

ISSUED TO

M/S -----



DY.CHIEF ENGINEER (I/C) OFFICE NCZO, KANPUR

TENDER FOR:-

**TENDER FOR SUPPLY, INSTALLATION,
TESTING & COMMISSIONING OF FIRE
FIGHTING INSTALLATIONS / SIGNAGES
SYSTEM / WATER SUPPLY PUMPS AND
ELECTRICAL SECURITY SYSTEM FOR
INVESTMENT BUILDING AT PLOT NO. INS-16,
SECTOR-14, VASUNDHARA (GHAZIABAD).**

PART-I (TECHNICAL BID)

Date of Downloading of Tenders	: From 05/02/2016 Onwards
Pre Bid Discussion on	: 17/02/2016
Last date of Submission of Tender	: 26/02/2016 up to 15:00 Hours
Date of Opening Technical Bid	: 26/02/2016 (at 15.30 Hrs)

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Re: Tender for S // T/ C of Fire Fighting Installations, Signage's System, Water Supply Pumps and Electrical Security System Work for Investment Building at Plot No INS-16, Sector 14, Vasundhara (Ghaziabad)

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Fire Fighting Installations, Signage's System,
Water Supply Pumps and Electrical Security System Work for
Investment Building at INS-16, Sector-14, Vasundhara, Ghaziabad, U.P.
LIFE INSURANCE CORPORATION OF INDIA
CONDITIONS OF CONTRACT

1.0 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 "DY.CHIEF ENGINEER (I/C)" 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 ENGINEER's, Superintending Engineers and/or Executive Engineers of the Corporation, who shall from time to time be appointed by the DY.CHIEF ENGINEER (I/C) 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 superintend 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, 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.
DY.CHIEF ENGINEER (I/C)	D.C.E.(I/C)
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
Asst. 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.

2.0 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 DY.CHIEF ENGINEER (I/C) whose decision shall be final & binding.

3.0 DISCREPANCIES:

- 3.1 If there are varying or conflicting provisions made in any one document forming part of Contract, the DY.CHIEF ENGINEER (I/C) 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'

4.0 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 DY.CHIEF ENGINEER (I/C) 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 DCE (I/C) 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.

5.0 CONTRACTOR TO PROVIDE EVERYTHING NECESSARY FOR EXECUTION OF WORK :

5.1 The Contractor shall provide everything necessary for the proper execution of the work according to the intent and meaning of 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 DCE (I/C) 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.

6.0 AUTHORITIES NOTICES AND PATENTS

- 6.1 The Contractor 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 DCE (I/C) 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 and 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 fees that may be properly chargeable in respect of the work and lodge the receipts with the Employer.
- 6.4 The Contractor 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 DY.CHIEF ENGINEER (I/C) before any such infringement and received his permission to proceed and should himself pay all royalties, license 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 neighboring 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.

7.0 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 correctness 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.

8.0 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.

9.0 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 octroi, excise and import duties, sales tax payable to all authorities and other charges. 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/outside sources 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.
- 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 DCE (I/C) 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 ceilings, 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 to 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 persons 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 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 shall depute an experienced foreman supervised by the DY.CHIEF ENGINEER and Superintending Engineer, Ghaziabad and who shall be constantly in attendance at the building while the **Fire Fighting Installation, Signages system, Water Supply Pumps and Electrical Security System works are** proceeding. Any directions, explanations, instruction or notices given by the Corporation's Engineer to such foreman shall be deemed to be given to the contractor.
- 11.2 Corporation's Engineer shall have power to give notice to the contractor or to his foreman of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the DY.CHIEF ENGINEER (I/C), NCZ is obtained. The work will from time to time be examined by the DY.CHIEF ENGINEER (I/C)/ DY.CHIEF ENGINEER, NCZ and the corporation's Engineers but such examination shall not in any way exonerate the contractor from the obligations to remedy and defects which may be found to exist in such of the work or after the completion of the same.

RECOVERY FOR NON-DEPLOYMENT OF ENGINEER/S AT SITE

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.

12.0 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.

13.0 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.

14.0 ASSIGNMENT:

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 DCE (I/C) 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.

15.0 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 DCE (I/C) or the Corporation's Engineers, whom the DCE (I/C) 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 DCE (I/C), 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 DY.CHIEF ENGINEER (I/C), 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 DY.CHIEF ENGINEER (I/C) 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 coefficients 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 DCE (I/C) the names of workmen employed) and materials incorporated be delivered for verification to the DCE (I/C) or his representative at or before the end of the week following that in which the work has been executed. The DCE (I/C) is not bound to recognize the cost of materials furnished in vouchers; the DCE (I/C) 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, statutory Taxes and Levies 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. Items for which the rates, as assessed by the employer are higher or lower by more than 35% of the market rates shall be termed as Abnormally High Rated Items (AHRI) and Abnormally Low Rated Items (ALRI) respectively. The decision of the DY.CHIEF ENGINEER (I/C) on categorization of items as AHRI / ALRI shall be final and binding.
- 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 DCE (I/C) shall proceed to fix the rate for the item(s) and the same shall be final and binding on the contractor.

- j. 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.

16.0 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 DCE (I/C), 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 DCE (I/C) 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.

17.0 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-alia, 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.

RECOVERY FOR NON EXTENSION OF INSURANCE POLICIES (WORKMEN'S COMPENSATION AND CONTRACTOR'S ALL RISK POLICY INCLUSIVE OF THIRD PARTY LIABILITY)

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 amounting to Rs. 10,000/- for each extension of such policy.**

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.

18.0 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 DCE (I/C) for which he shall have specifically applied in writing,
- (h) from other causes which the DCE (I/C) 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 well in advance but at least 30 days before schedule date of completion along with revised programme for completion of the work.

18.3 In case of strike or lockout the Contractor shall give written notice thereof to the DCE (I/C) 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 DCE (I/C) to proceed with the work.

- 18.4 The DCE (I/C) 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 within 3 (Three) months of the date of receipt of such request. 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 DCE (I/C).
- 18.5 The decision of the DCE (I/C) 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.

19.0 DAMAGE FOR NON-COMPLETION:

- 19.1 If the Contractor fails to complete the work by the date of completion stated in the "Appendix to Condition of Contract" or within time properly extended under Clause (18) hereof and the DCE (I/C) certifies in writing that in his opinion the same ought, reasonably so, to have been completed, the Contractor shall pay or allow the Employer the sum named in the Appendix as "Liquidated Damages" for the period during which the said works shall so remain incomplete and the Employer may deduct such damages from any money due to the Contractor. In case liquidated damages in accordance with the above provision accrue to maximum limit as mentioned in the Appendix to the Conditions of the Contract, the DY.CHIEF ENGINEER (I/C) shall be at liberty to rescind the Contract and to get it completed entirely at the risk and cost of the Contractor through any other agency he decides to appoint. All extra expenses incurred shall be recoverable from the money due to Contractor or lying to his credit with the Employer against the present or any other Contract.

20.0 FAILURE BY CONTRACTOR TO COMPLY WITH DCE (I/C)'S INSTRUCTIONS:

- 20.1 If the Contractor after receipt of written notice from the DCE (I/C), requiring compliance with such further Drawings and/or his instructions, fails within 7 (seven) days to comply with the same the DCE (I/C) 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. MEASUREMENT OF WORK:

- 21.1 All items having a financial value shall be entered in the Measurement Book. All measurements and levels shall be taken jointly by the Site Engineer or his authorised representative and by the Contractor or his authorised 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 DCE (I/C) whose decision in the matter shall be final and binding. Abstracts of

Measurements can also be recorded through electronic medium where specifically approved by DY.CHIEF ENGINEER (I/C).

- 21.2 If the contractor or his authorised representative does not remain present at the time of such measurements after the contractor or his authorised representative has been given a notice in writing 3 (three) days in advance or fails to countersign or to record objections within a week from the date of measurement, then, such measurements recorded in his absence by the Site Engineer shall be deemed to be accepted by and binding on the Contractor.
- 21.3 The Contractor shall, without any extra charge provide all assistance with every appliance, labour and other things necessary for taking measurements and recording levels including test checking of such measurements by any person authorised by the Employer.
- 21.4 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.
- 21.5 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.
- 21.6 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 Site Engineer or his authorised representative and the Contractor's Site Engineer, 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. PAYMENT TERM & VALUE OF WORK FOR INTERIM CERTIFICATE:

- 22.1 The contractor shall be paid by the employer, from time to time, by instalment under Interim Certificate to be issued by the Superintending Engineer to the Contractor on account of the work executed, when in the opinion of the Superintending Engineer, work to the approximate value named in the Appendix as "Value of work for Interim Certificate" (or less at the reasonable discretion of the Superintending Engineer) has been executed in accordance with this contract, subject however to a retention of the percentage of such value named in Appendix hereto as "Retention percentage on account of Security Deposit". The Interim Certificate shall be based upon Interim Bills or Running Account Bills to be prepared by the

Contractor and supported by the detailed measurements. The Superintending Engineer 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 but not incorporated in it.

- 22.2 In case any materials 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 DY.CHIEF ENGINEER (I/C) at the issue, rates of such material 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 DY.CHIEF ENGINEER (I/C) shall have certified in writing that it has been so completed on the basis of detailed measurements and after obtaining the written endorsements by the DY.CHIEF ENGINEER (I/C) that the DY.CHIEF ENGINEER (I/C) has made a final scrutiny and that there are no disputed items, rates and quantities, the Contractor shall be paid by the Employer in accordance with the certificate to be issued by the DY.CHIEF ENGINEER (I/C) the sum of money named in the Appendix as "Instalment 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 DY.CHIEF ENGINEER (I/C) with the approval the DY.CHIEF ENGINEER (I/C) with expiration of the period referred to as "Defects Liability Period" in the Appendix hereto from the date of virtual completion or as soon after the expiration of such period as the work shall have been finally completed and all defects made good according to the true intent and meaning hereof, whichever shall last happen;
- 22.3 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;
- 22.4 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;
- 22.5 The DCE (I/C) shall have power to withhold any Certificate if the work or any parts thereof are not being carried out to his satisfaction.
- 22.6 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.

22.7 Final Certificate shall be issued by the DCE(I/C) after the conditions are met with as per 23.4, 23.5, 23.6 and 27 and contractor's submission of **No Claim certificate cum receipt** as per the Proforma 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, Insulating Boards etc.

23.2 In case of dispute, the decision of the DY.CHIEF ENGINEER (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 DY.CHIEF ENGINEER (I/C). 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 DCE (I/C) to this effect. The DY.CHIEF ENGINEER (I/C) 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 equipment supplied and erected shall be guaranteed against defective workmanship, defective material and defective performance for a minimum period of 12 (Twelve) months to be reckoned from the date the **Fire Fighting Installation, Signages system, Water Supply Pumps and Electrical Security System works** are completed and handed over to LIC along with NOC from local Fire Authorities, Ghaziabad. Any defect or defects in performance, workmanship or material arising during the guarantee period shall be rectified by the contractor under this contract free of cost to Life Insurance Corporation of India. During the guarantee period the **Fire Fighting Installation, Signages system, Water Supply Pumps and Electrical Security System works** shall be serviced by the contractor by deputing once every month or earlier when directed by Life insurance Corporation of India. Any supply of oil, grease etc. required for servicing of the equipment shall be supplied by the contractor at his cost during the guarantee period. In addition to the servicing of the equipment as above, the contractor shall attend to all the breakdown calls during this period of 12 months at his own cost within four hours of reporting of defect. All the travelling expenses, incidental charges, etc. incurred for deputing the personnel for carrying out servicing will have to be borne by the contractor.

28. PROVISIONAL SUMS, APPLICATION OF:

- 28.1 For all the work listed under items for which provisional sums are provided in the tender, the DCE (I/C) 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 DCE (I/C), 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 DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) that he is able to carry out and fulfil the Contract and if required by the DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 authorised 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 DCE (I/C)'s instructions to the contrary sub-let any part of the Contract.

then and in any of the said causes, the DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 DCE (I/C) 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 SE 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 DCE (I/C) 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 DCE (I/C) 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 DY.CHIEF ENGINEER (I/C), 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 DY.CHIEF ENGINEER (I/C):

- 34.1 The Instruction, Decision, Opinion, Direction, Certificate or Valuation of the DCE (I/C) 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 DCE (I/C) or any refusal of the DCE (I/C) 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 in "APPENDIX TO CONDITIONS OF CONTRACT" in Part-II of 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 deductions from Running Account Bills at 7.5% (maximum) of gross amount of bill. 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 "Appendix to Conditions of Contract" shall be only in the form of Bank Guarantee valid upto scheduled date of completion.
- 35.3 The Bank Guarantee/s shall be from any Nationalised / Scheduled Bank approved by the DY.CHIEF ENGINEER (I/C), which is located at the Zonal Office Headquarters of L.I.C within whose jurisdiction the work falls or at the place of work.
- 35.4 Bank Guarantee/s (BGs) against Security Deposit (SD) and Performance Guarantee (PG) shall be executed as per the specimen pro-forma at Annexures A and C. The bank guarantee/s against Security Deposit shall be submitted within 21 (twenty one) days of issuance of letter of acceptance. The Bank Guarantee/s against Performance Guarantee (PG) shall be submitted within 20 (twenty) days from the date of commencement of work.
- 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 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 lying 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 the work (whether during the progress of the work or after its completion and whether before or after determination, abandonment or breach of the Contract) shall be referred by the Contractor to the DY.CHIEF ENGINEER (I/C) within 15 (fifteen) days of any such matter arising. The DCE (I/C) shall upon receipt of such reference convey his written instructions or decision within 30 (Thirty) days to the contractor. If the contractor be dissatisfied with the decision of the DCE (I/C) on any matter, other than EXCEPTED MATTERS, then and in any such case, the Contractor shall within 30 (Thirty) days after receiving notice of such decision give a written notice to the Employer requiring that such matters in dispute (other than excepted matters) be arbitrated upon. Such written notice shall specify the matters which are in dispute or difference of which such written notice has

been given and no other shall be and is hereby to be referred to the Arbitration. In case the Contractor fails to serve the written notice on any or all the issues in dispute within 30 (Thirty) days the decision conveyed by the DCE (I/C) shall be taken as final, binding and conclusive and shall not be open to arbitration.

- 36.2 Any disputes or differences that the employer may have with the contractor shall also be referred to Arbitration.
- 36.3 All disputes between the parties to the contract (other than those for which the decision of the DCE (I/C) or any other person is by the contract expressed to be final & binding) shall after written notice by either party to the contract to the other of them be referred to sole arbitration by an Arbitrator to be appointed by the Executive Director (Engineering), which shall be final and binding.
- 36.4 The sole Arbitrator shall be a qualified and experienced professional Engineer/Architect who is holding or held office in Central / State Govt. or public undertaking (of the rank DY.CHIEF ENGINEER (I/C) / Senior Surveyor of works / Dy. Chief Architect and above), OR a member of Indian Council of Arbitration.
- 36.5 If the arbitrator so appointed resigns his appointment or vacates his office or is unable or unwilling to act due to any reason whatsoever, the appointing authority shall appoint a new arbitrator in his place.
- 36.6 Unless both the parties agree in writing, reference of such disputes to arbitration shall not take place until after the completion or alleged completion of the work or termination or determination of contract.
- 36.7 The Sole Arbitrator shall determine all matters in disputes other than EXCEPTED MATTERS (referred in Cl.No.34) which shall be referred to the Sole Arbitrator.
- 36.8 The Arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act 1996 or any statutory modifications thereof.
- 36.9 The Contractor hereby also agrees that Arbitration under this Clause shall be a condition precedent to any right of action under the Contract.

37. LUMP SUM ADVANCE (APPLICABLE TO CONTRACT COSTING Rs.25 LAKHS AND ABOVE):

- 37.1 Loan will be available if required by the Contractor, and may be given as under on submission of application by him subject to other conditions being fulfilled.
- 37.2 A lump sum amount not exceeding 10% in two instalments (5%+5%) of the Contract sum may be advanced against a Bank Guarantee and at the simple interest at the rate of 10%. The advance shall be utilised by the Contractor for the purpose of this Contract only and for no other purpose.
- 37.3 The Bank Guarantee (Proforma at Annexure 'B') shall be for the equivalent amount of loan. The Bank Guarantee shall be from any Nationalised or approved scheduled Bank preferably

located at Zonal Head Quarters of LIC or place of work and shall be valid till the date of completion as specified in Appendix to Conditions of Contract.

