned. In all such cases, testing charges will be borne by LIC. If the material fails to conform to the Standards (BIS), the test charges shall be recovered from Contractor's bill.

9.5 For all tests, incidental charges such as cutting, loading, unloading, casting wherever applicable such as mortar briquettes/cubes and facilitating in transportation including materials required for testing shall be borne by the contractor.

9.6 The materials shall get tested preferably at Government Laboratory/Government Engineering Colleges. In absence of such facility at a particular place, the testing of materials shall be arranged through other Laboratories/Institutions of repute after obtaining specific approval from the Chief Engineer. The forwarding letter for testing of materials shall be signed by Employer's Engineer posted at site/Employer's Engineer controlling the project and shall be directly sent to test house by LIC of India. The testing charges shall be directly remitted by LIC of India and if the material fails to conform to relevant BIS standards and/or any other Standard stipulated by LIC of India, the testing charges shall be recovered from the contractor's bill/s payable. The incidental expenses like carriage, post and courier shall be borne by LIC of India. The testing Laboratory shall be asked to send the test result/s to LIC of India directly by Post/Courier.

Above stipulations (9.1, 9.2, 9.3, 9.4, 9.5 and 9.6) supersede any other conditions /stipulations pertaining to testing of materials mentioned elsewhere in this tender.

10. "PRINCIPAL MAKE/S OR OTHER EQUAL AND APPROVED" FOR MATERIALS / PRODUCTS:

10.1 The Contractor shall note that materials having "ISI" monogram shall primarily be used in the work. If in the tender "Certain Principal Make / Makes or other equal and approved of any material / Product is mentioned in any item or Trade Preambles relating to the particular items in its respective Trade Schedule, the Contractor shall have to use the Principal Make/Makes specified in the relevant item or the trade Preambles. In case the specified particular Principal make / makes of the materials product is/are not readily available, the Contractor shall take prior permission and approval of the Chief Engineer in writing before use of the alternative equivalent make of the Material / Product.

10.2 All principal makes specified for any item shall be treated at par as per the accepted quoted rate.

10.3 Use of the make other than the Principal Make/Makes (which shall be treated as an Equivalent make) shall be at the discretion of the Chief Engineer and such Make/Makes shall be used after the approval of the Chief Engineer.

10.4 In such cases the Contractor will not be paid any extra payment over the accepted quoted rate in any case. However if it is ascertained that the price of approved Equivalent Make or the Material/product is lower than that for the Principal Make/Makes of the same material / product the difference of the price shall be payable by the contractor to LIC. Such difference of price shall be suitably decided by the Chief Engineer whose decision shall be final and binding to the Contractor in this regard.

11. Valuation for Variation

The rates of such altered, additional or substituted works shall be determined in accordance with the following.

a. The net rates or prices in the original tender shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced therein.

b. The net price of the items in the original tender shall determine the value of the items omitted. However, if omissions vary the conditions under which any remaining items of the work are carried out or if the amount of any omission relative to the amount of the whole of the Contract works or to any part thereof shall be such that in the opinion of the Chief Engineer, the net rate or price contained in the Priced Schedule of Quantities or Tender or for any item of work involves loss or expenses beyond that reasonably contemplated by the Contractor and is by reason of such omission rendered unreasonable or inapplicable, the Chief Engineer shall fix another rate or price as in the circumstance he shall think reasonable and proper.

c. If the rate for any altered, additional, or substituted item of work is not specified in the schedule of quantities, the rate for that item shall be derived from the rate for the nearest similar item specified therein.

d. If the rate for altered, additional or substituted item of work cannot be determined in the

manner specified above, then such items of work shall be priced on the basis of coefficients of labour and materials as given in the latest CPWD rate analysis handbook and rates for labour and materials wherever applicable shall be the market rate prevailing at the time of execution.

e. Where such co-efficient are not available in C.P.W.D. rate analysis, the actual Labour/Materials involved and recorded by the Executive Engineer in executing the items shall be considered.

f. Where extra work cannot be properly measured or valued, the Contractor shall be allowed "Day Work" prices at the net rates stated in the Tender or the Priced Schedule of Quantities or, if not so stated, then in accordance with the local "Day Work" rates and wages for the district, provided that in either case vouchers specifying the date and time (and if required by the EE the names of workmen employed) and materials incorporated be delivered for verification to the EE or his representative at or before the end of the week following that in which the work has been executed. The EE is not bound to recognize the cost of materials furnished in vouchers; the CE at his discretion will fix the price of such materials based upon market value.

g. While fixing rates of extra items 15% (Fifteen percent only) shall be allowed over and above the cost of material, labour and all applicable taxes, cess, statutory levies (excluding Income Tax) to cover all supervision, overheads and profits. This shall not however apply where 100% advance is given by the employer for purchase of any material (such as cement, steel etc.). In such cases 3.75% of the cost of materials only shall be allowed as handling charges and 15% shall be allowed only on the labour cost apart from above mentioned taxes etc.

h. Where the quantities of any item in the schedule exceeds by 100% in foundation and in plinth, and 50% in super-structure (above plinth), these extra quantities over 100% & 50% respectively will be treated as extra items of work and priced accordingly as above. [Items such as roads, pavements etc. shall be considered as below plinth]. The decision of CE for terming items below or above plinth is final & binding on the contractor.

i. For all extra items of work, the contractor should submit to the concerned Corporation's Engineer the necessary particulars along with his analysis and the rate he proposes to claim for consideration within a period of 4 (four) weeks from the time of cropping up of any authorized extra / deviated item. He shall also ensure that all the authorized claims are included in the final bill. If the contractor fails to submit his claim within the stipulated period or the period duly extended by the Corporation's Engineer, then the CE shall proceed to fix the rate for the item(s) and the same shall be final and binding on the contractor. The Contractor shall note that Extra/Deviated items claim and/or any other claim whatsoever if submitted after submission of his Final Bill, will not be entertained and considered by the Employer. The Contractor shall not be allowed to make any Additions/ Alterations/ Revisions / Changes/ Modifications/ Variations in the final bill, after the final bill is submitted by him.