- 37.4 The amount of loan which may be given to the Contractor shall be at the sole discretion of the DCE (I/C) and may be in not less than two instalments.
- 37.5 Recovery of the sums advanced by way of loan as above and of interest, thereon shall be made by deduction from the Contractor's running account bills after 10% of the work is completed as fixed by the DCE (I/C) subject to the condition that entire amount of loan with interest thereon shall be fully recovered by the time the work amounting to 80% of the Contract sum is completed or completion period whichever is earlier. Provided that if at any time the Contractor fails to execute the Contract to the satisfaction of the Employer for any reason whatsoever, the Employer shall be entitled to recall forthwith the entire amount so advanced with interest, cost and legal expenses, etc. and/or recover the whole/balance amount as the case may be, from the bill if any, payable to the Contractor or by enforcing the Bank Guarantee.
- 37.6 Whenever extension of time is granted to the Contractors for the completion of the project and where the loan is not fully recovered, Contractor shall furnish fresh Bank Guarantee for extended period of Contract for the outstanding loan amount together with specified simple interest for the remaining period.
- 37.7 Whenever the full amount of loan plus interest has been fully recovered, the Bank Guarantee shall be released.

38 REWARD FOR EARLY COMPLETION:

- 38.1 If the Contractor completes the work 3 months earlier in all respects with respect to the final date of completion stated in the "Appendix to Condition of Contract" and the Dy. Chief Engineer (I/C) certifies in writing that in his opinion the same has been completed, 0.5% of Final Contract Sum stipulated in the original contract shall be rewarded.

If the contractor completes the work in less than 3 months in advance in all respects with respect to the final date of completion stated in the "Appendix to Condition of Contract" and the Dy. Chief Engineer (I/C) certifies in writing that in his opinion the same has been completed, 0.1% of Final Contract Sum stipulated in the original contract shall be rewarded.

LIFE INSURANCE CORPORATION OF INDIA
GENERAL INSTRUCTIONS TO CONTRACTORS

1.0 DRAWINGS:

- 1.1 The contractor upon commencement of work shall submit Drawings and the same shall be kept open for inspection at places as mentioned in the letter to the contractor from the DY.CHIEF ENGINEER (I/C). Drawings generally include the site plan, floor plans, elevations and sections of the proposed work. The contractor shall prepare detailed working drawings and get them approved by the consultants, ultimately by the DY.CHIEF ENGINEER (I/C) of LIC.

2.0 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.

3.0 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.

4.0 TIME AND PROGRESS CHART:

- 4.1 A time and Progress Chart shall be submitted by the successful contractor. The Contractor shall submit his version of time and progress chart fitted within the specified overall period of completion (as stated in Appendix to Conditions of Contract) within 21 (Twenty One) days of the communication of acceptance of the tender, to the Corporation's Engineer.
- 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.

5.0 DRAWINGS ON SITE:

- 5.1 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.

6.0 ORDER OF WORK:

- 6.1 The DY.CHIEF ENGINEER (I/C) 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.

7.0 WORKMANSHIP:

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

8.0 REJECTED WORKMANSHIP OR MATERIALS:

- 8.1 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.

9.0 QUOTED RATES:

- 9.1 Rate quoted by the contractor shall be firm throughout the currency of the contract (including extensions of time, if any granted) No price fluctuation 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. 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.

If called upon by the Dy Chief Engineer (I/C), detailed analysis of any, or of all the rates shall be submitted by the Contractor. The Dy Chief Engineer (I/C) is not bound to recognize Contractor's analysis and reserves the right to reject abnormal high rates quoted by the Contractor. In case, there are inconsistencies in the rates for item of same description, quoted in the different parts of the Schedule of Quantities, the lowest of such rates shall be considered unless Dy.Chief Engineer (I/C) finds that there is justification for such inconsistent rates.

10.0 WATCHING AND LIGHTING:

- 10.1 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.

11.0 SECURITY AND PROTECTION:

- 11.1 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.
- 11.2 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.
- 11.3 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.
- 11.4 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.

12.0 MINIMUM WAGES ACT:

- 12.1 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.

13.0 SHEDS FOR MATERIALS:

- 13.1 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.

14.0 WORKS AND SITE TO BE KEPT AND DELIVERED UP CLEAN:

- 14.1 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.

15.0 SIGN BOARD AND HOARDINGS:

- 15.1 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 DY.CHIEF ENGINEER (I/C).

16.0 SCIENTIFIC AND MEASURING INSTRUMENTS:

- 16.1 All necessary instruments for installation and checking as required shall be provided by the Contractor at his expense for the due performance of this Contract as instructed by the Corporation's Engineer.

17.0 ATTENDANCE ON SUB-CONTRACTORS:

- 17.1 **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.
- 17.2 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.
- 17.3 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.
- 17.4 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 DY.CHIEF ENGINEER (I/C), 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.

18.0 OCCUPATION BY EMPLOYER:

- 18.1 The Employer reserves the right to take possession of the **Fire Fighting Installation, Signages system, Water Supply Pumps and Electrical Security System works** in sequence as

completed, as may be considered deemed fit by the DY.CHIEF ENGINEER (I/C) both practicable and reasonable and without hindrance to the Contractor's progress.

19.0 TAXES, DUTIES, LEVIES AND DEDUCTION AT SOURCE:

- 19.1 The Contractors shall be responsible to pay all statutory levies/ taxes/ cess imposed by the State and Central Government such as Income Tax/ Work Contract Tax/ Sales Tax on works contract, Value Added Tax (VAT), Excise Duty, Octroi, etc., and the rates quoted in the tender shall allow for the same. The price quoted shall be firm until completion of work. The rates are exclusive of Service Tax.
- 19.2 Deduction at source of Income/Sales Tax on works contract etc. shall be made by LIC of India as per the provisions prevailing from time to time from the Running Account or Final Bills and remitted to the concerned Taxation Authorities/State Government on behalf of the contractor.
- 19.3 **Service Tax:** The rates are exclusive of service tax. Quantum of service tax shall be reimbursed to the contractor on production of proof of payment of service tax deposited. Balance portion of service tax shall be paid by LIC to Govt. Of India as per Financial Act.

20.0 WATER:

- 20.1 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.

21.0 ELECTRICITY:

- 21.1 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.

SPECIAL CONDITIONS OF CONTRACT

Re: Tender for S // T/ C of Fire Fighting Installations, Signage's System, Water Supply Pumps and Electrical Security System Work for Investment Building at Plot No INS-16, Sector 14, Vasundhara (Ghaziabad)

1. VISIT OF SITE OF WORK:

The tenderer shall visit the site of work before filling in his tender and get acquainted with all the information required before submitting the tender.

The dimensions given on the drawings, if any, supplied along with the tender should be considered as only indicative and it is obligatory on the part of the tenderer to satisfy themselves regarding actual dimensions available on the site. Depending on the actual dimensions of the Substation work etc. at site, the contractor shall include in his quotations for any additional structural steel work (like brackets to support guide rails, etc.) that may be necessary to erect and install the Substation etc. in its final position within the available space. No extra claims on account of any such extra work will be entertained at a later date.

2. PRICES :

The price quoted shall be firm until completion of the work and not subject to any variations. The tender prices shall include for all packing and unpacking, all loading and unloading, all freight, custom duty, Octroi duty, etc. insurance for the equipment during the storage as well as during the erection and for all damages from any cause whatsoever during the contract and defects liability period. The charges shall also include for delivery of the equipment at the site of work. No claim for extra or otherwise on account of the foregoing shall be entertained as the rates quoted shall be deemed to be inclusive of all the charges applicable.

3. TAXES & DUTIES, ETC.:

Tenders are invited on the basis of works contract. The contractors shall be responsible to pay the Sales Tax/ Trade Tax / Commercial Tax on works contract and such other duties and taxes as Turn Over Tax, Sales Tax on materials, Excise Duty, Octroi etc.. Service tax shall be reimbursed subject to submitting of documentary proof for payment of same to the concerned authority.

Deduction of Trade / Commercial / Works contract Tax/ Sales Tax on works contract at source shall be made by LIC of India as per the provisions prevailing and as per directive of Government from time to time from the running account or final bills and remitted to the concerned taxation authorities / State Government on behalf of the contractor under whose jurisdiction of work is executed (DY.CHIEF ENGINEER (I/C), LIC, North Central Zonal Office, Jeevan Vikas , 16/275 Mahatma Gandhi Marg, Civil Lines, Phool Bagh, Kanpur -208001).

4. OVERRIDING AND PRINTED CONDITIONS :

Overriding conditions, if any, imposed by the tenderer, having financial implications or otherwise are to be submitted with the technical bid.

5. PART I – (TECHNICAL BID):

Part I shall contain the un-priced tender consisting of complete technical specification including drawings and documents and commercial terms and conditions technical aspects of the tender such as equipment data sheets, tests and inspection, makes of materials, technical description, drawings in envelop super scribing Part I. Earnest money in the form of DD/ Pay Order shall be submitted with the Part I of the tender in two separate envelopes.

Part I of the tender shall contain the following:

- a) Power of Attorney/authorisation with the seal of the company/firm in the name of the person signing the tender documents.
- b) List of deviations, if any, in commercial terms and conditions.
- c) List of deviation, if any, in technical specification.
- d) Detailed proposed layout drawing and full equipment details.

Detailed specifications of each of the offered items such as Pumps, Motors, Panels, Cables, Valves, Camera, NVR etc. matching with the specifications contained under this contract along with manufacturer's catalogue / product brochure. If there are some variations in specifications and dimensions of the equipment / products as contained under the manufacturer's catalogue / product brochures vis-à-vis those given under the specifications contained under this tender document, the specifications and dimensions given in this tender document shall prevail.

Complete technical details and any special features proposed for incorporation must be given for full technical evaluation. Supporting documents for the claimed facilities/ features shall also be attached while submitting the technical bid.

The tenderer should have maintenance set-up at Ghaziabad or in National Capital Territory New Delhi, address & telephone / fax nos. of maintenance set-up shall be indicated.

Other Certificates / Declarations as per Annexures enclosed to be submitted.

The Tenderers are advised to visit the site of installation and acquaint themselves of the site conditions before tendering.

The tenderers are advised to submit the tender based strictly on the General Conditions of the Contract and Technical Specifications contained in the tender documents, and not to stipulate any deviations. If acceptance of the terms and conditions given in the tender documents has any price implications, the same should be considered and included in the quoted price. A tender containing deviation from the terms and conditions may be liable for rejection.

The tenderers shall submit full details of the patent, trade mark, registered design, intellectual property rights, and copy rights, industrial property rights held by them or used by them of any third party with regard to design or any part of the system.

All information, correspondence letters shall be addressed to The DY.CHIEF ENGINEER (I/C), LIC of India, Engg Dept. North Central Zonal Office, Jeevan Vikas, 16/275 Mahatma Gandhi Marg, Civil Lines, Phool Bagh, Kanpur -208001

6. PART II – (PRICE BID):

Part II containing price bid in envelope, super scribing Part II – “Price bid”, supplied along with the tender.

- (a) This part shall contain prices in Indian Rupees only with detailed break-up of price as per format (Part II) both in figures and words. No other enclosure is permitted in Part II. Change of terms and conditions and technical deviations, if any, found in Part II of the tender will not be taken into account and will be treated as null and void.

The rate quoted shall include supply of the Pumps, Motors, Panels, Cables, Valves, Camera, NVR accessories etc. and any other equipment shall cover packing, freight and insurance up to the site and any other charges as applicable to deliver the equipment upto the site. .

(The rate shall include obtaining NOC from local fire authority. The rates also shall inclusive to attend Routine service / break down calls for substation during the warranty / defects liability period)

- (b) The tenderer must use only the forms issued by the LIC to fill in the rates. The tender form must be filled in English and all entries must be made by hand and written in ink. If any of the documents is missing or unsigned, the tender may be considered invalid by the LIC in its discretion.
- (c) Rates should be quoted both in figures and words in columns specified. All erasures and alterations made while filling the tender must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender void at the LIC's option.
- (d) No request for any change in rate or conditions after the opening of the part II of the tender will be entertained.
- (e) The rates quoted shall be deemed to be for the finished work and shall be firm and binding without any escalation whatsoever till the system is handed over to the LIC.
- (f) For any item, if the rate and amount do not tally with respect to the quantity, then the amount arrived on the basis of quoted rates shall only be acceptable and in case of variation of rates in figures and words, the rate quoted in words will only be considered for arriving at the total amount for that item.

7. BRIEF SCOPE OF WORK: The scope of work shall include the following:

- Design, Supply, Fabrication, Erection, Installation, Testing and Commissioning of all equipment's/ materials for the captioned work, to LIC's site at CP-8, Sector 18, Vasundhara, Ghaziabad including packing, handling, transporting, loading/unloading etc. at site.
- Providing Regular Maintenance inclusive of periodic service including all spares, etc. during warranty period.
- The tenderer should indicate in his tender the complete description of the working of the system/ sub-systems and their power requirements with all relevant brochures/literature etc. in addition to those called for in the Technical Specifications:
- The Tenderer shall carefully check the specifications and shall satisfy himself that the equipment offered is suitable as per the LIC's Technical Specifications.
- Tenderer shall supply all tools, plants, scaffolding, labour and consumables etc as required for installation, testing and commissioning of the system.
- The tenderer shall state clearly in his tender the standard tools, spare parts which he will supply free of cost when installing the equipment's and handover same to the LIC after completion of the work.
- The tenderer shall furnish a separate Bank guarantee of 5% of the contract value as Security for due fulfilment of terms and obligation of defects liability period from the date of commissioning and handing over of the works as specified in the tender to the LIC. The amount of Bank Guarantee will be valid till satisfactory completion of the defects liability period of one year for entire work.

8. TERMS OF PAYMENT:

The payment for the works to be executed under this contract shall be made as follows and no variation in the mode of payment will be acceptable.

- (j) Manufacturer's Inspection and Test Certificates
- (ii) Contractor's Certificate that all components, parts, sub systems, consumables etc. for successful installation, commissioning and testing of the systems including maintenance have been received at site in good condition and if any shortfall is noticed during installation, commissioning and testing they will be supplied free to the LIC.
- (iii) Policies of insurance covering all the risks during transit, storage, installation, commissioning, testing and handing over including third party liabilities.
- (iv) The pro-rata payment against all inclusive Maintenance contract shall be made half yearly on completion of satisfactory services rendered and on confirmation regarding achievement of specified inside temperature.

9. SERVICE TAX:

The rates quoted shall be exclusive of service tax under partial reverse charge mechanism. Contractor quoted rate excluding the service tax liability for its full extent i.e. 100 % service tax on Serviceable portion .In case of service provider being a corporate entity, service tax shall be paid fully by them to the concerned authority directly and reimbursement will be made by LIC on production of proof of remittance. No recovery towards service tax will be effected from their bill. However, if the service provider is other than corporate entity (Individual, HUF, Proprietary, Partnership firm, LLP and AOP), LIC will remit 50 % of Service tax liability towards service recipient (LIC) liability and Contractor has to directly remit to the concerned Authorities remaining 50% of Service tax towards their liability (Service provider) and reimbursement will be made by LIC on production of proof of remittance. No recovery towards service tax will be effected from their bill.

10. WARRANTY/ DEFECTS LIABILITY PERIOD:

The mechanical structures, Pumps, Motors, Panels, Cables, Valves, Camera, NVR etc. electrical works including power connections/ digital meters / switchgear/, etc. and overall workmanship from the date of successful commissioning of **Fire Fighting Installation, Signages system, Water Supply Pumps and Electrical Security System works** must be warranted against any manufacturing /design/ installation defects for a minimum period of one year. During this period, the successful tenderer shall make periodical inspection of the working of the system free of charge at least once in a month or less and attend to various equipment's and other service/settings that may be required of him.

12. ALL INCLUSIVE MAINTENANCE DURING WARRANTY PERIOD:

All Inclusive Maintenance Contract of the entire **Fire Fighting Installation, Signages system, Water Supply Pumps and Electrical Security System works** as provided, including all spares and consumables for a period of 01 years after successful completion of work.

13. PACKING AND DESPATCH:

The equipment shall be properly and securely packed in boxes for multiple handling and transportation by air / rail / road under Indian conditions. All equipment/components shall be delivered at site i.e. LIC's proposed INS-16 building at sector 14, Vasundhara, Ghaziabad (U.P.)

14. SIGNING OF CONTRACT AGREEMENT:

The General instructions to the tenderers and special conditions, conditions hereinbefore referred to Conditions of Contract and Technical Specifications and drawings enclosed with the tender documents, the subsequent correspondence exchanged between the LIC and the tenderer and the work order placed shall be the basis of the final contract to be entered into with the successful tenderer.

The Tenderer shall go through the terms and conditions given in the general conditions of contract herewith and his offer shall be strictly in line with the terms specified therein. No deviation from the terms and conditions specified shall be acceptable. Each page of the tender documents should be signed for his/their having acquainted himself/themselves in the general conditions of contract, Technical specifications, etc.

The tender submitted on behalf of a firm shall be signed by all the partners of the firm or a partner who has the necessary authority on behalf of the firm to enter into the proposed contract. Otherwise the tender may be rejected.