BILL FORMAT

MEASUREMENTS: - **The measurement shall be recorded by Construction Associates (i.e. Contractor) as per prescribed format attached (Annexure A1, Annexure-B, and Annexure-C) and followed the instruction for preparation & submission of measurement sheets & bill as per enclosed Annexure-D herewith for your ready reference. (Refer Clause-21 with all its Sub-clauses of Conditions of Contract of the Tender(Part-I)**

Annexure-A1

E-MEASUREMENT SHEET

Bill No:

i	Name of the work
ii	Agreement No & date / Contract Ref:
iii	Name of the Construction Associate & address
iv	Name and Designation of LIC measurer with S.R. No.
v	Period of measurement
vi	Name of the Construction Associate's authorised Engineer/s attending measurement. Authorisation letter ref:

Item no	Description of item	Unit	No	Length	Breadth	D/H	Qty	Remarks / Notes.

Signature of Construction Associate's Engineer. (Name)

Signature of LICI Site Engineer (Name & S.R. No)

Signature of LICI Test Checking Engineer (Name & S.R. No)

Annexure-A2

E-MEASUREMENT SHEET (Reinforcement)
R.A. BILL..... / FINAL BILL

i) Name of the work
ii) Agreement No & date / Contract Ref.
iii) Name of the Construction Associate & address
iv) Name, Designation of LIC measurer with S.R. No
v) Period of measurement
vi) Name of the Construction Associate's authorised Engineer/s attending measurement.
Authorisation letter ref.

Location Description and size of RCC Member.	Number of RCC members	Sketch of reinforcement bar and position in RCC member if posible to draw.	Reinforcement bar as marked on the drawing / Position of bar	Number of bars	Leangth of bars	Total length of bars , col (2)x(5)x(6)	Remarks	Diameter of bars and Total length as per column 7						
								8 mm	10 mm	12 mm	16 mm	20mm	25mm	32mm
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Signature of Construction Associate's Engineer.
(Name)

Signature of LIC Site Engineer
(Name & S.R. No)

Signature of LIC Test Checking Engineer
(Name & S.R. No)

[redacted]

Annexure -B

ABSTRACT SHEET

A/C R.A. BILL ..... / FINAL BILL

i Name of the work

ii Agreement No & date / Contract Ref:

iii Contract Amount :

iv Name of the Construction Associate & address:

v Name, Designation of LIC measurer with Sr. No. :

vi Period of measurement :

vii Name of the Construction Associate's authorised Engineer/s attending measurement. Authorisation letter ref:

viii Date of Submission :

Sl No	T. Item No	Description of Item	Unit	Tender Qty	Qty up to pervious Bill	Qty in this Bill	Cumulative Total Qty	Rate in Rs.	Amount in Rs.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)= (6)+(7)	(9)	(10)=(8)X(9)

Note: For any inadvertent deviations in Item Description, unit or Rate after importing the file, the original contract document will prevail upon

Authorised Signatory of Constrcution
Name & Designation

Annexure -C

DRAFT INVOICE

CONSTRUCTION ASSOCIATES NAME AND ADDRESS , GST NO......, STATE CODE ....., PAN NO.....

To,

....., **LIFE INSURANCE CORPORATION OF INDIA..... OFFICE .....**

LIC GST NO.....

STATE CODE :.....

INVOICE NO:

DATE:

REF OF WORKORDER :

NAME OF WORK:

Sl No	T. Item No	Description of Item	Unit	Tender Qty	Qty up to pervious Bill	Qty in this Bill	Cumulative Total Qty	Rate in Rs.	Amount in Rs.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)= (6)+(7)	(9)	(10)=(8)X(9)

Date of Submission :

Authorised Signatory of
Constrcution Associate
Name & Designation

Annexure-D

FLOWCHART OF e-MEASUREMENT PROCESS.	ACTION BY
MASTER FOLDER For Each Contract : BOQ in duly protected EXCEL File with full description of Items as per the approved Tender with all amendments to be shared with Construction Associate.	LIC
Construction Associate to import item description in measurement sheet from BOQ. He will enter the measurements in e-measurement sheet in EXCEL format. (Annexure -A1&A2) and submit to LIC Site Engineer with Printout.	Construction Associate
LIC Site Engineer to Check 100% measurements submitted by Construction Associate. Test Check to be carried out by Sr officials wherever necessary as per norms. Variation/ correction if any found in the measurements submitted by Construction Associate shall be entered by LIC Site Engineer and a print of such PDF formatted Measurement Sheet will be taken and signed by the LIC Site Engineer, Test Checking Engineer and the Construction Associate on the hard copy.	LIC Site Engr.
Construction Associate to Prepare the Abstract of Bill in EXCEL Sheet taking quantities from PDF formatted measurement sheets and items specifications from BOQ. The Construction Associate to submit Abstract of Bill in EXCEL Format and Printout to LIC Site Engineer along with the corrected measurement sheets.	Construction Associate
After due verification of Abstract Bill , The LIC Site Engineer shall submit the Printout of Abstract Bill, Measurement Sheets duly signed by LIC Site Engineer and Construction Associate, Bill Forwarding note to Zonal Office/ Unit Office for Accounts verification	LIC Site Engr.