The contractor shall not assign the contract. He shall not sublet any portion of the contract except with the written consent of the Employer. In case of breach of these conditions, the Employer may serve a notice in writing on the Contractor rescinding the contract whereupon the security deposit shall stand forfeited to the Employer, without prejudice to his other remedies against the Contractor

15. SUFFICIENCY OF SCHEDULE OF QUANTITIES:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the Schedule of Quantities and/or the Schedule of Rates and Prices which shall cover all his obligations under the Contract, and all matters and things necessary for the proper completion of the works.

The quantities in the schedule of quantities approximately indicate the total extent of work, but may vary to any extent and even be omitted thus altering the aggregate value of the contract. However, during actual execution of work if the quantities of any of the items of work exceeds by more than 25% of the tender quantities, the quantities of such items executed, by the authority of the DY.CHIEF ENGINEER (I/C), in excess of 25% of the tender quantity shall be considered as an extra item of work for which the contractors shall submit fresh rates supported by rate analysis worked on the actual cost basis plus 15% towards establishment charges, contractor's overhead and profit. The rate for all such items of work, being current ones, will not be eligible for price adjustment due to increase or decrease in prices of materials and labour rates as per escalation formula, if any, given in the tender. If any of the items of work is omitted from the accepted tender at the sole discretion of the employer, the contractor shall not be entitled to any claim on this account.

Right to Accept Part Tender

The LIC reserves the right to accept the tender either in whole or in part at the same prices quoted by the Tenderer.

16. TESTING:

Before dispatching the equipment to site, the equipment, will be inspected at the discretion of the LIC and tested for various parameters by the LIC's Engineers at the manufacturer's works and then cleared for transportation. This will however, not in any way absolve the contractor of his responsibility for the continued performance of the system/components after erection & commissioning at the designated site during the period of defects liability.

17. DRAWINGS:

All required drawings for all the equipment lay out viz: Fire Hydrants layout etc. Should be prepared by the tenderer and submitted to the LIC's engineer for approval before commencement of work.

Other Issues

The Contractor shall carry out all the work strictly in accordance with the approved drawing, detailed specifications and instructions of the LIC's engineer. If in the opinion of the DY.CHIEF ENGINEER (I/C), nominal changes have to be made to suit the site condition and with the prior approval in writing of the Employer, the Contractor shall carry out the same without any extra charge.

The rates quoted in the tender shall include all charges for scaffoldings, watching and lighting by night as well as day including Sundays and holidays, protection of all other erections, matters or things and the Contractor shall take down and remove any or all such centring, scaffolding etc. as occasion shall require or when ordered so as to do, and fully reinstate and make good all matters and things disturbed during the execution of work and to the satisfaction of the LIC.

18. Recovery of Charges against Electricity /Water from Contractors (Bill):

Contractors shall have to make its own arrangement for temporary Electrical supply for installation work. However for testing and commissioning of plant, LIC will provide three phase 415 volt, electric power supply.

19. Fire N.O.C.:

Fire NOC from local fire authority for whole work is deemed to be included in the quoted rates and nothing extra shall be paid on this account. Any statutory fees to be paid to authority, only shall be paid by LIC of India / reimbursed to the contractor based on receipt for the said amount/fees to authorities.

20. ENROLMENT FORM:

Enrolment form along with Annexures duly filled-in enclosing therewith related documents duly self attested with credentials of contractor, copies of work order, completion certificates, solvency, proof of turn over as per requirement along with non-refundable processing fees of Rs. 2000/- in the form of DD/ Pay Order in favour of "Life Insurance Corporation of India" payable at Kanpur.

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

1. 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.**

LIFE INSURANCE CORPORATION OF INDIA

(Refer clause 39.1 of Conditions of Contract)

FORM OF BANK GUARANTEE TO SECURE A LUMP SUM ADVANCE

To
THE LIFE INSURANCE CORPORATION OF INDIA

In consideration of the Life Insurance Corporation of India having its..... North Central 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 the terms and conditions of contract (vide its acceptance letter No.....dt.....) made between M/s.....(hereinafter called "the said contractor) and the Corporation in connection with.....(hereinafter called the said contractor) to accept a Deed of Guarantee and Indemnity as herein provided for Rs. from the.....(name of the Bank) 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 fulfilment by the said contractor of the term and conditions contained in the said contract, we,.....(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 by the Corporation by reason of any breach or breaches by the said contractor of any of the terms and conditions contained in the said contract and/or in respect of all its claims for money and/or material found due and recoverable from the said contractor in respect of the said contract and to unconditionally pay the amount claimed as such by the Corporation on demand and without demur to be extend aforesaid.

2.0 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 on account of thereof and the decision of the Corporation that the said contractor has committed such breach or breaches and as to the amount or amounts 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 shall be final and binding on us.

- 3.0 The Corporation shall have the fullest liberty without affecting in anyway 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 even for this provision have the effect of so releasing the Bank from its such liability.
- 4.0 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 unrealised.
- 5.0 Notwithstanding anything to the contrary hereinbefore contained the Bank's liability hereunder shall not exceed Rs..... (Rupees..... only). The Guarantee shall remain in force till the.....day of the year 2015 unless a claim or demand under this guarantee is made or presented to the Bank within 6 months from the expiry date i.e. on or before..... All rights of Corporation under this guarantee shall cease and the Bank Guarantee shall be released and discharged from all liabilities thereafter.
- 6.0 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 & Designation)

The above Guarantee is accepted by the
Life Insurance Corporation of India.

For and on behalf of the

Contractor

Life Insurance Corporation of India

.....
(Name and Designation)

Note No.1 (: FILL IN AS APPLICABLE)

* 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
legal representatives).

OR

* For Partnership concerns:

1. Shri.....son of
.....resident of
.....
2. Sri.....son of
.....resident of
..... carrying on business in Co
partnership under the name and style of
..... (Hereinafter collectively called
'the said contractor, which expression shall unless the context requires otherwise include each of
them and their respective, executors, administrators and legal representatives)

OR

* For companies:

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 assigns).** Please fill in the name of any Nationalised Bank.

Note No.2:

(Please fill in the name and address of Bank).

LIFE INSURANCE CORPORATION OF INDIA
(Refer Clause No. 35 of Conditions of Contract)

**FORM OF BANK GUARANTEE FOR PERFORMANCE GUARANTEE
IN INDIVIDUAL CONTRACTS**

To
THE LIFE INSURANCE CORPORATION OF INDIA

1. 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 _____ ((_____ for the due fulfilment 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.**

Fire Fighting Installations, Signage's System,
Water Supply Pumps and Electrical Security System Work for
Investment Building at INS-16, Sector-14, Vasundhara, Ghaziabad, U.P.

ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made at..... this..... Day of20
between **THE LIFE INSURANCE CORPORATION OF INDIA**, a body corporate constituted and
established by the Life Insurance Corporation Act. 1956 (Act 31 of 1956) having its Central Office at
"Yogakshema", Jeevan Bima Marg, Mumbai and its Zonal Office at 16/275, M G Marg, Kanpur
hereinafter called the Employer (which expression shall include its successors and assignees
wherever the 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 (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 Rupees.....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 at the times 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 on their part respectively in such conditions contained.
4. All disputes arising out of or in any way connected with this Agreement shall be deemed to have arisen in Kanpur (Zonal Head quarters) and only the Court in New Delhi (Zonal Head quarters) shall have jurisdiction to determine the same.

5. This contract comprises

- i) Tender documents serial pages.....
- ii) Subsequent Correspondences 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 initialled by the Contractor and Engineers, North Central Zone, Life Insurance Corporation of India, Kanpur. The said Officer is hereby authorised to sign and initial on behalf of the Employer, the documents forming part of this contract.

7. IN WITNESS WHERE OF THE official seal of LIFE INSURANCE CORPORATION OF INDIA, North Central Zonal office, was thereto affixed and signed on its behalf by its Dy. Chief Engineer (I/C) and the Contractor/s has/have signed this Agreement on the dates respectively mentioned against their signature in the presence of the following witnesses:

In the presence of

Signed by Dy. Chief Engineer (I/C) or
His Authorised Representative
FOR AND ON BEHALF OF THE
LIFE INSURANCE CORPORATION OF INDIA
Date:

- 1. Signature :
Name :
Address :
- 2. Signature :
Name :
Address :

In the presence of

Signed by M/s or His Authorised Representative
FOR AND ON BEHALF OF THE CONTRACTOR
Date:

- 1. Signature :
Name :
Address :
- 2. Signature :
Name :
Address :

SCOPE OF WORK

Sr No	Name & Location of work	Proposed Construction of Investment Building on Plot No. INS-16, Sector 14, Vasundhara Ghaziabad (U.P.)
1	(A) FIRE FIGHTING INSTALLATIONS	Design, Supply, Erection, Fabrication, Installation, Testing & Commissioning of:-
		(i) Fire Hydrant System (ii) Pipes & Valves (Hydrant System) (iii) Automatic Sprinkler System (iv) Fire Pumps & Accessories (v) Electric Motor Driven Pump (vi) Electric Motor Driven Jockey Pump (vii) MCC (with Starters) for pumps (viii) Fire Extinguishers
2	(B) SIGNAGE'S SYSTEM	(i) Room Identification Signage's (ii) Floor Identification Signage's (iii) Fire Exit Signage's (iv) Toilet Signage's
3	(C) WATER SUPPLY PUMPS & ACCESSORIES	(i) Submersible Pumps & Panels (ii) Mono Block Pumps & Panels.
4	(D) ELECTRICAL SECURITY SYSTEM	(i) Fire Detection System (Addressable type). (ii) CCTV System. (iii) PA System

LIST OF APPROVED MAKES OF VARIOUS EQUIPMENT/MATERIALS FOR FIRE FIGHTING INSTALLATIONS / WATER SUPPLY PUMPS

SR. NO.	ITEM	MAKES
1	<u>EQUIPMENT</u>	
	Pumps	KSB, Kirloskar, HBD, Mather & Platt, Crompton
	Submersible Pump	KSB, HBD, Mather & Platt, Crompton
	Motors	ABB, Kirloskar, Siemens
2	<u>APPLIANCES</u>	
	Hydrant valves	Minimax, Safex, New Age, Shah Bhogilal, Monsher
	Hose reel	Monsher, Safex, Reliance, New Age, Minimax
	Collecting heads	Monsher, Safex, New Age, Minimax
	Hose fittings	A.K. Dey, Nitie, New Age, Minimax
	Canvas hose	Jayashree, Newage, Reliance
	Rubber hose	Dunlop, Swastik, New Age
	Fire axe	A.K. Dey, Ashok,
	Portable extinguishers	Minimax, Vijay, Reliance, New Age
	Sprinkler	HD fire, Tyco, Reliance
3	<u>PIPING</u>	
	GI & CS (MS) pipes	Tata, Zenith, Jindal
	GI & CS (MS) Fittings	M.J.Patel, CSA, KS, SB, Venus, Kirti, Vibro
4	<u>VALVES</u>	
	Butterfly valves	Audco, C&R, Advance, leader, KSB, Intervales
	Ball valves	Leader, Vibro, Kirloshkar C&R, Hawa, KSB, Zoloto
	Air release valve	Hawa, Spirax, Dewrance, Vatsika
	Non return valve	Hawa, KSB, Advance, Leader, Vibros, Audco, Zoloto

	Strainers	Leader, Vibros, Kirloshkar, Tylor, IVC, DSE, Zoloto
	Gate valve	Leader, Zoloto
5	<u>CONTROLS & INSTRUMENTS</u>	
	Pressure gauge	H.Guru, Feibig, Venus, Prega, Bestobell
	Thermometer	H.Guru, Feibig, Venus, General, Scientific, Cambridge, Bestobell
	Flow switch	Rapid cool or equal
	Pressure switch	Indfos, Switzer
	Tamper Switch	Siemens, LT
6	<u>MISCELLANEOUS</u>	
	Hardware	Tata, GKW, Fittight, Sundram fasteners
	Anchor Fasteners	Hilti, Shakti
	Paint	Asian, ICI, Nerolac, Burger
	Welding Rods	Advani-orlicon, ESAB, Sechron, Universal, Sunanre
	Vibration Isolator & Flexible Connection	Dunlop, Resistaflex, Kanwal
7	<u>MV SWITCHGEAR</u>	
	ACB	L&T, Siemens, C&S, ABB
	MCCB	ABB, Siemens, Merlin Gerin, Legrand
	MCB /DB/ RCCB	Merlin Gerin, Hager, Legrand, Load kontakt, Siemens
	SF Unit	Siemens, L&T, ABB, GE
	HRC Fuses	L&T, GE, Siemens
	Starters and contractors	Siemens, Telemecanique, L&T
	Panel Fabrication	TO CPRI Specs

LIST OF APPROVED MAKES OF VARIOUS EQUIPMENT/MATERIALS FOR SIGNAGE'S SYSTEM

SR. NO.	ITEM	MAKES
1	FIRE EXIT SIGNAGES	PROLITE/ EQUIVALENT MAKE

LIST OF APPROVED MAKES OF VARIOUS EQUIPMENT/MATERIALS FOR ELECTRICAL SECURITY SYSTEM

SR. NO.	ITEM	MAKES
1	Analogue Addressable Fire Detector and VRS System	Morley IAS, Notifier , Siemens / Ateis
2	PVC 600V grade Cable	Capilast , Finolex , Polycab
3	Alarm indicating Devices	System Sensor ,Notifier
4	Amplifier	Bosch, Ateis, Ahuja, Philips
5	Ceiling Mount Speaker	Bosch, Ateis, Ahuja, Philips
6	Paging Condenser / Microphone	Bosch, Ateis, Ahuja
7	Mini Dome Camera	Samsung , Bosch , Everfocus, Axis
8	NVR /DVR	Bosch , Everfocus, Axis
9	Card Access System	HID, Solus , Spectra , Honeywell
10	MBS System Con	Clipsal / Honeywell ,Siemens
11	Gas Based Fire Separation System	Novac, Kidde ,Siemens
12	Aspiration System	Tyco , Xtrail
13	Fire Extinguishers	Safex, Nitie

TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING INSTALLATIONS

1. SCOPE

The scope under this section covers the systems technical aspects and the scope of work included in the contract.

The detailed description of the items and quantities are indicated in the Schedule of work.

The fire fighting system shall include hydrant system, sprinkler system, fire extinguisher, fire pumps and external hydrant piping & appliances etc.

The approval and certification from the local fire authorities shall be the sole responsibility of the contractor.

1.1 MODE OF MEASUREMENT

The mode of measurement and the basis material to be included are as shown below. However, the item required for the proper installation other than that clearly indicated in the items excluded to achieve proper installation finish and functioning of the whole system shall be the responsibility of the contractor. All the items shall be measured as per Bill of quantity.

Cutting and chasing of brick walls using cutters only, rectifying, leveling etc. wherever required shall be included in the scope of work. No chasing or cutting shall be done on RCC work. The fixing of supports and hangers to RCC work shall be done using anchor bolts/ fasteners of adequate capacities, which are included in the scope of work. Finishing of chasing will be by others.

1.2 APPLIANCES

The fire fighting appliances shall be measured individually or as assemble unit as indicated in the schedule of material

SL No	DESCRIPTION	ITEM INCLUDED
1	F.B BREACHING	1no. 150mm 750mm long header 4 no. 65mm spring loaded Instantaneous S.S. coupling with cap.
2	F.B. STREET CONNECTION	1 No. 150 dia 750 long header 4 Nos. 150 dia 750 long header 1 No. 150mm butterfly valve and NRV
3	Each internal hydrant unit	1 No. Single/Twin hydrant valve 1 No. Hose reel 1 Set Canvas hose 1 no. Branch pipe 1 no. Large hose cabinet 1 no Firemen's Axe Fire extinguisher

4	EXTERNAL HYDRANT UNIT	1 No. Single Hydrant valve 1 set Canvas hose 1 no. Branch pipe 1 no. small hose cabinet
5	INTERNAL HYDRANT VALVE	1 no. 100/65mm SS Twin (Siamese) oblique hydrant valve with cap.
6	EXTERNAL HYDRANT VALVES	1 No. 80/65dia SS oblique hydrant valve with Cap
7	HOSE REEL	1 No. 500mm revolving hose reel with bracket 1 No. 20mm GM ball valve 1 No. 20mm/36m rubber hose 1 No. 20mm Al. shut off nozzle
8	CANVAS HOSE	2 Nos. 65mm/15m rubberized canvas hose 2 Nos. 65mm S.S.Male & female instantaneous couplings 1 No. 65mm SS branch pipe/Nozzle
9	ORIFICE PLATE	SS orifice plate with flanged joint
10	FIRE EXTINGUISHERS	Fire extinguishers as specified, mounting bracket
11	Alarm Check Valve	1 no. 150mm installation control valve assembly with automatic alarm to be connected with control valve, drain valve, test valve
12	Zone control Valve	1No. 25 mm dia gunmetal inspecting & testing assembly with ball valves(3nos) gunmetal sight glass, bypass valve & connected to drain line
13	Pressure Vessel	Min. 450mm dia and 2000mm height fabricated from M.S. sheet with shell thickness 12 mm and dish ends 10mm with all fittings/accessories such as air release valve, drain valves etc. two coats of red enamel paint over primer outside and two coats of epoxy coating inside, no pressure gauge on the delivery line.