Technical Scrutiny to be completed by concerned official and then Account Section to do scrutiny of Bill on Hard copy as per present practice and Corrected copy to be shared with Construction Associate for generation of Tax Invoice.	**Higher officials & Engg. Accounts.**
Construction Associate to prepare Tax Invoice based on scrutinized Abstract of Bill and Submit the same to Zonal Office /Engineering unit as per GST requirements	**Construction Associate**
After Passing of Bill, the RA Bill/Final Bill duly scanned and Bonafide measurement sheets in PDF format of all the Original Works, Modernization Works and Repair Maintenance /Addiction Alteration works costing more than Rs. 5.00 Lakhs to be uploaded on EDMS server.	**Engg. Accounts.**

EAST CENTRAL ZONAL OFFICE, PATNA

LIST OF PRINCIPAL / APPROVED MAKES FOR CIVIL WORKS

Sr. No.	MAKES /AGENCIES / BRANDS	Sr. No.	MAKES /AGENCIES / BRANDS
1	**GI PIPES**	2	**GI PIPE FITTINGS**
	a. Jindal		a. R- Brand
	b. Zenith		b. K. S. Brand
	c. Apollo		c. Zoloto
	d. GST		d. RR
	e. Surya Prakash		e. SSS
	f. QST		f. NMC
	g. Tata		g. Unik
			h. Surya
3	**COPPER PIPES / TUBES**	4	**MULTILAYER COMPOSITE PIPES**
	a. Rajco Metal Industries		a. Ki TEC
	b. B. P. Conex		b. Kisan
	c. Comap		
5	**PVC PIPES & FITTINGS**	6	**UPVC (UNPLASTICIZED PIPES & FITTINGS)**
	a. Chemplast		a. Prince
	b. Prince		b. Supreme
	c. Supreme		c. Paras
	d. Finolex		d. Precision Pipes
	e. Oriplast		e. Kelvin
	f. Precision Pipes		
	g. Kelvin		
7	**CPVC PIPES & FITTINGS**	8	**GATE VALVES, GLOBE VALVES**
	a. Supreme		a. Leader
	b. Precision Pipes		b. Kirloskar
	c. Kelvin		c. Zoloto
	d. Prince		d. Orient
	e. Astral		
	f. Flowguard		
9	**FOOT VALVES, CHECK VALVES**	10	**WATER METER**
	a. Kirloskar		a. Capstan
	b. Leader		b. Anandaasahi
	c. Ashoka		c. Dasmesh
			d. Remco
11	**FERRULES**	12	**BIB COCKS, STOP COCKS, PILLAR TAPS ETC**
	a. Leader		a. Jaguar
	b. HINDCO		b. Marc
	c. Neta		c. Essco
	d. Annapurna		d. ARK

			e. GEM
			f. CERA
13	**FLUSHING CISTERNS (PVC / CERAMIC)**	14	**VITREOUS SANITARY WARE LIKE IWC, WASH BASIN, URINALS, EWC ETC.**
	a. Parryware		a. Parryware
	b. CERA		b. CERA
	c. Hindware		c. Hindware
	d. Commander		d. Neycer
			e. RAK
			f. Jaquar
15	**PLASTIC SEAT & COVER**	16	**BATHROOM FITTINGS**
	a. Commander		a. Jaguar
	b. Parryware		b. ESSCO
	c. Bestolite		c. Gem
	d. Duroshine		d. Ark
	e. Jaquar		e. Marc
			f. CERA
			g. RAK
17	**CI PIPES & FITTINGS**	18	**CI NAHANI TRAP**
	a. Hind.		a. BIC
	b. Bic		b. SKF
	c. Neco		c. NECO
	d. RPMF		d. RAJCO
			e. RPMF
19	**CI MANHOLE COVER**	20	**SW PIPE**
	a. RPMF		a. HIND
			b. PERFECT
			c. BURNS
21	**PVC CABINET MIRROR**	22	**SLUICE VALVE**
	a. Commander		a. Leader
			b. Kirloskar
23	**HDPE / LDPE / LLDPE WATER STORAGE TANKS**	24	**HDPE PIPES & FITTINGS**
	a. Sintex		a. Kelvin

	b. Polycon		b. Prince Pipe & Fittings
	c. G&P		
	d. Prince Pipe & Fittings		
25	**CERAMIC /GLAZED TILES**	26	**VITRIFIED TILES**
	a. NITCO		a. NITCO
	b. Kajaria		b. Kajaria
	c. Euro		c. RAK
	d. H. R. Johnson		d. Euro
	e. Somany		e. Somany
	f. Oriental Bell Ltd.		f. Oriental Bell Ltd.
	g. Asian granite India Ltd (AGL)		g. Asian granite India Ltd (AGL)
	h. CERA		h. Vermora
	i. RAK		i. H. R. Johnson
	j. Vermora		j. CERA
27	**PLYWOOD (BWR), BLOCK BOARD**	28	**FLOAT GLASS**
	a. Archid		a. Saint Gobain
	b. Green Ply		b. Modi Guard
	c. Century Ply		c. Triveni Sheet Glass
	d. Bhutan Board		d. Indo Asahi Glass Co.
	e. Sharon		e. Tata
	f. Anchor		f. Atul
	g. Swatstik		
	h. National		
	i. Samrat Plywood Ltd		
	j. Green Panel		
	k. Merino		
	l. Austin		
	m. Kalpataru		
	n. Duro		
29	**CALCIUM SILICATE BOARD / FIBRE CEMENT BOARD & ACCESSORIES**	30	**PVC DOORS AND DOOR FRAMES**
	a. Hilux (Ramco)		a. Rajshri
			b. Sintex
			c. Supreme
31	**ALUMINIUM EXTRUDED SECTIONS**	32	**WPC DOOR, DOOR FRAMES & WINDOWS, UPVC SOLID DOOR**
	a. Jindal		a. Qute