1.3 STANDARDS & CODES

The following standards shall be applicable:

- a) IS: 2065 COP for water supply in buildings
- b) IS: 5822 COP for laying welded steel pipes
- c) IS: 10234 Recommendation for general pipe line welding

d) IS: 634 COP for plastic pipe work for potable water supply

e) NBC 2005 Building construction standards

1.4 GENERAL REQUIREMENTS

The pipe assembly shall be suitable for the service and pressure it serves. The assembly shall be totally leak proof and easy for maintenance.

Necessary flanged joints and control valves shall be incorporated in pipe for easy maintenance, replacement and isolation of section of pipes. The flanged joints shall be 3 mm neoprene gasket or gasket suitable for the pressure and temperature of the fluid.

The pipes shall be laid in lines and levels indicated in the drawings. The vertical risers shall be properly secured to the building structure with Necessary clamps. The horizontal runners shall be hung from the ceiling using pipe hangers or laid on structural steel racks.

Additional supports shall be provided at the assembly of valves and control accessories, change in direction of pipes etc.

Neat appearance and good workmanship with provision for easy maintenance shall be prime consideration. Pipes shall be cleaned thoroughly and cleared off, of all foreign matters before taking up the assembly.

The pipes shall be assembled and laid in straight line and levels with adequate slopes for draining out the system.

The inside and outside surface of the pipe and fittings shall be thoroughly cleaned before and after the fabrication work.

All fabricated piping shall conform to the fabrication dimensional tolerance specified in the code for pressure piping, ANSI B 31.3 and shall in no case be more than the following:

a) Individual tolerance: ± 1.5 mm

b) Overall tolerance: ± 3.0 mm

All piping work shall be provided with protective coating as specified separately in this section.

1.5 SCREWED PIPE ASSEMBLY-GI (IF MENTIONED IN BOQ)

The GI pipe assembly shall be carried out using screwed fittings if mentioned in BOQ.

The pipe ends shall be filled using round files to remove burrs. Threading of proper length and size shall be made conforming to IS: 554 so that the joint is leaking proof with adequate strength, at the same time no excess threading is exposed.

kote or Teflon tapes shall be applied to entire length of threading, before assembling.

Flanged connections shall be provided at the equipment connections and the pipe route as indicated on the drawings using threaded flanges.

GI pipe carried out by welding shall be protected against corrosion by applying aluminum paint over area projecting a distance not less than 50 mm after thoroughly cleaning the area.

1.6 CLEANING

The pipe shall be thoroughly cleaned, internally and externally during the fabrication, assembling and completion of the entire piping work using compressed air, clean water etc.

Necessary detergents shall be used while cleaning and flushing the piping system and in-line instruments, traps etc. shall be isolated.

All field fabricated piping shall be cleaned at the completion of fabrication. Care shall be taken to see that all burrs, welding icicles and weld spatter are removed by reaming, chipping, filing, sanding or other suitable means. All foreign material such as cement, mortar, sand, heavy oil film

and loose scale shall be removed from the interior of pipe by thoroughly flushing with water. To avoid large size foreign material being washed into smaller diameter branch blinds from a larger diameter header line, special precautions should be taken to disconnect at branches or to selectively blank them off.

A record shall be kept of cleaning of each line or section of erected piping. Cleaned line shall be tagged.

Proper temporary drainage for flushing water shall be provided so that no damage is done to permanent facilities.

Valves shall be cleaned when received. All possible precautions shall be taken to prevent contamination and valves shall be inspected immediately prior to installation. If a valve is found to be contaminated in any way, it shall be cleaned as follows.

- a) Removed all foreign particles by wiping with clean lint less cloth.
- b) Wipe interior of valve with a clean lint less cloth moistened with clean trichloroethylene for metallic valves and dilute Sulphuric acid for PVC valves

If contamination is excessive in metallic valves, suspend the valve in a degreasing tank with hand wheel uppermost. Direct stream of liquid trichloroethylene into the rim of the valve through both ends and against all inside surfaces. Flush thoroughly to remove all foreign matter.

Temporary screens of 20 mesh shall be installed in all rotary equipment suction lines inlet of all delicate equipments like glass and glass lined vessels etc. and before starting up a unit. These screens shall be inserted between flanges close to the equipment and must be removed when operation becomes normal.

1.7 UNDER GROUND PIPING

The pipes laid underground shall be in trenches having a minimum cover of 600 mm and a sand cushion of 150 mm above the pipe. The pipes crossing roads, pavements etc. shall be taken through Hume pipes.

1.8 CORROSION TREATMENT

The pipe assembly shall be provided with outer coating to prevent corrosion. The pipe laid above ground shall be provided with the following anti corrosive coating.

- a) Two coats of paint of approved color over two coats of red-oxide primer for G.I. pipe.

Three coats of cold coal tar (Shalimastic H.D or equal) shall be applied resulting in a final film thickness of 0.79mm and simultaneously inner wrap of fiber glass reinforced or equal shall be pulled into it. Manufacturer's recommendation shall be followed for the coal tar application.

Immediately following the application of the inner wrap a layer of outer wrap (fiber glass) based outlet wrap impregnated with coal tar or equal shall be applied to the external surface of the coating. The coating shall be then allowed to dry and shall be protected from burrs, scratches and sharp edges.

Wrapping of pre-laminated self adhesive composite sheets of polyethylene and bitumen similar to PYPKOTE or Fiber glass and bitumen similar to COATEX shall be acceptable as corrosive treatment for underground piping.

1.9 VALVES

The valves shall be incorporated in the piping system as shown on the drawings and shall be installed at locations and levels so that they are easily accessible for operation, maintenance and replacement.

The screwed valves wherever provided shall be easily removable for repairs or replacement. Pipe for repairs or replacement. Pipe nipples with flanged joints to be incorporated on either side of the valves.

Gate valves shall be incorporated at branch office to isolate the section for maintenance and repairs. The gate valves shall be used only at shut-off device.

Butterfly valves and globe valve shall be used to regulate the flow and balancing the system and to achieve the specified flow in different branches and sections of the piping work.

Strainers are to be incorporated at the suction side of pumps. By pass line with shut off valves to be provided across every strainer.

Flanged valves shall be installed using matching flanges on the pipe line with 3 mm thick neoprene gasket unless otherwise specified. The gasket should be suitable for the medium of flow, the temperature and pressure.

Supports shall be provided for the pipes at each end of the valve to relieve pressure on the valve joint. In addition to this additional support are to be provided for valves of 100 mm and above.

2.0 HYDRAULIC TESTING

All piping shall be pressure tested by filling water, removing air locks and applying pressure 2.5 times the operating pressure using hand or hydraulic test pump unless otherwise specified.

The pressure shall be maintained for a minimum period of 2 hrs. and achieve pressure drop within 0.5 kg/sq.cm.

The testing shall be carried in section by blocking both ends or closing the valves, if provided. After completion of the entire installation and connecting to the mains or pumping system the installation shall once again be tested and rectify breakages, if any, or replace the defective material and workmanship.

After commissioning the system, each valve shall be tested for effective working by closing and opening a number of times.

The piping coming under IBR or any local authority's regulator shall be tested according to the clause laid under such regulations.

All testing shall be carried out in the presence of the Owner/Consultants and test register shall be maintained. Water, labor, equipments and register required for the testing shall be the responsibility of the contractor.

The contractor shall provide all material, tools, equipment, instruments, services and labor required to perform the test and to remove water resulting from cleaning and after testing.

Complete certified balancing report shall be submitted for evaluation and approval. Upon approval, four copies of the balancing report shall be submitted with complete drawings and documents.

2.1 STANDARDS

The following standards shall be applicable:

- a) IS: 778 Gate, globe and check valves, copper alloy for water supply works purposes.
- b) IS: 780 Sluice valves for water works purposes (50 to 300 mm sizes)
- c) IS: 1703 Ball valve (horizontal plunges type) including floats for water supply purposes.
- d) IS: 3004 Plug cocks for water supply purposes
- e) IS: 4928 Check valves, quip closing for centrifugal pump outlets.
- f) IS: 9739 Pressure reducing valves for domestic water supply systems
- g) IS: 9896 Ball valves, general purposes
- h) IS : 779 Water meter domestic type

The valves for the control of steam shall meet the requirements of IBR and approved by them.

2.2 GENERAL REQUIREMENTS

The valves shall be of reputed make with ISI mark, suitable for the specified duty such as

- a) Medium to be handled
- b) System pressure
- c) System temperature

The material and type of construction shall be as indicated in section 2101 systems and materials, schedule of materials and shall be suitable for the duty specified.

The valves up to 50 mm shall be screwed type and 65 mm and above flanged type unless otherwise specified. The valves shall be with non rising spindle and the flanges drilled to BS: 10 tables E or to match the flanges incorporated in the piping work.

The valves shall be rated for a test pressure of minimum 20 kg/sq.cm.

2.3 VALVES FOR VARIOUS SYSTEMS

The valves for various sizes shall be as indicated below:

- | | | |
|-----------------|-----------|------------------------------|
| a. UPTO 50 mm | Ball | Gun metal / Bronze |
| b. 65mm & above | Butterfly | Cast Iron / SS 316 / SG iron |

2.4 STOP VALVES

The stop valves shall be gate or butterfly as indicated in the drawing and schedule of material conforming to IS: 778 & IS: 780. The stop valves shall be capable of complete stoppage of flow of the medium handled with solid wedge, split wedge or parallel double disc type.

The butterfly valves shall be with circular or lenses shaped disc pivoted in the body by two unions. The operating handle shall be provided with locking facility and shall have flow indication.

2.5 FOOT VALVES

The foot valves shall be suitable for the pump suction and shall be with NRV and strainer.

2.6 AIR RELEASE VALVE

The air release valves shall be single or double float type with air outlet at top.

2.7 APPLIANCES & ACCESSORIES STANDARD SPECIFICATION

The following standard specification shall be applicable.

- a) IS : 5290 Landing valve
- b) IS : 5714 Hydrant, stand pipe for fire fighting
- c) IS : 9972 Sprinkler head, automatic
- d) IS : 884 Hose reel, first aid for fire fighting
- e) IS : 636 Hose, FF (Rubber lined or rubberized fabric lined, woven jacketed)
- f) IS : 4927 Canvas hose, unlined flex for FF
- g) IS : 910 Combined key for hydrant, hydrant cover and lower valve.
- h) IS : 8090 Coupling branch pipe, nozzle used in hose reel tubing for fire fighting
- i) IS : 901 Couplings, double male and double female
- j) IS : 905 Delivery breeching, dividing and collecting instantaneous pattern for fire fighting
- k) IS : 5131 Dividing breeching with control, for fire brigade use
- l) IS : 908 Fire hydrant, stand post type
- m) IS : 5612 Hose clamps and hose bandages for Fire brigade use
- n) IS : 2546 Fire bucket, galvanized mild steel

- o) IS : 2871 Branch pipe, universal, for firefighting purposes
- p) IS : 926 Axe, fire man's
- q) IS : 8149 Fire extinguishers (trolley mounted) twin CO₂ , functional requirements
- r) IS : 933 Fire extinguisher, chemical, portable foam type

2.8 GENERAL REQUIREMENTS

The appliances and accessories should conform to the relevant IS specification and shall meet the requirement and approval from the fire authorities. The appliances and accessories shall be mounted in such a way that they are easily accessible and easy to operate.

The fire fighting equipments such as fire extinguishers etc. shall bear the class of fire it is suitable, the operating and precautions etc.

2.9 APPLIANCES

- a) The external (yard) hydrants shall be single or double headed conforming to IS: 5920. The hydrants shall be complete with stand pipe, hydrant valves and orifice plate wherever necessary.
- b) The internal hydrants shall be single or double headed conforming to IS: 5920. The hydrant shall be complete with branch pipe, hydrant valves and orifice plate wherever necessary, blank-off cap etc. The hydrant valves shall be flanged gunmetal with instantaneous female outlets suitable for fire brigade 65mm canvas hose. The single headed hydrant valves shall be with 80mm inlet and single 60mm oblique outlet. The double hydrant valve shall be with 100 mm inlet and twin 65mm Siamese outlet.
- c) The hose pipe shall be 15m long 65mm dia ply flax circular woven canvas, fully shrunk and brunettes for preservation and shall be with a pair of instantaneous SS coupling.
- d) The branch pipe shall be brass with 65mm inlet and 20 mm nozzle.
- e) The first aid hose reels shall consists of 30m long 20mm dia high pressure braided rubber hose mounted on heavy duty circular M.S drum complete with gun metal shut off valve, nozzle etc. The hose reel bracket shall be M.S fabricated or cast iron swing type suitable for 90 deg. smooth and free rotations in vertical plane.
- f) The fire hose cabinet shall be 16 SWG sheet steel with lockable hinged door of minimum 50% glazing. The cabinet shall be of suitable size to house hydrant valves, hose reel, canvas flex, branch pipe, fire axe and other accessories. The cabinet shall be painted with two coats of synthetic enameled paint over two coats of red oxide primer.

The minimum size of the cabinets shall be as indicated below unless specified otherwise:

- a) With hose reel 1200 x 1500 x 250
- b) Without hose reel 600 x 600 x 250
- g) The fire brigade collective breaching shall be with 150mm header of adequate length with 4 nos. 65mm spring loaded instantaneous SS coupling with caps. The fire brigade street connection shall be similar to FB breaching but with 150mm butterfly valve and NRV
- h) The sprinkler heads shall be threaded gun metal quartzite bulk type with a temperature rating of

68C approved by the local authorities. The sprinklers shall be ceiling mounted vertical throw or wall mounted horizontal throw as indicated in the drawings and bill of material. The sprinklers shall be with water distribution/reflector.

i) The fire alarm valve shall be turbine type with test cock approved by local authorities. The alarm shall operate and sound a gong on drop of pressure for flow of water in the sprinkler system main.

The turbine type alarm approved by the local fire brigade shall be installed on the mains to sense the pressure drop and flow of water and activate alarm. The alarms shall be with suitable test cock.

3.0 ACCESSORIES

a) The air vessel/air cushion tank shall be of adequate capacity fabricated out of sheet steel and shall be complete with air release valve, 20 mm stop valve, 20 mm drain valve, associated piping work etc. The air vessels shall be mounted at the highest points prone to air trap.

b) The air release valves shall be single or double float with air outlet at the top. Drain valves of 50 mm gun metal shall be provided at the lowest points of the piping work to enable draining of water in the system. The drain valves assembly shall include 50mm nipple and 5m long PVC rubber hose.

3.1 FIRE EXTINGUISHERS

The following standard specification shall be applicable.

- a) IS : 2546 Fire buckets
- b) IS : 940 Fire extinguishers, chemical, portable water type (gas pressure)
- c) IS : 6234 Fire extinguisher, chemical, portable water type (constant air pressure)
- d) IS : 2878 Fire extinguisher, portable CO₂
- e) IS : 933 Fire extinguisher, chemical, portable, foam type
- f) IS : 2171 Fire extinguisher, portable, dry powder type
- g) IS : 11108 Fire extinguisher, portable halon 1211

a :-The fire buckets shall be 9 liter capacity made out of 24 SWG GI sheet painted white inside and fire red on outside with "Fire" written in black.

b:-The CO₂ extinguishers shall be 4.5 kg capacity conforming to IS: 2878 made out of high pressure steel cylinder. These extinguishers shall be complete with wheel type valve, internal discharge tube, high pressure discharge and non conducting hose.

c:-The soda acid type fire extinguishers shall be of 5 liter capacity conforming to IS: 934.

d:- All fire extinguishers shall be supplied with initial charge of the chemical and shall be with mounting hooks or brackets for portable extinguishers. Large capacity extinguisher shall be trolley mounted.

4.0 PIPE WORK

4.1 GENERAL REQUIREMENTS

All materials shall be of the best quality conforming to the specifications and subject to the approval

of the LIC. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls and ceilings by suitable clamps and supports (galvanized after fabrication) at intervals specified. Only approved type of anchor fasteners shall be used for RCC slabs and walls / floors etc.

Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

Pipe accessories such as gauges, meters, control devices, etc. shall have the same working pressure rating as the associated pipe work. All pipe work shall be free from burrs, rust and scale and shall be cleaned before installation. All personnel engaged on welding operations must possess a certificate of competence issued by an acceptable / recognized authority.

4.2 PIPING:-

Pipes of following types are to be used: Mild steel black pipes as per IS: 1239 Galvanized heavy grade (for pipes of sizes 150 mm N.B. and below) suitably lagged on the outside to prevent soil corrosion. G.I. pipes buried below ground shall also be suitably be lagged with 2 layers of 400 micron polythene sheet over 2 coats of bitumen.

Steel pipelines up to 150 mm dia shall be as per IS: 1239, Part-I (heavy grade) while pipelines above 150 mm dia shall be as per I.S.:3589.