	b. Indal		
	c. Hindalco		
33	**STAINLESS STEEL KITCHEN SINKS**	34	**PRE-LAMINATED PARTICLE BOARD**
	a. Nirali		a. Green Lam
	b. Farnkee		b. Archid lam
	c. Jayna		c. Swastik
	d. Diamond		d. Green Panel
	e, Neelkanth		e. Duro
	f. CERA		f. Asis
			g. Heritage Laminates
			h. Century
35	**FLUSH DOOR SHUTTERS**	36	**DECORATIVE LAMINATES**
	a. Kutty Flush doors		a. Green Lam
	b. Century		b. Merino
	c. Green Ply		c. Sunmica / Formica
	d. Shiva Hari Plywood Ltd. (Corbett)		d. Century
	e. Anchor Ply		e. Durian
	f. Swastik Ply		f. Sundek
	g. Western India		g. Anchor
	h. Parvati Wood		h. Decolam
	i. Archid Ply		i. Archid Ply
	j. Samrat Plywood Ltd		j. Samrat Plywood Ltd
	k. Green Panel		k. Heritage Laminates
	l. Merino		l. Asis
	m. Austin		m. Green Panel
	n. Kalpataru		n. Virgo
	o. Duro		
37	**FLOOR SPRINGS**	38	**VENEERS**
	a. Everite		a. Decowood
	b. Hardwyn		b. Euro veneers
	c. Efficient Gadgets		c. Durion
	d. Garness		d. Green Lam
	e. Dorma		e. Archid Ply
			f. Green Panel
			g. Kalpataru
			h. Duro
39 i)	**MDF BOARDS**	39 ii)	**HDF BOARD**

	a. Duratuff		a. Green Panel
	b. Nuwud		b. Asis
	c. Century		
	d. Green Ply		
	e. Green Panel		
	f. Asis		
40	**ADHESIVES**	41	**WOOD PRESERVATIVES**
	a. Fevicol (Pidilite)		a. Bison
	b. Araldite		b. Godrej
	c. Ciba Giegy		c. Kot
	d. Mowiol – HV of Mafatlal		d. Terminator
42	**HARDWARE FITTINGS**	43	**DOOR CLOSERS**
	a. Jyoti		a. Everite
	b. Argent		b. Hardwyn
	c. C.I.E.F.		c. Efficient Gadgets
	d. Classic		d. Ebco
	e. Everite		e. Dorma
	f. Metaco India		f. Garness
	g. JH Aluminum		
	h. PV Radhakrishna		
	i. Etalia		
	j. Hardwin		
44	**S S HARDWARE FITTINGS (HINGES, FLOOR SPRINGS, DOOR CLOSERS, HANDLES, FURNITURE HARDWARE, LOCKS, PATCH FITTING FOR GLASS, SHOWER PANEL, SLIDING/TOWER BOLT, GLASS RAILINGS)**	45	**DRAWER SLIDERS**
	a. Ozone		a. Efficient Gadgets
	b. Hettich		b. Ebco
	c. KICH		c. Etahoa
	d. Godrej		d. Sisco
	e. Dorset		
	f. Magnum		
	g. Yale		
	h. Ebco		
46	**LOCKS**	47	**MIRRORS**

	a. Godrej		a. Atul
	b. Golden		b. Sun
	c. Efficient Gadgets		c. Commander
	d. Mark		d. Modi Guard
	e. Sheet		e. Saint Gobain
	f. Vision		f. Globe
	g. Dorma		g. CERA
48	**WATER PROOFING COMPOUND**	49	**SPECIAL PROTECTIVE & DECORATIVE FINISH**
	a. Impermo		a. Snowcem Paints
	b. Cico		b. Asian Paints
	c. Pidilite		c. Berger
	d. Roff		d. Jenson & Nicholson
	e. Choksey		e. Kansai – Nerolac
	f. Hindustan - Ciba –Gaigey		f. ICI
	g. Accoproof		g. Godawari
	h. Sika		h. Nippon
	i. Fosroc		
	j. MYK Arment		
	k. Tikidan		
	l. Berger Home Shield		
	m. Asian Paints Smart Care		
	n. Kryton		
50	**OIL BOUND DISTEMBER**	51	**CEMENT PAINT**
	a. Asian		a. Snowcem Plus
	b. Berger		b. Berger
	c. Jenson & Nicholson		c. Asian
	d. ICI		d. Jenson & Nicholson
	e. Kansai – Nerolac		e. Kansai – Nerolac
	f. Godawari		f. ICI
	g. Nippon		g. Godawari
			h. Ultratech
52	**SURFACE TEXTURE**	53	**TEXTURED PAINT**
	a. Heritage (Bakelite Hylam Ltd.)		a. Snowcem India Ltd.-Santex matt
	b. Spectrum		b. Asian
			c. Jenson & Nicholson
			d. Berger
			e. Kansai – Nerolac
54	**ENAMEL PAINT / PRIMERS / READY MIXED PUTTY FOR WOOD WORK, IRON & STEEL**	55	**WALL PUTTY**
	a. Asian		a. Birla wall care

	b. Berger		b. Snowcem paints
	c. Jenson & Nicholson		c. JK
	d. Kansai – Nerolac		d. Asian Paints
	e. ICI		e. Berger
	f. MRF		
	g. Godawari		
	h. Nippon		
56	**EXTERIOR EMULSION**	57	**CEMENT CONCRETE PIPES**
	a. Asian Paints-Apex Ultima		a. The Indian Hume Pipe
	b. Berger Paints		b. Premiere Pre-stressed Co.
	c. Kansai – Nerolac		
	d. MRF		
	e. Jenson & Nicholson		
	f. ICI Weather Shield Max		
	g. Godawari		
	h. Nippon		
58	**EXPANSION JOINT BOARD**	59	**FALSE CEILING (Gypsum)**
	a. Shalimar Tar Products		a. USG Knauf
	b. Lloyds insulations		b. Gyproc Saint Gobain
	c. Fosroc		
	d. Shalitex		
	e. Pidilite		
60	**FALSE CEILING (METAL)**	61	**MINERAL FIBRE CEILING**
	a. Saint Gobain		a. Daiken
	b. Hunter Douglas		b. USG Knauf
	c. Armstrong		c. Armstrong
	d. Fameline		
	e. USG Knauf		
62	**CSB FALSE CEILING**	63	**VERTICAL BLINDS**
	a. Aerolite		a.Vista Levlor
			b. Trac
			c. Mac
			d. MARVEL
64	**PLASTICIZER, SUPER PLASTICIZER, ADMIXTURES & OTHER CONSTRUCTION CHEMICALS.**	65	**ADHESIVE FOR TILE FIXING**
	a. Asian Laboratories		a. Roffe
	b. CICO		b. Balendura
	c. Ultracon		c. Cera Bond
	d. Fosroc		d. Fosroc
	e. Sika		e. Choksey Chemicals
	f. Kunal Conchem		f. Dr.Fixit

	g. Pidilite		g. Sika
	h. BASF		h. Sunanda
	i. ECMAS		i. Ferrous Crete
	j. MYK Arment		j. BASF
	k. Kryton		k. MYK laticrete
			l. CICO
			m. Berger Home Shield
			n. Asian paints Smart Care
66	**LIQUID/ SELF ADHESIVE MEMBRANE**	67	**PAVING TILES**
	a. Asian Paints Ltd		a. Eurocon
	b. Ardex Endura		b. Ultra
	c. Fosroc		c. Duracrete
	d. Pidilite		d. Unistone
	e. MYK Arment		
68	**PVC FLOORING**	69	**VINYL FLEXIBLE FLOORING**
	a. Flora		a. Wonder floor
	b. Armstrong		b. Armstrong
			c. Bhor
			d. Rikvin
			e. Tusker
70	**FIBRE GLASS DOOR**	71	**Soft Board**
	a. Master Craft		a. Jolly Board
72	**SCREW**	73	**FIBRE REINFORCED COMP. DOOR**
	a. Nettlefold		a. Loknath Unique
	b. GKW		
74	**CEMENT**	75	**Steel**
	Brands produced by any company, who is a Member of Cement Manufacturers Association.		a. SAIL
			b. Vizag Steel
			c. Tata Steel
			d. JSW
76	**SPECIALISED WATERPROOFING AGENCIES**	77	**RAL GLAZING AND ACP WORK**
1	India Water proofing Co. 3rd Floor, Rohit Chambers, Janmabhoomi Marg, Mumbai G.P.O(fort), Mumbai Tel.: 022 2287 1156		**Glass : Monolithic heat-strengthened / Insulated / laminated / Tempered glass.** a. Asahi India Glass Ltd. b . St. Gobain India
2	Likproof India Pvt Ltd. 2nd floor, Cecil Court, Mahakavi Bhushan Marg, Colaba, Next To Regal Cinema, Colaba Mumbai 400039, 022 2202 0083		**Aluminium Extrusions.** a. Jindal b. Hindalco c. Indal d. Global Aluminium e. Bhoruka
3	The Perfect waterproofing Co, 6637/6, Kothi Mem, Bara Hindu Rao,Delhi-110 006, Delhi – 110006 Tel.:(011)9711804217, 9312630094		**Aluminium Composite Cladding Panels** a.Alcobond b.Aluma c.Durabuild d. Euro

			e. Virgo f. Timexbond g. Alutech h. Alstrong i. Aludecor j. Alcopanel k. Alpolic l. Alubond
4	Oversee Waterproofing Corporation 2nd Floor, Baldota Bhavan, 117, M Karve Road, Churchgate, Mumbai-400020, Tel.:022 2205 3827		**Expansion anchors with SS 316 Screw, Bolts & Nuts**. a. Hilti b. Fischer c. Arrow d. Kundan
5	M/s New Asia Water Proofing Co, Mohiyuddin Khan, Gaour Mohallah, Roshan Ganj, Sikar, Raj. (332001)		**Chemical anchors** a. Hilti or approved equivalent
6	M/s. Asian Waterproofing Co. , 347/CT Road, Salkia, Kolkatta -6 **(The agency is debar for 5 years (20.6.2020 to 20.6.2025 as approved by the then CE, CZO vide note ref CZ/Engg/Biaora dated 18.06.2020)**		**Door & Window furniture:** a. **4 point lockset** : GIESSE or approved equivalent. b. **S.S friction hinges :** Cotswold, c.**Patch fittings / Spider Fittings:** Dorma ,Windor, Kich d. **Floor Spring, handle etc** : Dorma e. **Adhesive film** : 3 M, Birla or approved equivalent
7	M/s. M.R. Consultants & Constructions, Universal House, D-187, Vaibhav Khand, Gomati Nagar, Lucknow .		**Structural Sealant :** Dow Corning, GE – Two Part
			Weather Sealant : Dow Corning, GE
			Foam Spacers and Mounting Tapes: Norton
			EPDM : AMEE Rubber Industries or approved equivalent
			Insulation : U.P. Twiga, Lloyds Insulation or approved equivalent