All pipe clamps and supports shall be fabricated from MS steel sections and shall be factory galvanized before use at site. Welding of galvanized clamps and supports shall not be permitted.

Pipes shall be hung by means of expandable anchor fastener of approved make and design. The hangers and clamps shall be fastened by means of galvanized nuts and bolts. The size/diameter of the anchor fastener and the clamps shall be suitable to carry the weight of water filled pipe and dead load normally encountered.

Hangers and supports shall be thoroughly galvanized after fabrication. The selection and design of the hanger & support shall be capable of carrying the sum of all concurrently acting loads.

They shall be designed to provide the required supporting effects and allow pipeline movements as necessary. All guides, anchor braces, dampener, expansion joint and structural steel to be attached to the building/structure trenches etc. shall be provided. Hangers and components for all piping shall be approved by the LIC. The piping system shall be tested for leakages at 2.5 times the operating pressure or 1.5 time shut-off pressure, whichever is higher. Flanged joints shall be used for connections for vessels, equipment, flanged valves and also on two straight lengths of pipelines of strategic points to facilitate erection and subsequent maintenance work.

For pipes underground installation the pipes shall be buried at least one meter below ground level and shall have 230 mm x 230 mm masonry or concrete supports at least 300 mm high at 3m intervals. Masonry work to have plain cement concrete foundation (1 cement: 4 coarse sand: 8 stone aggregate) of size 380x380x75 thick resting on firm soil.

Mains below ground level shall be supported at regular intervals not exceeding 3.0 meter and shall be laid at least 2.0 meter away from the building.

4.3 PIPING INSTALLATION & SUPPORT

Tender drawings indicate schematically the size and location of pipes. The Contractor, on the award of the work, shall prepare detailed working drawings, showing the cross-sections, longitudinal sections, details of fittings, locations of isolating and control valves, drain and air valves, and all pipe supports. He must keep in view the specific openings in buildings and other structure through which pipes are designed to pass. Piping shall be properly supported on, or suspended from, on stands, clamps, hangers as specified and as required.

The Contractor shall adequately design all the brackets, saddles, anchor, clamps and hangers, and be responsible for their structural stability.

Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. Risers shall be supported at each floor with Galvanized steel clamps. To permit free movement of common piping support shall be from a common hanger bar fabricated from Galvanized steel sections.

Pipe hangers shall be provided at the following maximum spacing's:

Pipe Dia (mm)	Hanger Rod Dia (mm)	Spacing between Supports (m)
Up to 25	6	2
32 to 50	10	2.7
80 to 100	12	2.7
125 to 150	16	3.6

Hanger rods 6 mm dia shall be up to a maximum 0.45 m length above an up to 1.2 m length 10 mm. 12 mm shall be used above 1.2 m lengths.

The end of the steel rods shall be threaded and not welded to the threaded bolt. Wherever slab thickness is less than 100 mm in thickness anchor fasteners used shall not exceed 50% of the slab thickness or as directed by the structural consultant. All pipe work shall be carried out in a proper workman like manner, causing minimum disturbance to the existing services, buildings, roads and structure.

The entire piping work shall be organized in consultation with other agencies work, so that area can be carried out in one stretch. Cut-outs in the floor slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cutouts provided and clearly point out wherever the cut-outs shown in the drawings, do not meet with the requirements.

Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fiberglass and finished with retainer rings. The contractor shall

make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate or as specified / approved by Engineer In Charge.

All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter. Where reducers are to be made in horizontal runs, eccentric reduces shall be used for the piping to drain freely. In other locations, concentric reduces may be used.

Automatic air valves shall be provided at all high points in the piping system for venting. All valves shall be of 15mm pipe size and shall be associated with an equal size gate valves. Automatic air valves shall be provided on risers.

Discharge from the air valves shall be piped through a pipe to the nearest drain or sump. All pipes shall be pitched towards drain points. Pressure gauges shall be provided as shown on the approved drawings. Care shall be taken to protect pressure gauges during pressure testing.

4.4 PIPE FITTINGS

Pipe fittings mean tees, elbows, couplings, unions, flanges, reducers etc and all such connecting devices that are needed to complete the piping work in its totality.

Forged steel fittings of approved type with "V" groove for welded joints. Fabricated fittings shall not be permitted for pipes diameters 50mm and below.

When fabricated fittings are used, they shall be fabricated, welded in workshops. The welding procedures of the workshop should have been approved by the rules for sprinkler system and applicable to hydrant and sprinkler system. For "T" connection, pipes shall be drilled and reamed. Cutting by gas or electrical welding shall not be permitted.

4.5 PROCEDURE FOR PYPKOTE / COATEK APPLICATION

A) Surface Preparation - The pipe surface shall be cleaned by a wire brush.

B) Application of Primer - Pypkote / Coatek primer is to be applied on pipes immediately after cleaning. This is to prevent any further accumulation of rust on the pipe. This is a cold applied primer and is applied by brush.

C) Application of Pypkote / Coatek 4 mm Tape - After the primer is applied on the pipe, it is allowed to dry for about 30 min. till it becomes touch dry. Before adhering the tape to the pipe, it is advisable to gently heat the primer coated pipe by a run of LPG torch. Remove the bottom polyethylene from the tape & then heat bottom surface of the tape by LPG torch or any heat source & start wrapping the tape to the pipe by heating the primer coated pipe & by removing the bottom polyethylene from the tape before wrapping better adhesion between the tape & pipe is obtained. Overlaps are maintained with a minimum of 12.5 mm.

D) Tape coating of weld joints - The tape is applied over the weld joints after the necessary welding & testing methods of the joints is completed. The procedure for application of tape shall be the same as bare pipe procedure. Overlaps on each side of the weld joints shall be 50 mm.

E) A final coat of White wash with water based cement paint is done immediately over the entire coated pipe.

4.6 JOINTING

4.6.1 Welded Joints:

Joints between MS pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner. But welding without "V" groove shall not be permitted.

All joints in the pipe line with screwed fittings shall be seal welded after testing and the weld plus the adjoining portion shall be given two coats of zinc rich primer.

4.6.2 Flanged joints (65 mm dia and above)

Flanged joints with flanges conforming to BS 10 Table E shall be provided on

- a. Straight runs at intervals not exceeding 25-30m on pipe lines of 50 mm dia and above and as directed by the EIC.
- b. For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and as required for good engineering practice and as shown/noted on the drawings.
- c. Flanges shall be with GI bolts and nuts and 3mm insertion gasket of natural rubber conforming to IS: 11149.

4.6.3 Unions (upto 50 mm dia)

Approved type of dismountable unions shall be provided on pipe lines of 40 mm dia and smaller dia, in locations similar to those specified for flanges.

Material of Pipe shall be as per Standard engineering practice like providing flange joint ,flanged elbow ,flanged T joints etc to ensure easy maintenance & it should be as per NBC 2005

5.0 AIR VESSEL

The air vessel shall be provided to compensate for slight loss of pressure in the system and to provide an air cushion for counter-acting pressure, surges, whenever the pumping sets come into operation. Air vessel shall conform to IS: 3844. It shall be normally half full of water, when the system is in normal operation. Air vessel shall be fabricated with 8 mm thick M.S. plate with dished ends and suitable supporting legs. It shall be provided with one 100 mm dia flanged connection from pump, one 25 mm drain with valve, one water level gauge and 25 mm sockets for pressure switches. The air vessel shall be tested to pressure for 12 hours at 2 times the operating pressure or 1.5 times the shut-off.

6.0 AIR CUSHION TANK

Every wet riser shall be provided with an air cushion tank at its top most point. The air cushion shall be provided with an automatic air release cock, 20 mm dia drain pipe, drain valve and shut off valve.

7.0 FIRE BRIGADE CONNECTION

The storage tank shall be provided with a 150 mm fire brigade pumping connection to discharge at least 2275 litres / minute into it. This connection shall not be taken directly into the side of the storage tank, but arranged to discharge not less than 150 mm above the top edge of the tank such that the

water flow can be seen. The connection shall be fitted with stop valve in a position approved by the EIC. An overflow connection discharging to a drain point shall be provided from the storage tank.

The fire brigade connection shall be fitted with four numbers of 63mm instantaneous inlets in a glass fronted wall box at a suitable position at street level, so located as to make the inlets accessible from the outside of the building. The size of the wall box shall be adequate to allow hose to be connected to the inlets, even if the door cannot be opened and the glass has to be broken. Each box shall have fall of 25mm towards the front at its base and shall be glassed with wired glass with "FIRE BRIGADE INLET" painted on the inner face of the glass in 50 mm size block letter. Each such box shall be provided with a steel hammer with chain for breaking the glass.

In addition to the emergency fire brigade connection to the storage tank, a 150mm common connection shall be taken from the four 63mm instantaneous inlets direct to hydrant main so that the fire brigade may pump to the hydrants in the event of the hydrant pumps being out of commission. The connection shall be fitted with a sluice valve and reflux valve. Location of this valve shall be as per the approval of the EIC.

Two way collecting head with two numbers 63 mm instantaneous type inlets shall be connected to the sprinkler header. All other details shall be as described above.

8.0 SYSTEM DRAINAGE

The system shall be provided with suitable drainage arrangement with drain valves complete with all accessories.

9.0 VALVE CHAMBERS

Provision of suitable brick masonry chambers in cement mortar 1:5 (1 cement : 5 coarse sand) on cement concrete foundations 150 mm thick 1:5:10 mix (1 cement:5 fine sand : 10 graded stone aggregate 20 mm nominal size) with 15 mm thick cement plaster inside and outside finished with a plaster inside and outside finished with a floated coat of neat cement inside with cast iron surface box approved by fire brigade including excavation, back-filling complete shall be made.

10.0 VALVES

10.1 SLUICE VALVES

Sluice valves shall be double flanged valves with cast iron body. The spindle, wall seat and wedge nuts shall be of bronze. They shall generally have non-rising spindle and shall be of the particular duty and design called for. The valves shall be supplied with suitable flanges, non- corrosive bolts and asbestos fibre gaskets. Sluice valves shall conform to Indian Standard IS : 780-1969 and IS : 2906 .

10.2 BUTTERFLY VALVE

The butterfly valve shall be suitable for waterworks and rated for PN 16. The body shall be of cast iron to IS:210 in circular shape and of high strength to take the water pressure . The disc shall be heavy duty cast iron with anti corrosive epoxy or nickel coating.

The valve seat shall be of high grade elastomeric or nit riles rubber. The valve in closed position shall have complete contact between the seat and the disc throughout the perimeter. The elastomeric rubber shall have a long life and shall not give away on continuous applied water pressure. The shaft shall be EN 8 grade carbon steel. The valve shall be fitted between two flanges on either side of pipe

flanges.

The valve edge rubber shall be projected outside such that they are wedged within the pipe flanges to prevent leakages.

10.3 BALL VALVE

The ball valve shall be made forged brass and suitable for test pressure of pipe line. The valve shall be internally threaded to receive pipe connections. The ball shall be made from brass and machined to perfect round shape and subsequently chrome plated. The seat of the valve body bonnet gasket and gland packing shall be of Teflon.

The handle shall be provided with PVC jacket. The handle shall also indicate the direction of 'open' and 'closed' situations. The gap between the ball and the Teflon packing shall be sealed to prevent water seeping. The handle shall also be provided with a lug to keep the movement of the ball valve within 90°. The lever shall be operated smoothly and without application of any unnecessary force.

10.4 GUN METAL VALVES

Gun metal Valves shall be used for smaller dia pipes, and for threaded connections. The Valves shall bear certification as per IS: 778. The body and bonnet shall be of gun metal to IS:318. The stem gland and gland nut shall be of forged brass to IS: 6912. The hand wheel shall be of cast iron to IS:210. The Hand wheel shall be of high quality finish to avoid hand abrasions. Movement shall also be easy. The spindle shall be non rising type.

10.5 NON-RETURN VALVE

Non-Return valves shall be cast iron double flanged with cast iron body and gunmetal internal parts conforming to IS:5312.

10.6 PRESSURE RELIEF VALVE

Each System shall be provided with a Pressure Relief Valves. The Valve shall be spring actuated and set to operate as per field requirement. The Valve shall be constructed of bronze and provided with an open discharge orifice for releasing the water. The Valve shall be open lift type.

11.0 PRESSURE SWITCH

The pressure switches shall be employed for starting and shutting down operation of pumps automatically, dictated by line pressure. The Pressure Switch shall be diaphragm type. The housing shall be die cast aluminum, with SS 316 movement, pressure element and socket. The set pressure shall be adjustable.

The Switch shall be suitable for consistent and repeated operations without change in values. It shall be provided with IP:55 water and environment protection.

12.0 PRESSURE GAUGE

Pressure gauge shall be provided near all individual connections of the hydrant system with isolation valves and near each flow switch assembly of the sprinkler system. Pressure gauge shall be 50 mm dia gunmetal bourdon type with gunmetal isolation ball valve, tapping and connecting pipe and nipple.

The gauge shall be installed at appropriate height for easy readability.

Butterfly Valve

The butterfly valve shall be suitable for water works and rated for PN 15. The body shall be cast iron to IS: 210 in circular shape and of high strength to take the water pressure. The disc shall be heavy duty cast iron with anti corrosive epoxy or nickel coating.

The valve seat shall be of high grade elastomer or nitrile rubber. The valve in closed position shall have complete contact between the seat and the disc throughout the perimeter. The elastomer rubber shall have a long life and shall not give away on continuous applied water pressure. The shaft shall be EN 8 grade carbon steel. The valve shall be fitted between two flanges on either side of pipe flanges. The valve edge rubber shall be projected outside such that they are wedged within the pipe flanges to prevent leakages.

13.0 PAINTING

All Hydrant and Sprinkler pipes shall be painted with post office red colour paint. All M S pipes shall first be cleaned thoroughly before application of primer coat. After application of primer coat two coats of enamel paint shall be applied. Each coat shall be given minimum 24 hours drying time. No thinners shall be used. Wherever required all pipe headers shall be worded indicating the direction of the pipe and its purpose such as "TO RISER NO.1" etc.

Painting shall be expertly applied; the paint shall not over run on surfaces not requiring painting such as walls, surfaces etc. Nuts and bolts shall be painted black, while valves shall be painted blue.

14.0 EXCAVATION

Excavation for pipe lines shall be in open trenches to levels and grades shown on the drawings or as required at site. Pipe lines shall be buried with a minimum cover of 1 meter or as shown on drawings. Wherever required Contractor shall support all trenches or adjoining structures with adequate timber supports, shoring and strutting. On completion of testing in the presence of the EIC and pipe protection, trenches shall be backfilled in 150 mm layers and consolidated. Contractor shall dispose off all surplus earth as directed by the Engineer In Charge.

15.0 ANCHOR / THRUST BLOCK

Contractor shall provide suitably designed anchor blocks in cement concrete/steel support to cater to the excess thrust due to work hammer and high pressure Thrust blocks shall be provided at all bends, tees and such other location as determined by the EIC. Exact location, design, size and mix of the concrete blocks/steel support shall be as shown on the drawings or as directed by the EIC prior to execution of work.

16.0 FIRE HYDRANTS (ISI marked)

16.1 EXTERNAL HYDRANTS (ISI marked) Downward Pattern

a) Contractor shall provide external hydrants. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be single outlet conforming to IS:908 with CI duck foot bend and flanged riser or required height to bring the hydrant to correct level above ground.

b). Contractor shall provide for each external fire hydrant two numbers of 63mm dia. 2 x 15 m long controlled percolation hose pipe with gunmetal male and female instantaneous type couplings machine wound with GI wire (hose to IS:636 type certification) , gunmetal branch pipe with nozzle to IS:903. This shall be measured and paid for separately.

- c). each external hydrant hose cabinet shall be provided with a drain in the bottom plate.
- d). each external hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner. This shall be measured and paid for separately.
- e). Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".
- f). The Hydrant valve (Landing wall) of the wet riser System shall be downward pattern & Bib nose threaded type made up of GM. It should be Single Headed & the system shall be painted as per IS 2379:1990 reaffirmed -1996 para7.4.

16.2 Internal Hydrants (ISI marked) Downward Pattern

- a). Contractor shall provide on each landing and other locations as shown on the drawings single headed gunmetal landing valve with 80 mm dia inlet as per IS:5290, with shut off valves having cast iron wheels as shown on the drawings. Landing valve shall have flanged inlet and instantaneous type outlets as shown on the drawings.
- b). Instantaneous outlets for fire hydrants shall be standard pattern and suitable for fire hoses. c). Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 2 x 15 m long rubberized fabric lined hose pipes with gunmetal male and female instantaneous type coupling machine would with GI wire (hose to IS:636 type 2 and couplings to IS:903 with IS certification), fire hose reel, gunmetal branch pipe with nozzle to IS:903. This shall be measured and paid for separately.
- d). Each internal hydrant hose cabinet shall be provided with a drain in the bottom plate. The drain point shall be lead away to the nearest general drain.
- e). Each internal hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. The cabinet shall be recessed in the wall as directed. This shall be measured and paid for separately.
- f) Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".
- g). The Hydrant valve (Landing wall) of the wet riser System shall be downward pattern & Bib nose threaded type made of GM/SS. It should be double Headed & the system shall be painted as per IS 2379:1990 reaffirmed -1996 para7.4.