EAST CENTRAL ZONAL OFFICE, PATNA

LIST OF PRINCIPAL / APPROVED MAKES FOR ELECTRICAL WORKS

Sr. No.	MAKES /AGENCIES / BRANDS	Sr. No.	MAKES /AGENCIES / BRANDS
1	**COPPER CONDUCTOR PVC INSULATED FR GRADE WIRES**	2	**PVC INSULATED ARMOURED CABLES (LT/HT)**
	a. Finolex		a. Finolex
	b. Havells		b. Fort Gloster
	c. V Guard		c. CCI
	d. R R Kabel		d. R R Kabel
	e. KEI		e. Delton
	f. Svarn		f. KEI
	g. Rallison		g. Havells
	h. Polycab		h. Svarn
	i. Delton		i. Rallison
			j. Polycab
3	**MAIN SWITCH WITH HRC FUSES**	4	**MAIN SWITCHES WITH REWIREABLE FUSE**
	a. L&T		a. L&T
	b. Siemens		b. Crompton
	c. Havells		c. Havells
5.	**MCCB**	6	**MCB/ELCB/ELMCB/DB**
	a. Siemens		a. .Legrand
	b. L&T		b. Siemens
	C. Schneider-MJ		c. Schneider-MJ
	d. Legrand		d. L&T
	e. Havells		e. Havells
7	**CHANGE OVER SWITCH /SWITCH FUSE UNIT UPTO 100AMP**	8.	**CHANGE OVER SWITCH /SWITCH FUSE UNIT ABOVE 100AMP,**
	a. HPL		a. HPL
	b. L&T		b. L&T
	c. Havells		c. Siemens
	d. Siemens		d. Havells
9	**RISING MAINS**	10	**PVC CONDUIT(ISI MARK)**
	a. GEC		a. Precision
	b. Schneider -MJ		b. Avon plast
	c. L&T		c. Essarke
	d. Siemens		d. Sudhagar
	e. Legrand		e. Kalinga
			f. AKG
			g. Finolex
11	**PVC CASING CAPING**	12	**M. S. CONDUIT**
	a. Precision		a. Supreme
	b. Kalinga		b.BEC
	c. AKG		c.NIC
	d. Sudhakar		d. AKG
	e. Diamond		

	f. Modi		
13	**FLOOR TRUNKING SYSTEM**	**14**	**G. I. PIPE**
	a. Legrand		a. Jindal
	b. Honey well		b. Senith
	c. Precision		c. Prakash
	d. Modi		d. TATA
			e.GST
			f. Apollo
15	**MODULAR SWITCHES, ACCESSORIES &ELECTRONIC REGULATOR**	**16.**	**NON MODULAR SWITCHES , ACCESSORIES &ELECTRONIC REGULATOR**
	a. Anchor		a. Anchor
	b. SSK		b. Leader
	c. Leader		c. SSK
	d. Havells		d. CPL
	e. Honey Well		e. Havells
	f. L & T		f. L & T
17	**INDUSTRIAL PLUG &SOCKET**	**18 i)**	**CEILING /EXHAUST /WALL FAN**
	a. Legrand		a. Usha
	b. Havells		b. Crompton
	c. Crompton		c. Orient
	d. L&T		d. Bajaj
	e. Anchor		e. Almonard
	f. Honey well		f. Havells
			g. Rallison
18 ii)	**BLDC FANS**	**19**	**INDOOR LIGHT FITTINGS / LAMPS**
	a. Usha		a. Philips
	b. Crompton		b. Wipro
	c. Orient		c. Crompton
	d. Bajaj		d. GE
	e. Almonard		e. Havells
	f. Havells		f. Osram
	g. Rallison		g. Bajaj
	h. Atomberg		h. Elenserve
			i. Jaquar
			j. Banburry
20	**OUT DOOR LIGHT FITTINGS / LAMPS**	**21**	**CABLE GLANDS**
	a. Philips		a. Comet
	b. wipro		b. Dowells
	c. Crompton		c . Braco
	d. GE		d. Siemens
	e. Havells		
	f. Osram		
	g. Bajaj		
	h. K-LITE		
	i. Elenserve		
	j. Jaquar		

	k. Banburry		
22	**LUGS**	**23**	**CONNECTORS**
	a. Dowells		a. Elmex
	b. Comet		b. Connectwell
	C. Braco		c. Phoenex
			d. Wago
24	**MOTOR STARTER**	**25**	**MONOBLOCK PUMP**
	a. Siemens		a. Kirloskar
	b. L & T		b. Crompton
	c. Crompton		c. CRI
	d. kirloskar		d. Wilo
	e. Texmo		e. Grundfos
	f. Suguna		f. Texmo
	g. KSB		g. Suguna
	h. Sharp		h. KSB
	i. Mahindra		i. Sharp
	j. Decon		j. Mahindra
			k. Decon
26	**LIGHTERNING ARRESTOR**	**27**	**TRANSFORMER**
	a. Pactil		a. Pactil
	b. Heco		b. Emco
	c. Atlas		c. Crompton
	d. G.K. Electricals		d. Kirloskar
			e. GEC
			f. Tesla
			g. Voltamp
			h. BHEL
			i. Areva
28	**A.B. SWITCH & D.O. FUSE**	**29**	**SELECTOR SWITCH**
	a. Pactil		a. Kaycee
	b. Jenco		b. Siemens
	c. Crompton		c. C & S
	d. Atlas		d. AE
			e. L&T
30	**INDICATING LAMPS**	**31**	**CONTACTORS**
	a. Vaishno		a. Siemens
	b. Essen		b. L & T
	c. Philips		c. ABB
	d. L&T		d. Schnieder-mj
	e. GE		
32	**MEASURING INSTRUMENTS**	**33**	**PF IMPROVEMENT CAPACITOR & APFC PANEL**
	a. AMP		a. EPCOS
	b. Meco		b. Neptune
	c. AE		c. L & T
	d. Enercon		d. Crompton
	e. PROK-DV's		e. Havells
	f. L&T		