16.3 Hose Reel (ISI marked)

Hose reel shall conform to IS : 884, heavy duty, 20 mm dia length shall be 36 metre long fitted with gun metal chromium plated nozzle, mild steel pressed reel drum which can swing up to 170 degree with wall brackets of cast iron finished with red and black enamel complete.

Contractor shall provide standard fire hose reels of 20mm dia high pressure "Dunlop" rubber hose 36 m long with gunmetal nozzle, all mounted on a circular hose reel of heavy duty mild steel construction having cast iron brackets. Hose reel shall be connected directly to the wet riser with an isolating valve. Hose reel shall conform to IS: 884 and shall be mounted vertically. This shall be measured and paid for separately.

16.4 Fire Hose

All hose pipes shall be of 63 mm diameter RRL/ CP as required, conforming to IS: 636 or IS: 8423. The hose shall be provided with copper alloy delivery coupling. The hose shall be capable of

withstanding a bursting pressure of 35.7 Kg/Sq.cm without undue leakage or sweating. Hose shall be provided with instantaneous spring lock, type couplings.

16.5 Branch Pipe, Nozzle

Branch pipes shall be of gun metal with loaded tin bronze ring at the discharge and to receive the nozzle and provided at the other with a leaded tin bronze ring to fit into the instantaneous coupling. Nozzle shall be of spray type of diameter of not less than 16 mm and not more than 25 mm. Nozzle shall be of loaded tin bronze branch pipe and nozzle shall be of instantaneous pattern conforming to IS - 903.

16.6 Hose Cabinet

Hose cabinet shall be provided for all internal and external fire hydrants. Hose cabinets shall be fabricated from 16 gauge MS powder coated sheet of fully welded construction with hinged double front door partially glazed (3 mm glass panel) with locking arrangement, stove enameled fire red paint (shade No. 536 of IS:5) with "FIRE HOSE" written on it prominently (size as given in the schedule of quantities). Cabinet surfaces in contact with the walls shall not be powder coated but instead given two coats of anti-corrosive bit mastic paint.

16.7 Internal Hose Cabinet

Hose cabinet shall be of glass fronted with hinged door & lock. The cabinet shall be made of 16 gauge thick MS sheet and spray painted to shade No. 536 of IS:5. The hose cabinet shall be of size to accommodate the following:

- I Landing Valves (Single/double headed)
- ii. Hose pipe
- iii. Hose reel (36.5 mtr.)
- iv. Branch pipes, nozzles (1 set)
- v. Fire man's axe and hand appliances

16.8 External Hose Cabinet

The hose cabinet shall be of size to accommodate the following:

- I Single/Double headed yard hydrant valve
- ii. Hose pipe (2 length of 15 m)
- iii. Branch pipes, nozzles (1 set)

17.0 SPRINKLER SYSTEM (UL/FM Approved)

17.1. GENERAL SPECIFICATION

The scope of work shall include supply, commissioning, testing of the system as a whole. The sprinkler heads are to be fixed into heavy quality black steel pipes, conforming to IS 1239 or any other approved specification. The size of pipe will vary from 20 mm to 150mm to suit the hydraulics of the system. The System shall conform to CFO Rules for the installation of sprinkler systems in general for 'Hazard' category as per NBC -in respect of design, density and spacing of sprinkler

heads.

Reduction in pipe sizes shall not be made by use of bushings. All piping shall be done by means of welding, screwed & flanged jointing as per codes.

Due care shall be taken that sprinklers are not applied with paint at the time of applying paint to piping and fittings. All control, drain, test and alarm valves shall be provided with signs to identify their purposes, functions, direction of flow the satisfaction of the LIC of India.

17.2 QUARTZOID BULB AUTOMATIC SPRINKLER (UL/FM Approved)

Sprinkler heads shall be made of Gun metal / SS/ brass quartzoid bulb type & UL Listed /FM Approved, in compression to withstand any pressure, surge or hammer likely to occur in the system. The yoke & body shall be made of high quality gun metal brass with arms streamlined to ensure minimum interference with the spread of water. The deflector of suitable design shall be fitted to give even distribution of water over the area commanded by the sprinkler.

The bulb shall contain a liquid having a freezing point below any natural climatic figure and a high coefficient of expansion. The temperature rating of the sprinkler shall be stamped on the deflector & the colour of the liquid filled in the bulb shall be according to the temperature rating as per NFPA standard. The sprinkler heads shall be of type & quality approved by the local fire brigade authority.

The inlet shall be screwed. The sprinklers shall have 15mm nominal size of the orifice for ordinary hazard. The orifice size shall be marked on the body or the deflector of the sprinkler. Metal guards for protection of sprinkler against accidental or mechanical damage shall be provided as desired by the EIC.

Contractor shall submit detailed submittal and discharge spray pattern for the Sprinkler for the approval of consultant.

17.2.1 Operating Temperature

The Operating temperature, at which the quartzoid bulb of the sprinkler head shall actuate, shall be 68 degree C or as specifically mentioned.

17.2.2 Sprinkler Installation

Sprinkler heads shall be located in positions shown on the drawings. While slight relocation may result from building construction features or interference from other services, the maximum spacing between sprinkler heads and coverage area shall not exceed those stipulated in the NFPA 13-1994 Rules.

Allowance shall be made for such relocations within a radius of 1500 mm of the indicated positions without additional cost. The Fire Protection Services Trade shall co-ordinate with the ceiling Trade to set out the sprinkler locations to suit the site location of the unit grid. In general, all sprinklers shall be located at the centre of the ceiling unit and a provision of about 10% more sprinklers and pipe work than required in NFPA Rules shall be included in this sub-contract. Chrome plated wire mesh guards shall be used to protect the sprinkler heads which are liable to accidental or mechanical (at no extra cost) damage.

Sprinkler Spacing is planned in such a way that it should not hinder the installation of pipe network & the Sprinkler is placed in such a way that it should be away from column & beam to give effective coverage of water spray.

Sprinkler shall not be provided in LV Room & Server Room.

17.2.3 FLOW REQUIREMENTS

The flow requirement for sprinkler heads shall be specifically approved for the designated area of installation.

17.3 ORIFICE PLATES

For restricting pressure at lower levels in the sprinkler system, orifice plates of appropriate sizes shall be fitted at different floor levels, at the branching points from Riser Main.

The Diameter of such orifice shall not be less than 50% of the dia of pipe into which it is to be fitted, which shall not be less than 50mm dia. These orifice plates must be of stainless steel with plain central hole without burrs, and the thickness shall be 3mm for pipe size up to 80 mm, 6 mm for pipes from 80 to 125 mm dia and 9 mm for pipes greater than 125 mm dia. Such orifice plate must have a projecting identification tag.

The orifice plate shall fitted not less than two pipe internal diameters downstream of the outlet from any elbow or brand. Contractor shall submit the design and identify location on drawing before installation.

17.4 INSTALLATION CONTROL VALVES (UL/FM LISTED)

Each installation shall be provided with a set of installation control valves comprising:-

- a) An Alarm Valve.
- b) A Water Motor Alarm & Gong.
- c. Installation valves shall be installed on the sprinkler circuits as shown on the drawings.
- d) Contractor shall submit detailed shop drawings showing the exact location, details of installation of the valves/alarm in all respects.
- e) Installation valve shall comprise of a cast iron body with gunmetal trim, and double seated clapper check valves, pressure gauges, test valve and orifice assembly and drain valve with pressure gauges, turbine water gong including all accessories necessary and required and as supplied by original equipment manufacturer and required for full and satisfactory performance of the system. A cast iron isolation valve with lock and chain at the inlet of the installation valve shall be provided.

17.5 INSPECTION AND TEST VALVE ASSEMBLY

Inspection and testing of the automatic starting of the sprinkler system shall be done by providing an assembly consisting of gunmetal valves, gunmetal sight glass, bye-pass valve and orifice assembly as per approved drawing.

17.6 WATER FLOW SWITCH (UL/FM Appoved)

Flow switch shall have a paddle made of flexible and sturdy material of the width to fit within the pipe bore. The terminal box shall be mounted over the paddle/ pipe through a connecting socket. The Switch shall be potential free in either N O or N C position as required. The switch shall be able to trip and make / break contact on the operation of a single sprinkler head. The terminal box shall have connections for wiring to the Annunciation Panel. The flow switch shall have connections for wiring

the seat shall be of S.S to the Annunciation Panel. The flow switch shall have IP: 55 protections.

The flow switches work at a triggering threshold bandwidth (flow rate) of 4 to 10 GPM. Further, it shall have a 'Retard' to compensate for line leakage or intermitted flows.

TAMPER SWITCH shall be UL/FM Approved

17.7 WATER CURTAIN NOZZLE

Water Curtain Nozzle distributes water in a flat curtain extending all the way to the ground. Water Curtain Nozzle when mounted in pendent position acts as a window spray nozzle to protect interior walls, windows and other opening of the building which are affected by fire. The nozzles when mounted in horizontal position with flow towards ground, a flat water curtain are produced to segregate the area which is under fire. Water Curtain Nozzles are available in Brass and Stainless Steel construction with spacing between nozzles of 2.5 m with working pressure of 1.5 to 3.5 kg/cm².

17.7.1 Deluge Valve (UL/ FM Approved)

Deluge Valve is a quick release, hydraulically operated diaphragm valve. It has three chambers, isolated from each other by the diaphragm operated clapper & seat seal. While in 'set' position, water pressure is transmitted through an external bypass check valve & restriction orifice from the system supply side to the top chamber, so the supply pressure in the top chamber acts across the diaphragm operated clapper which holds the seat against the inlet supply pressure because of differential pressure design. On detection of fire the top chamber is vented to atmosphere through the outlet port via opened actuation device. The top chamber pressure cannot be replenished through the restricted inlet port, thus it reaches less than half the Supply pressure instantaneously & the upward force of the supply pressure lifts the clapper allowing water to enter the system piping network & alarm devices.

17.7.2 THE MAIN STOP VALVE

These shall be of cast iron body of requisite size. When closed, these will shut off supply of water to the installation. A location plate must be fixed on the outside or an external wall, as near to the main stop valve as possible, bearing the following words on raised letters or other approved type letter.

i Sprinkler Stop Valve Inside : The word 'sprinkler stop valve' shall be in letters of at least 35mm and the word "INSIDE" at least 25mm in height. The words shall be painted white on black background.

ii All stop valves shall be right handed i.e. they shall be so constructed that in order to shut the valve the spindle shall turn from left to right. There shall be an indicator which will show whether the valve is open or shut.

17.8 PIPES FOR DRAINAGE: Sprinkler pipes shall be so installed that the system can be thoroughly drained. As far as possible all pipes shall be arranged to drain to the installation drain valve as shown in the drawing for ordinary hazard system.

In the case of basement & other areas where sprinkler pipe-work is below the installation drain valve & in other trapped points in the system, auxiliary valves of the following sizes shall be provided.

- 20 mm valves for pipes upto 50mm dia.

- 25 mm valves for 80mm dia pipe.

- 50 mm valves for pipes larger than 80mm dia.

Provision for discharge /Performance test of Sprinkler shall be made in such a way that the water flow of the System can be dumped through the bypass System.

17.9 SYSTEM DESIGN

The entire sprinkler installation shall be designed to make it a hydraulically balanced system. The pressure requirement at typical floors shall be designed between 2.5 bars and 3.5 bars.

16.0 HAND HELD FIRE EXTINGUISHERS (ISI marked)

16.1 HAND APPLIANCES

18.00 Scope

Work under this section shall consist of furnishing all labour, materials, appliances and equipment necessary and required to install fire extinguishing hand appliances as per relevant specification of various authorities.

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

Installation of fully charged and tested fire extinguishing hand appliances of A B C powder type as required and specified in the drawings and schedule of rates.

All the extinguisher shall be positioned/ installed as per IS:2190 requirement guidelines

GENERAL REQUIREMENTS

Hand appliances shall be installed in easily accessible locations with the brackets fixed to the wall by suitable anchor fasteners.

Each appliance shall be provided with an inspection card indicating the date of inspection, testing, change of charge and other relevant data.

All appliances shall be fixed in a true workmanlike manner truly vertical and at correct locations. Distribution / installation of fire extinguisher to be in accordance to IS: 2190.

MEASUREMENT

Fire extinguishers shall be counted in numbers and include installation of all necessary items required as given in the specifications.

18.3. ABC TYPE DRY POWDER EXTINGUISHER

The capacity of the extinguisher when filled with Dry Chemical Powder (First filling) as per IS 15683, Part II, shall be 5 Kg +/-2% or 10 Kg +/- 3%.

The extinguishers should be position /Installed as per IS: 2190 – 2010.

It shall be operated upright, with a squeeze grip valve to control discharge. The plunger neck shall have a safety clip, fitted with a pin, to prevent accidental discharge. It shall be pressurized with Dry Nitrogen, as expellant. The Nitrogen to be charged at a pressure of 15 Kg/cm²

Body shall be of mild steel conforming to relevant IS Standards. The neck ring shall be also mild steel and welded to the body. The discharge valve body shall be forged brass or leaded bronze, while

the spindle, spring and siphon tube shall be of brass. The nozzle shall be of brass, while the hose shall be braided nylon.

The body shall be cylindrical in shape, with the dish and dome welded to it. Sufficient space for Nitrogen gas shall be provided inside the body, above the powder filling. The Neck Ring shall be externally threaded - the threading portion being 1.6 cm. The filler opening in the neck ring shall not less than 50 mm. Discharge nozzles shall be screwed to the hose.

The design of the nozzle shall meet the performance requirement, so as to discharge at least 85% of contents upto a throw of 4 mtrs, continuously, at least for 15 seconds. The hose, forming part of discharge nozzle, shall be 500 mm long, with 10 mm dia internally for 5 Kg capacity and 12 mm for 10 Kg capacity. It shall have a pressure gauge fitted to the valve assembly or the cylinder to indicate pressure available inside.

The extinguisher shall be treated with anti-corrosive paint, and it shall be labeled with words ABC 2.5 cm long, within a triangle of 5 cm on each face. The extinguisher body and valve assembly shall withstand internal pressure of 30 Kg/cm² for a minimum period of 2 minutes. The pressure gauge shall be imported and suited for the purpose.

50% of the extinguisher shall be Stored Pressure & 50% shall be cartridge type.

These are equally distributed in the building along with water type Extinguisher placed alternatively at strategic Location

18.4 WATER TYPE EXTINGUISHER (Stored Pressure water type)

The Extinguishing medium shall be primarily water stored under normal pressure, the discharge being affected by release of Carbon Dioxide Gas from a 120 gms cylinder. The capacity of Extinguisher, when filled up to the indicated level, shall be 9 ltr +/- 5%

The skin thickness of the Cylinder shall be minimum 4.0 mm, fabricated from Mild Steel sheet, welded as required, with dish and dome, being of same thickness, and of size not exceeding the diameter of body. The diameter of body to be not less than 150 mm and not exceeding 200 mm. The neck shall be externally threaded upto a minimum depth of 16 mm, and leaded tin bronze.

The cap shall be of leaded tin bronze, and screwed on the body upto a minimum of 1.6 cm depth, with parallel screw thread to match the neck ring. The siphon tube to be of brass or G.I. and the strainer of Brass.

The cartridge holder, knob, discharge fittings and plunger to be of Brass/Leaded tin bronze, and plunger of stainless steel, spring of stainless steel. The cap to have handle fixed to it. The discharge hose shall be braided nylon, of 10 mm dia and 600 mm long, with a nozzle of brass fitted at end. The extinguisher shall be treated for anti-corrosion internally and externally, and externally painted with Fire Red paint.

The paint shall be stove enameled/ powder coated. The cartridge shall be as per IS, and have 60 gm net carbon dioxide gas for expelling. The extinguisher, body and cap shall be treated to an internal hydraulic pressure of 25 Kg/cm². It shall have external marking with letter A, of 2.5 cm height, in block letters within a triangle of 5 cm each side. The extinguisher shall be upright in operation, with the body placed on ground and discharge tube with nozzle held in one hand to give a throw of not less than 6 mtr, and continue so for at least 60 secs. The extinguisher body shall be clearly marked with ISI stamp (IS 940).

Stored Pressure water type Fire extinguisher shall be required in cellulose/Paper/cloth hazards in the building. These are equally distributed in the building along with ABC powder Extinguisher placed alternatively at strategic Location

18.5 CARBON DIOXIDE EXTINGUISHER

The Carbon Dioxide Extinguisher shall be as per IS: 2878 The body shall be constructed of seamless tube conforming to IS: 7285 and having a convex dome and flat base. Its dia shall be maximum 140 mm, and the overall height shall not exceed 720 mm.

The discharge mechanism shall be through a control valve conforming to IS: 3224. The internal syphon tube shall be of copper aluminium conforming to relevant specifications. Hose Pipe shall be high pressure braided Rubber hose with a minimum burst pressure of 140 Kg/cm² and shall be approximately 1.0 meter in length having internal dia of 10 mm. The discharge horn shall be of high quality unbreakable plastic with gradually expanding shape, to convert liquid carbon dioxide into gas form.

The hand grip of Discharge horn shall be insulated with Rubber of appropriate thickness. The gas shall be conforming to IS: 307 and shall be stored at about 85 Kg/cm². The expansion ratio between stored liquid carbon dioxide to expanded gas shall be 1:9 times and the total discharge time (effective) shall be minimum 10 secs and maximum 25 secs.

The extinguisher shall fulfill the following test pressures:

Cylinder: 236 Kg/cm²

Control Valve: 125 Kg/cm²

Burst Pressure of Hose: 140 Kg/cm² minimum

It shall be an Upright type. The cylinder, including the control valve and high pressure Discharge Hose must comply with relevant Statutory Regulations, and be approved by Chief Controller of Explosives, Nagpur and also bear IS marking. The Extinguisher including components shall be IS marked.

18.6 HFC-BASED, CLEAN AGENT PORTABLE FIRE EXTINGUISHER

The product utilizes HFC-236, clean agent fire extinguishers store agent as a liquid, which turns to gas when it hits the air. Clean agent extinguishers are effective on Class A, B and C fires and will not conduct electricity back to the user. Clean agent extinguishers act to extinguish a fire by cooling and smothering it (without thermal shock to delicate electronic equipment). These extinguishers have zero global warming (or ozone depletion) potential.

19.0 FIRE PUMPS AND ALLIED EQUIPMENTS

19.1 SCOPE

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install electrically operated and diesel driven pumps and as required by drawings and specified hereinafter or given in the schedule of rates.

a. Electrically operated pumps with motors and diesel engine driven pumps with diesel engine, common base plates, coupling, coupling guard and accessories.

- b. Automatic starting system with all accessories, wiring and connections and pressure switches.
- c. Motor control centre.
- d. Annunciation system with all accessories wiring and connections.
- e. Pressure gauges with isolation valves and piping, bleed and block valves.
- f. Suction strainers and accessories.
- g. Vibration eliminator pads and foundation bolts.
- h. Leak-off drain shall be led to the nearest floor drain.

19.2. GENERAL REQUIREMENTS

Pumps shall be installed true to levels on suitable concrete foundations. Base plate shall be firmly fixed by properly grouted foundation bolts.

Pumps and motors shall be truly aligned by suitably instruments. Record of such alignment shall be furnished to the LIC. All pump connections shall be standard flanged type with number of bolts as per relevant standard requirement for the working pressure. Companion flanges shall be provided with the pumps.

Manufacturers' instructions regarding installation, connections and commissioning shall be strictly followed.

Contractor shall provide necessary test certificates, type test certificates, performance curves and NPSH curves of the pumps from the manufacturer when called for. The contractor shall provide facilities to the fire authority for inspection of equipment during manufacturing and also to witness various tests at the manufacturer's works without any cost to the EIC or Consultant. Seismic isolation and clamping for each pump and flexible connection on the suction as well as the discharge side shall be provided. The contractor shall submit with this tender a list of recommended spare parts for three years of normal operation and quote the prices for the same as a separate submittal / annexure.

19.3 ELECTRIC FIRE PUMP

General The electric fire pump shall be suitable for automatic operation complete with necessary electric motor and automatic starting gear, suitable for operation on 415 volts, 3 phase, 50 Hz. A.C. system. Both the motor and the pump shall be assembled on a common base plate, fabricated M.S. channel type or cast iron type.

Drive: - The pump shall be direct driven by means of a flexible coupling. Coupling guard shall also be provided.

19.4 FIRE PUMP

The fire pump shall be horizontally mounted centrifugal type. It shall have a capacity to deliver 2850 lpm as specified, and developing adequate head so as to ensure a minimum pressure of 3.5 Kg/Sq.cm at the highest and the farthest outlet.

The pump shall be capable of giving a discharge of not less than 150 per cent of the rated discharge, at a head of not less than 65 per cent of the rated head. The shut off head shall be

within 120 per cent of the rated head. This test shall be performed on annual basis complete with flow measuring device & piping diverted back to Tank. This testing procedure shall be as per NFPA 25.

The pump casing shall be of cast iron to grade FG 200 to IS: 210 and parts like impeller, shaft sleeve, wearing ring etc. shall be of noncorrosive metal like bronze/brass/gun metal. The shaft shall be of stainless steel. Provision of mechanical seal shall also be made.

Bearings of the pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water. The pump shall be provided with a plate indicating the suction lift, delivery head, discharge, speed and number of stages. The pump casing shall be designed to withstand 1.5 times the working pressure.

Provision of Jockey Pump for low and high zone shall be made. The pump shall be vertical SS type and of detail as in schedule of quantity. Contractor shall verify that the capacity of the Jockey pump shall not be less than 3% (Minimum 180 LPM) and not more than 10% of the installed pump capacity.

Motor

The motor shall be squirrel cage A.C. induction type suitable for operation on 415 volts 3 phase 50 Hz. system. The motor shall be totally enclosed fan cooled type conforming to protection clause IP 55. The class of insulation shall be F. The synchronous speed shall be 1500 RPM as specified. The motor shall be rated for continuous duty and shall have a horse power rating necessary to drive the pump at 150 per cent of its rated discharge with at least 65 per cent rated head. The motor shall conform to I.S.325-1978.

Motor Starter

The motor starter shall be as per detail in MCC. The unit shall include suitable current transformer and ammeter of suitable range on one line to indicate the current. The starter shall not incorporate under voltage, no voltage trip overload or SPP. The starter assembly shall be suitably integrated in the power and control panel for the wet riser system & sprinkler system.

19.5 DIESEL FIRE PUMP

General

The diesel pump set shall be suitable for automatic operation complete with necessary automatic starting gear, for starting on wet battery system and shall be complete with all accessories. Both engine and pump shall be assembled on a common base plate.

Drive

The pump shall be only direct driven by means of a flexible coupling. Coupling guard shall also be provided. The speed shall be 1800 RPM as specified.

Fire Pump

The fire pump shall be horizontally mounted centrifugal. It shall have a capacity to deliver as specified, and developing adequate head so as to ensure a minimum pressure of 3.5 Kg/Sq.cm at the highest and the farthest outlet.. The pump shall be capable of giving a discharge of not less than 150 per cent of the rated discharge, at a head of not less than 65 per cent of the rated head.

The shut off head shall be within 120 per cent of the rated head. This test shall be performed on

annual basis complete with flow measuring device & piping diverted back to Tank. This testing procedure shall be as per NFPA 25.

The pump casing shall be of cast iron to grade FG 200 to IS 210 and parts like impeller, shaft sleeves, wearing-ring etc. shall be of noncorrosive metal like bronze/brass/gun metal. The shaft shall be stainless steel. Provision of mechanical seal shall also be made.

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

Diesel Engine

Engine Rating - The engine shall be cold starting type without the necessity of preliminary heating of the engine cylinders or combustion chamber (for example, by wicks, cartridge, heater, plugs etc.). The engine shall be multi cylinder/vertical 4 stroke cycles, air-cooled, diesel engine, developing suitable HP at the operating speed specified to drive the fire pump. Continuous capacity available for the load shall be exclusive of the power requirement of auxiliaries of the diesel engine, and the after correction for altitude, ambient temperature and humidity for the specified environmental conditions. This shall be at least 20% greater than the maximum HP required to drive the pump at its duty point. It shall also be capable of driving the pump at 150% of the rated discharge at 65% of rated head. The engine shall be capable of continuous non-stop operation for 8 hours and major overhaul shall not be required before 3000 hours of operation. The engine shall have 10% overload capacity for one hour in any period of 12 hours continuous run. The engine shall accept full load within 15 seconds from the receipt of signal to start. The diesel engine shall conform to BS 649/IS 1601/IS 10002, all amended up to date.

a) Engine Accessories - The engine shall be complete with the following accessories:-

Fly wheel dynamically balanced.

Direct coupling for pump and coupling guard.

Corrosion Resistor.

Air cleaner.

Fuel service tank support, and fuel oil filter with necessary pipe work.

Elect. starting battery (2X24 v).

Exhaust silencer with necessary pipe work.

Governor.

Instrument panel housing all the gauges, including Tachometer, hour meter and starting switch with key (for manual starting).

Necessary safety controls.

b) Fuel System - The fuel shall be gravity fed from the engine fuel tank to the engine driven fuel pump. The engine fuel tank shall be mounted either over or adjacent to the engine itself or suitably wall mounted on bracket. The fuel filter shall be suitably located to permit easy servicing.

All fuel tubing to the engine shall be with copper, with flexible hose connections where required.

Plastic tubing shall not be permitted.

The fuel tank shall be of welded steel construction (3 mm. thick) and of capacity sufficient to allow the engine to run on full load for at least 8 hours. The tank shall be complete with necessary wall mounted supports, level indicator (protected against mechanical injury) inlet, outlet, overflow connections and drain plug and piping to the engine fuel tank. The outlet shall be so located as to avoid entry of any sediment into the fuel line to the engine.

As semi rotary hand pump for filling the daily service tank together with hose pipe 5 mtr. long with a foot valve etc. shall also form part of the scope of supply.

c) Lubricating Oil System- Forced feed Lub. Oil system shall be employed for positive lubrication. Necessary Lubrication, Oil filters shall be provided, located suitably for convenient servicing.

d) Starting System- The starting system shall comprise necessary batteries (2x24v), 24 volts starter motor of adequate capacity and axle type gear to match with the toothed ring on the fly wheel. Bi metallic relay protection to protect starting motor from excessively long cranking runs suitably integrated with engine protection system shall be included within the scope of the work.

The capacity of the battery shall be suitable for meeting the needs of the starting system. The battery capacity shall be adequate for 10 consecutive starts without recharging with cold engine under full compression. The scope shall cover all cabling, terminals, initial charging etc.

e) Exhaust System - The exhaust system shall be complete with silencer suitable for outdoor installation and silencer piping including bends and accessories needed for a run of 15 metre from the engine manifold.(Adjustment rates for extra lengths shall also be given). The total back pressure shall not exceed the engine manufacture's recommendation. The exhaust piping shall be suitably supported. f. Engine shut down mechanism- This shall be auto/ manually operated and shall return automatically to the starting position after use.

g) Governing System- The engine shall be provided with an adjustable governor to control the engine speed within 5% of its rated speed under all conditions of load up to full load. The governor shall be set to maintain rated pump speed at maximum pump load.

h) Engine Instrumentation- Engine instrumentation shall include the following:-

- i) Lub. oil pressure gauge.
- ii) Lub. oil temperature gauge.
- iii) Water pressure gauge.
- iv) Water temperature gauge.
- v) Tachometer.
- vi) Hour meter.

The instrumentation panel shall be suitably resident mounted on the engine.

Engine Protection Devices- Following engine protection and automatic shut down facilities shall be provided:-

- i. Low lub.oil pressure.

- ii. High cooling water temp.
- iii. High lub.oil temperature.
- iv. Over speed shut down.

i. Pipe Work - All pipe lines with fittings and accessories required shall be provided for fuel oil, lub.oil and exhaust systems, copper piping of adequate sizes, shall be used for Lub.oil and fuel oil. M.S. piping will be permitted for exhaust.

j. Anti Vibration mounting- Suitable vibration mounting duly approved by EIC shall be employed for mounting the unit so as to minimise transmission of vibration to the structure. The isolation efficiency achievable shall be clearly indicated.

k. Battery Charger- Necessary float and boost charger shall be incorporated in the control section of the power and control panel, to keep the battery in trim condition. Voltmeter to indicate the state of charge of the batteries shall be provided.

19.6. PUMP SETS ASSEMBLY:

On the main fire sprinkler and hydrant headers near pump sets a 150 mm dia by-pass valve located in an accessible location shall be provided along with a rate of flow rota meter calibrated in 1 pm and able to read 200% of the rated pump capacity. The delivery shall be connected to the fire tank. Each and every pump set assembly shall be provided with suction valve (only for positive suction head), discharge valve, non-return valve and 150 mm dia Bourdon type pressure gauge with isolation valve.

19.7 FLEXIBLE CONNECTORS

On all suction and delivery lines double flanged reinforced neoprene flexible pipe connectors shall be provided. Connectors should be suitable for maximum working pressure of each pipe line on which it is mounted and tested to a test pressure of 1.5 time the operating pressure. Length of the connector shall be as per manufacturer's standard.

19.8 INTERLOCKING

The following inter-locking between the two main fire pumps (i.e. wet riser pump & sprinkler pump), the jockey pump and the diesel engine driven pump. Only one category of pumps will work at a time i.e. either jockey pump or main fire pumps (wet riser and sprinkler, both the wet riser and sprinkler can come up at a time) or diesel driven pump.

Sr No	JOCKEY	WET RISER	SPRINKLER DIESEL DRIVEN
	PUMP	PUMP	PUMP PUMP
i	ON	OFF	OFF OFF
ii	OFF	ON	OFF OFF
iii	OFF	OFF	ON OFF
iv	OFF	ON	ON OFF

V	OFF	OFF	ON	ON
vi	OFF	OFF	OFF	ON
vii	OFF	ON	OFF	ON

19.9 ANNUNCIATION PANEL

One solid state electronic annunciation panel, fully wired with visual display and audible alarm unit shall be provided to indicate:

- Flow condition in any flow switch indicating the area of distress and fire alarm.
- Starting and stopping of each hydrant pump.
- Starting and stopping of each jockey pump.
- Starting and stopping of each sprinkler pump.
- Failure of Hydrant / Sprinkler pump to start.
- High level in fire water storage tank compartment.
- Low level in fire water storage tank compartment.
- Low level in HSD day tank of the fire pump.

The panel shall be factory fabricated, wired and tested. All details shall be submitted with the tender. The annunciation panel shall be located in the security office / reception on the ground floor or as instructed by the EIC.

19.10 VIBRATION ISOLATION

The pumpset shall be mounted on rolled steel channels and 150 mm thick inertia block spring and ribbed neoprene vibration isolation mounting shall support the inertia block onto a 100 mm thick concrete plinths. The spring mountings shall have a maximum deflection of 15 mm. Reference shall be made to the section on "Noise and Vibration" for further technical requirements.

19.11 TESTING

Fire Pump testing procedure shall be in compliance to NFPA 25. For Annual testing of Fire water Pump (at 150% rating) provision of water Circulation in storage tank, Flow rate measuring instrument etc as per NFPA 25 shall be provided. Pump run & Power off of Sprinkler System shall be Standard make & UL/ FM Listed

Manufacturer should have Factory Testing Facility for pumps.

TECHINICAL SPECIFICATION FOR WATER SUPPLY PUMP

6.00 DOMESTIC WATER PUMP

GENERAL

- a) The pump heads in the Schedules or Drawings are given for tendering guidance only and the Contractor shall be responsible for checking the total final resistance of each system, based on the actual pipe runs and equipment offered, prior to ordering. Any modifications to the system or any of the components, i.e. pumps, pipe work, motors etc., which may be required to meet the scheduled duties and space limitations shall be carried out at the Contractor's expenses.
- b) All pumps shall be constructed to meet the required working conditions and test pressure of the system concerned.
- c) All pumps shall be self primed and mounted on a common bed-plate together with the motor and directly driven through a flexible coupling and shall be aligned in the manufacturer's factory. Locally fabricated bed-plates will not be accepted. Base plate shall incorporate a drain pan and is to be provided with a screwed socket outlet for drain connection.
- d) Unless otherwise specified, pumps shall be selected for an impeller speed of 1450/1500 rpm. All pumps shall be as commercially silent in operation. A unit which is considered to be noisy shall be removed from the site and replaced by silent unit at the Contractor's expense.
- e) The Contractor shall submit for the approval the characteristic curves of the pump offered. The operating conditions shall be indicated and curves of pumps having excessive shut-off head will not be accepted.
- f) All pumps shall be fitted with an air-cock and drain plug. Each pump shall be provided with connection for pressure gauges at the suction and delivery connections, the gauges for all pumps shall be mounted on common hardwood gauge board on the wall inside the pump room. Gauges shall have 100mm diameter dial. Pressure gauge piping shall be copper comprising a loop siphon at the junction to the gauge and each gauge shall be supplied through 12mm diameter brass pig tail and pet cock. Drains shall be piped to floor drains/waste pit.
- g) The Contractor shall supply and install flexible pipe connectors at the pump suction and discharge sides for each pump.
- h) All flexible connectors shall have flanges joints to the table specified for the connecting pipe work and must be suitable for the working conditions and test pressure of the system concerned.
- i) Gland drains shall be provided in each pump packing gland with suitable nipple/outlet for copper/PVC pipes to be connected. All drains shall have a minimum internal bore of 15mm diameter and arranged in a proper pattern for piping the same to the channels or floor outlets provided inside the pump room.
- j) Where necessary, an automatic air relief valve shall be fitted in the pump to purge any air likely to be trapped inside the pump casing. Suitable fittings shall be use for such connection and the relief valve shall not discharge at a location directly over or near to the pump motor or

any other electrical equipment.