34	**RELAY FOR AUTOMATIC PF IMPROVEMENT**	**35**	**CURRENT TRANSFORMER**
	a. EPCOS		a. AE
	b. Conzerve		b. Rishabh
	c. L & T		c. Kappa
	d. Havells		d. L&T
36	**DATA CABLES & FACTORY MADE PATCH CHORDS**	**37**	**INFORMATION OUTLET / RJ 45 CONNECTORS / RJ – 11 SOCKETS**
	a. Legrand		a. D –Link
	b. D- Link		b. Legrand
	c. Finolex		c. Molex
	d. Molex		d. Systemax
	e. AMP		e. AMP
	f. KEI		
	g. Poly cab		
38	**TELEPHONE WIRES**	**39**	**RG 6 CABLE FOR TV**
	a. Finolex		a. FInolex
	b. Delton		b. Delton
	c. Havells		c .National
	d. RR KABEL		d. KEI
	e. KEI		e. Poly cab
	f. Poly cab		
	g. Rallison		
40	**JACK PANEL**	**41**	**RACK**
	a. D- Link		a. Valrack
	b. Legrand		b. Digitron
	c. Molex		c. HCL
	d. Systemax		d. A Link
	e. Valrack		e. D-Link
	f. AMP		
42	**FIRE ALARM PANEL**	**43**	**SMOKE / HEAT DETECTOR**
	a. Honey well / System sensor		a. Apollo
	b . Notifier		b. Morley ias
	c. Mircom/ Secutron		c. Edward
	d . Morley ias		d. System sensor / Honey well
	e. Ravel		e. Mircom /secutron
	f. Agni		f. Notifier
			g. Ravel
			h. Agni
44	**MANUAL CALL POINT / HOOTER/ RESPONSE INDICATOR**		
	a. Honey well /System sensor		
	b. Notifier		
	c. Simplex		
	d. Mircom/ Secutron		
	e . Morley ias		
	f. Ravel		
	g. Agni		

LIST OF PRINCIPAL / APPROVED MAKES FOR FIRE FIGHTING WORKS

Sl. No.	ITEM	MAKE
1	FIRE Pumps	KIRLOSKAR / CROMPTON GREAVES/ CRI
2	Hydrant (Landing) Valve. Conforming to IS-5290	NEW AGE / EVERSAFE / MINIMAX / SAFE GUARD
3	Fire delivery hose-IS-636-type-B fitted with delivery hose coupling-conforming to IS-903	NEW AGE / EVERSAFE/CRC / JAYSHREE
4	Short branch pipe universal-conforming to IS-2871	EVERSAFE / VIKING/GE / MINIMAX / NEWAGE / SAFE GUARD
5	Hose cabinet :	NEW AGE / EVERSAFE / MINIMAX / SAFE GUARD
6	Isolation valve	KIRLOSKAR / LEADER / ZOLOTO / ORIENT
7	Non-return valve	KIRLOSKAR / LEADER / ASHOKA / KARTAR
8	**Fire service inlet**	EVERSAFE /NEW AGE / MINI MAX / SAFE GUARD
9	First Aid Hose Reel Swinging Type:-	EVERSAFE / NEW AGE / MINI MAX / SAFE GUARD.
10	Piping	JINDAL / ZENITH / APOLLO / GST / PRAKASH / QST
11	Pressure Gauge	H GURU / DWYER / FIEBIG / INDFOS / DANFOSS
12	Butterfly Valve	AUDCO / DANFOSS / CASTLE / KARTAR
13	**Fire Alarm Control Panel**	HONEY WELL / NOTIFIER / MORLEY IAS / MIRCOM / SECUTRON / ZICOM
14	Manual call Point	HONEY WELL / ZICOM / NOTIFIER / SIMPLEX / MIRCOM / SECUTRON
15	Hooter	HONEY WELL / ZICOM / NOTIFIER / SIMPLEX / MIRCOM / SECUTRON
16	Connecting wire / Cable	FINOLEX / HAVELLS / V GUARD / RR CABLES.
17	PVC Conduit	AKG / PRECESSION / AVON PLAST / ESSARKE / SUDHAKAR / KALINGA
18	Carbon dioxide type portable fire extinguisher	EVERSAFE / FIRESHIELD / MINIMAX / CEASE FIRE
19	ABC type stored pressure portable fire extinguisher	EVERSAFE / FIRESHIELD / MINIMAX / CEASE FIRE
20	Water Co2	EVERSAFE / FIRESHIELD / MINIMAX
21	Fire Sprinkler flexible hose (UL listed)	HD/ NEW AGE/ TYCO
22	Sprinkler bulb (UL Listed)	HD/ NEW AGE/ TYCO

SITC of VRV/VRF / MRV system

Sl. No.	ITEM	MAKE
1	High side Equipment	
1.1	VRV/VRF/ MRV system using compressor of following make only.	Carrier, Daikin, Hitachi, Blue Star, Voltas, Toshiba
2	Y-Joints VRV/VRF system	Carrier, Daikin, Hitachi, Blue Star, Voltas, Toshiba
3	Fans	
3.1	Propeller fan	Caryaire, Kruger, Nuaire (UK) , Nicotra
4	Cables & accessories	
4.1	Control Cables	Skytone, Universal, Delton, Finolex, RR , Polycab
4.2	XLPE/ PVC insulated Aluminium Conductor Armoured Power Cables	Skytone, Universal, Havells, RPG Asian, INCAB
4.3	Communication cable	Fusion, Comscope, Contemp, Finolex, RR, Armaflex, Polycab
4.4	Cable Gland Double Compression with Earthing Links	Power, Gripwell, Baliga Lighting Ltd.
4.5	PVC Insulated Copper Conductor standard Flexible wires	Finolex, National cables-NC, Polycab, Skytone, Havells
4.6	PVC Conduits & accessories (BIS approved)	BEC, Precision, D Plast, Polypack
4.7	MS/GI Conduits (ISI Approved)	BEC, AKG, Steel Kraft
4.8	Accessories for MS/GI Conduits (ISI Approved)	Sharma sales corporation, Super Sales corporation.
4.9	Bimettalic Cable Lugs	Hex(Brass copper Alloy India Ltd), Dowell's (Biller India Pvt Ltd.)
4.10	Lugs (Tinned Copper)	Dowell's
4.11	Perforated /Slotted cable tray	Kelp, Fletco, MM Enterpries
5	Ducting and Grilles	
5.1	Grilles/ Diffusers	Caryaire, Ravistar, Mapro, Tristar, Cosmic
5.2	Fire Dampers	Caryaire, Conaire, Cosmic, Ravistar, Mapro
5.3	G. I. Sheet Metal Duct	Jindal, National, Tata

LIST OF PRINCIPAL / APPROVED MAKES FOR ELEVATOR /LIFTS/ ESCALATORS / PARKING SOLUTION.

1. M/S JOHNSON.
2. M/S KONE ELEVATORS INDIA PVT LTD.
3. M/S OTIS ELEVATOR COMPANY.
4. M/S OMEGA ELEVATORS .
5. M/S ESCON ELEVATORS P LTD .
6. M/S SCHINDLER INDIA P. LTD
7. THYSSENKRUP ELEVATOR (TKE ELEVATOR)
8. M/S L T ELEVATOR P. LTD.

LIST OF PRINCIPAL / APPROVED MAKES FOR DIESEL GENERATOR SET.

1. KIRLOSKAR GREEN
2. GREAVES.
3. CUMMINS INDIA.
4. MAHINDRA AND MAHINDRA LTD.
5. ASHOK LEYLAND

Note:

All Switch-gear and the Distribution Boards should be clearly marked with Red. Yellow, Blue and Black colour for phases and neutral. All busbar enclosures Angle iron frame and switch-gears should be painted with battleship grey oil paint. Danger and caution boards at appropriate places on main boards and Distribution Boards should be fixed. All controlling main switches on main boards and distribution boards should clearly indicate with white oil paint lettering the floor and section controlled by it. All equivalent alternative materials used on the job will have to be approved by Chief Engineerof LICI before it is actually used. If any item is installed without prior approval, the contractor will be asked to dismantle the installation and use materials as specified. The insulated wire used for concealed wiring shall be with Red, Yellow, Blue colour for respective phases, Black for neutral & Green for earth wires.

SPECIAL CONDITIONS REGARDING INSPECTION OF WORK

2. INSPECTION OF WORK :

All works in course of execution or after execution in pursuance of the Contract, shall at all times be open to the inspection and supervision of the Executive Director (Bldg.) or his authorized representatives and the Contractor or his responsible agent, duly accredited in writing, shall at all such times, be present to receive writing, shall at all such times, be present to receive instructions/orders. The work during the progress or any time before settlement of the final bill, is also liable to be inspected by Chief Technical Examiner of the Central Vigilance Commission, New Delhi, on behalf of the Employer and this shall be also considered as an inspection by the Employer for all purpose.

3. PRECEDENCE FOR ACCEPTANCE :

If the contradiction or variance is observed in different components of the tender's the details clearly given in -

a) "General Preamble" shall have the precedence over the relevant details given in General "Specifications".

b) "Trade Preambles" shall have the precedence over the relevant details given in "General Specifications"

c) The description of an item of the "Schedule of Quantities" shall have the precedence over the relevant details given in "General preambles", General "Specification" and "Trade preambles".

C E R T I F I E D

THAT THE PERCENTAGE RATE IS QUOTED IN THE “PRICE- BID” AFTER ACTUAL VISITING SITE OF WORK AND ACQUAINTING WITH THE NATURE OF WORK & WORKING CONDITION. THAT WE HAVE CAREFULLY STUDIED THE CONDITIONS OF CONTRACT AND SPECIFICATION FOR MATERIAL AND WORKMANSHIP AND WILL ADHERE TO THE SAME.

REFUND OF EARNEST MONEY DEPOSIT (EMD).

Bid Security/Earnest Money Deposit shall be refunded to other than the lowest bidders/Contractor within a week from the date of opening of Financial Bid. Recording of Demand Draft/Banker's Cheque received as earnest money with the tenders must be entered in the Bid/Tender opening register.

FORFEITURE OF EARNEST MONEY DEPOSIT.

A Bidder's Bid Security (EMD) will be forfeited if the bidder:-

i) If the bidder withdraws or amends its/ his tender;
ii) Impairs or derogates from the tender in any respect within the period of validity of the tender;
iii) If the successful bidder fails to sign the contract or furnish the required performance security within the specified period.

In case of forfeiture of earnest money as prescribed above, the tenderer shall not be allowed to participate in the tendering process of the work.