- k) Each pump shall be fitted with valves to enable it to be isolated, and in addition, where shown on the Drawings, a check/non-return valve shall be fitted in each pump discharge.
- l) Transfer pump set shall be mounted on an inertia block. Holding down bolts shall be set in position during the manufacture of the structural base. Filtered pump set shall be mounted on base plate. Generally all pump sets shall be mounted on the reinforced concrete plinth 150mm high or as instructed by the Engineer.
- m) Inertia block shall be concreted. Anchor bolts of base shall be provided.
- n) Pump inertia bases shall be provided and shall be twice the operating weight of the pumps and the associated pipe work as mounted thereon.
- o) The base plates shall be of approved make with pads machined for correct alignment of the pump and motor. At least two locating dowels shall be fitted to each component after alignment.
- p) All exposed shafts, couplings and moving parts of pumps shall be provided with suitable galvanized angle iron wire mesh guards which shall be stoutly constructed and easily removable; and shall be provided with lifting handles. Care shall be taken that these guards of not cause "Ringing" sound and/or vibrate so causing noise.
- q) An identification plate of metal shall be fixed to each pump unit. This plate shall include full details and diameter of the impeller installed, pump size, model and serial number, r.p.m., amps, etc. pump head and delivery for the duty specified, and lubricant required.
- r) All pumps shall bear the manufacturer's designation plate which shall indicate the type of services and serial number of the unit.

PUMP ARRANGEMENT

Pumps for plumbing services are single stage or multi-stage centrifugal vertical, horizontal split case or end suction type as shown in Schedule/ Drawing. Sewage pumps shall be submersible type, or centrifugal self priming. Each pump shall be directly coupled with the electric motor and aligned in the manufacturer's factory.

PUMP SPEED AND NOISE

Pumps shall be selected for an impeller speed as indicated in the Schedule/Drawing. All pumps shall be as commercially silent in operation.

The noise level shall be not more than NC 70 in pump room, NC 50 in the same floor and NC 35 for other floors.

PUMP BASES

Except for submersible sump pumps, each pump set shall be mounted on an anti-vibration pump base. Details shall be submitted by the Contractor well before the manufacture of the structural base. All holding down bolts shall be provided by the Contractor.

SAFETY GUARDS

All exposed shafts, couplings and moving parts of pumps shall be provided with suitable galvanized angle iron wire mesh guards which shall be stoutly constructed and easily removable; and shall be provided with lifting handles. Care shall be taken that these guards do not cause "ringing" sound and/or vibrate so causing noise.

IDENTIFICATION

An identification plate of metal shall be fixed to each pump unit. This plate shall include full details and diameter of the impeller installed, pump size, model and serial number, r.p.m., sumps, etc pump head and delivery for the duty specified, and lubricant required.

All pumps shall bear the manufacturer's designation plate which shall indicate the type of services and serial number of the unit.

ELECTRICAL WORKS FOR PUMPS

All electrical works associated with the pumps shall comply with the NBC regulations (the latest edition) code of practice, supply rules and regulations and described in the relevant section of this Specification.

Anti-vibration mountings shall be inertia base, springs, neoprene pads or rubber-in-shear isolators, with the specified static deflection and selected to provide isolating efficiency of not less than 95%.

A) The control panel shall be of the pressure switch/microprocessor. The complete control panel assembly and all the internal devices shall be UL508.

The panel shall be complete with IP54/NEMA1 enclosure and include door interlocked main disconnect and magnetic motor starters with fused motor protectors, adjustable time delays, Hand-off auto selector switch and for each pump, power on light, minimum run timers, low suction pressure switch and pilot light. The control circuit shall include fault relay circuit to turn on the next pump should the lead pump fail.

B) Should the duty pump fail to start and the pressure of the system shall continue to fall, the standby pump shall be initiated to cut into operation.

C) Either pump shall be able to be selected as duty/standby/jockey. The operating pump shall also be able to select as automatic or manual and interlock devices shall be provided to isolated the system for maintenance

D) Automatic changeover shall be provided to alternate between the duty/standby pumps on each cycle.

E) A time delay (0 to 10 seconds) switch shall be installed in the control of each pump set to provide a time lag between the initiation of signals by the pressure switches (both pump on and

off) and the actual start and stop of the pump set to avoid excessively frequent on/off cycles of the pumps due to surges in the long pipe runs.

F) The pump set together with the required control panel and fitted with hoot shall be mounted on a common bedplate, factory assembled in the manufacturer's workshop prior to delivery.

Control panel for all pump sets shall be as per Indian standard.

RAW WATER PUMPS

Where required transfer water pumps shall conform to the following Specification:

Pump efficiency **shall not be less than 75%**,

Materials shall be as follows:

Casing	-	Cast iron and minimum working pressure not less than 250 PSI Or 150% of maximum discharge pressure.
Impellers	-	Bronze and hydraulic balancing.
Wearing	-	Bronze Rings
Shaft Sleeve	-	Bronze
Shaft	-	Stainless steel
Seal	-	Mechanical seal/gland packing (asbestos-free)
Couplings	-	Flexible metallic coupling, complete with coupling guards
Bearings	-	Ball thrust type, grease lubricated, rated bearing life not less than 100,000 Hr

SUBMERSIBLE SEWAGE AND DRAINAGE PUMPS

Submersible sewage and drainage pumps shall be installed in sump pits consisting of discharge connection, galvanized steel guide rail, galvanized chain and lifting handle as per detail. Pump efficiency shall **not be less than 75%**.

Materials shall be as follows:

Casing	-	High grade grey cast iron with internal sea water corrosion resistant coating
Impellers	-	Cutter type for sewage pumps or non-clog type for drainage pumps, chromium-alloyed cast iron material of abrasion resistant.
Shaft	-	Stainless steel.
Seal	-	Double mechanical seal.
Bearings	-	Ball thrust type, grease lubricated
Maximum	-	As shown on the Equipment Schedule/Drawing
Speed Bolt & Nut	-	Stainless Steel

Level switches (high/low levels alarm and indications) shall be supplied and installed in the sump pits for the proper operation of the pumps as indicated on Drawings. The switches shall be of mercury float switch type. The lead-lag selection of pumps shall be changed automatically after each cycle.

Attention shall be paid to the internal dimensions of the sump pits and covers when selecting pumps. Motor shall be class F insulation and inside the casing to prevent water ingress.

The Contractor shall supply and fix pump discharge pipe work, vents, control and power wiring and associated conduit. Three spare packing shall be provided for each pump. The installations shall be complete with the following accessories:

- . Seal monitor in oil chamber for leakage checking.
- . Thermal switches to protect over heated motor.
- . Automatic control box.
- . Cable of sufficient length for connection of the control box to the pump. . A.C. alarm bells. . Cable holders.

EXECUTION

- A) Completely align and level pumps, motors and bases. Where pumps and motor are shipped as a unit, realign them in the field.
- B) Grout base plates completely to provide a non-deflecting support.
- C) Install and align mechanical seals in accordance with the manufacturer's recommendation.
- D) Pump manufacturer or his representative to set packing, adjust impellers and check alignment prior to start-up.
- E) Pump shall be mounted according to vibration isolation section.
- F) Repair all surface damage during shipping and installation or prior to client's acceptance of the building.

TECHNICAL SPECIFICATIONS FOR ELECTRICAL SECURITY SYSTEM

1. Codes and Standards

The supply of the entire fire alarm system shall conform to BS: 5839 or NFPA 72. The detectors shall conform to relevant codes for Fire Alarm Systems.- A general line diagram showing the circuit and spacing of detectors is enclosed. However, this line diagram is mainly for guidance of the Vendors and wherever it maybe at variance with the BS: 5839 or NFPA 71 and 72, the latter shall be followed.

2. Fire Alarm Control Panel

The Fire Alarm Control Panel shall be micro processor based fully Analogue Addressable Analogue Control Unit which shall control all Analogue Addressable devices, detectors, Manual Call Stations and Switching Systems (for disconnecting power supply) connected to it and other Input Devices such as magnetic Contacts and Flow Switches.

All addressable units shall be connected to the panel through the loop cards and shall be addressable through individualized numbers. The panel shall be able to obtain analogue value for all detectors in the circuit through a pulsed digitalized current data. The panel shall be able to analyze all analogue inputs from all addressable units and through its own software and ambient level screening the panel shall be able to identify Fire, possible Fire or Fault conditions. The unit supervision shall be dynamic and continuous.

The fire alarm panel shall itself have all loop cards in it. No isolated motherboard or transponder is being considered. Each loop shall be able access a minimum of 250 addressable devices. The design has been based on the basis of 125 detectors per loop.

The Panel shall also give adequate warning signal whenever there is dust accumulation in detectors and upto the point of its replacement it should be possible to change the level of ambient alarm calibration condition either by the use of software programme operable by the owner or by resetting the detector.

Short-circuiting, loose wiring or missing units shall also be reported at the panel with pinpoint or segment wise location. In such cases the system through the use of fault isolators shall be able to isolate the segment between the two fault isolators.

The Panel shall have a Liquid Crystal Display Alpha - Number type on it to indicate immediately all conditions. In case of testing of the system from the panel, the display shall be able to give readouts of analogue value of all detectors being tested. The panel shall also be able to carry out continuous self-monitoring when in normal conditions.

The Panel shall also be able to discriminate between false alarms and fire conditions as well as priority selection of alarm address in case alarm activates in two or more remotely located Units simultaneously. In such cases, the Manual Call Box shall be reported first, group of sequentially laid detectors (in one room for example) second and a detector with the greatest obscuration over a period of time third.

The Panel shall also be able to actuate Switches automatically in case of Fire condition that of Power Supply or other Systems such as piped pressurized gas supply. The Vendor will be required to design and install the System in operation in coordination with the relevant Contractors. The Vendor will not be allowed to charge extra on this account, and such charges shall be included in his package.

The system shall be fail safe and adequate safe guards should be under taken that in the event of a failure of a part of the system it shall not handicap the complete system. The Mother Board shall be of Modular Construction.

The vendor shall undertake the responsibility of the complete installation, commissioning, user trials, training and maintenance of the System as required. The Vendor shall take all responsibility for preparation and installation of System Soft Ware into the Panel. The Soft Ware shall be such so as to be easily operated by the Owner's Personnel, is secured against Software errors, ability to be up gradable so as to incorporate more Detector Units or replacement / changing of Detector units, can incorporate more features at a later date such as Illumination Control, Security etc.

The Panel shall have its own Battery Back up of a minimum of 12 hours run. The Battery shall be sealed maintenance free type of capacity minimum 27 Ah capacities. - It shall be able to withstand temperature variation from 0° Centigrade to 50° Centigrade. The acceptable Relative Humidity (non Condensing type) shall be upto 95%. The Voltage rating shall be from 17 V DC to 28 V DC, through the voltage may be changed depending upon the working voltages of a proprietary Fire Alarm Panel.

The Panel shall be totally enclosed dust and vermin proof type made of minimum 16 gauge dust inhibited sheet with even backed finish. The panel shall be of completely solid-state design.

The logic circuitry shall be based on high noise immunity, solid-state hardware employing modular construction. Logic cards shall be epoxy fiberglass construction.

The System shall meet the BS 5839 / EN 54 / NFPA 71 & 72 standards and all equipment excluding cabling and wiring shall be listed with UL / FM or LPCB. Further, the System shall be expandable and be able to add at least 100 more Units in the Panel through additional Loops.

The Panel shall have software to cater to the changeover of any of the operating Loop Cards to an extra Loop Card. Other software necessary to actually change the terminals of a Loop from an existing Loop Card to the extra Loop Card shall be carried out at site as and when required. Charges for such software, loading, test run etc. shall be indicated when required.

3. Photo Electric Type Smoke Detector

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

The Detector shall be able to sense incipient fire by detecting the presence of visible and invisible products of combustion. The detector shall be suitable for low voltage (17 to 28 volts DC) two wire supply. The detector shall be provided with response indicator (LED) and the sensitivity of the detector shall not vary with change in ambient temperature, humidity, and pressure of voltage variation. Neither its performance shall be not affected by air current up to 10 mtr per second.

The detector shall be suitably protected against dust accumulation / ingress and it shall be free from maintenance and functional test at intervals. All detectors shall be identical in construction design and characteristic to facilitate easy replacement. The detector housing shall be damage resistant made of polycarbonate or proprietary self extinguishing material.

The coverage per smoke detector shall be up to a minimum of 70 SQ M. This coverage area will reduce depending upon structural configurations or partitions etc. It shall be possible to connect Smoke Detector with Heat Detector or Manual Push Button in the same circuit. The sensitivity of

detector shall be set / adjusted by the supplier to suit the site requirement.

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

4. Rate of Rise Type Heat Detector

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

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

It shall be able to withstand temperature variations from 0° Centigrade to 50° Centigrade. Further, Relative Humidity (non Condensing type) upto 95% shall not hamper its performance. The Voltage rating shall be from 17 Volt DC to 28 Volt DC, though the voltage may be changed depending upon the working voltages of a proprietary Fire Alarm Panel.

The Detector shall meet the requirements of EN 54 / FM / UL and shall be specifically approved by FM / UL / LPCB. It shall be possible to test the Detector's working both from the Panel as well as locally by means as designed by the Vendor.

The approved coverage per Detector for unhampered areas shall not be less than 50 (sqmtr)

5. Manual Call Box

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

The Manual Call Box station shall be fully addressable with its own set code and operated by digitized signals sent from the panel. The voltage range shall be from 15 V to 28 V. It shall have protection as per IP 33. The operating temperature range shall be from 0 Degree C to 50 Degree C. Relative Humidity (non condensing) range for performance parameters shall be between 0 to 95%. Further, it shall conform to BS 5839 or EN 54 / FM / UL / Vds / LPC.

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

6. Hooter

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

It shall be complete with electronic oscillations, magnetic coil (sound coil) and accessories, ready for mounting (fixing). The sound output from the Hooter should not be less than 100 decibels at the

source point. Hooter shall be 4 W each and enclosed in an acoustically lined MS box.

7.00 Fault Isolator

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

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

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

8.00 Control Module

The module shall be addressable and commendable Units controlled form the Fire Alarm Panel that shall automatically energize circuits to disable electrical circuits for Power Supply etc.

9.00 Monitor Module

The module shall be addressable and commendable Units controlled form the Fire Alarm Panel that shall take inputs from flow switches, gas flooding Panel etc, and report back to the Main Fire Alarm Panel.

10.00 Repeater Panel (Network)

The Panel shall be controlled by a Micro Processor that shall control all fire / fault / short signals. The microprocessor shall continually monitor each zone in the Panel for each signal, as well as the condition of the battery.

- I. The Panel shall be provided with an LCD Display Unit of 40 character that shall provide alphanumeric information on the fire / fault signal with zone number.
- II. For accessing the LCD Display a keypad operation shall be provided. The Keypad shall have Help Menu and other functions controlled from either Function Keys or by a combination of keypad numbers. By using the keypad one can scroll through the event list for at least a month.

III. Inspection

The vendor shall provide detailed "Quality Assurance Plan" being implemented at the site to ensure that the Fire Alarm System meets the requirement of the specifications.

The vendor shall also submit inspection schedule of Fire Alarm Panel and Devices etc. The inspection shall be under taken by the authorized representative of the owner..

IV. Technical Details For Analogue Addressable Fire Alarm System and Field Device

• Fire Alarm System

1. System Type : Microprocessor based Analog Addressable Fire Alarm System

2. Panel Type : Four loop, each loop being single pair 1.5 sq mm X 2 copper conduction type
3. Wiring Type : Class A closed loop
4. Input Devices : Optical Smoke combined with Class 'A1' thermal sensor, Manual Call Box,
5. Output Devices : Speaker / Hooter, Relay, operated power supply Shut Off
6. Number of Inputs : 280 addressable devices per loop, 140 detectors and 125 modules per loop
7. Panel Location : Security / BMS Room
8. Standards to be followed : NFPA 72 / LPC
9. Approval by : Local Fire Service

Fire Alarm Panel

1. Panel Type : Microprocessor based Analog Addressable Fire Alarm Panel
2. Number of Loops : As indicated in particular specifications
3. Material of Construction: Cold Rolled Steel Sheet
4. Thickness of Sheet : 16 gauge
5. Finish : Epoxy finished on two layers of primer paint
6. Door : One number for accessing Zone Cards and Relay Units One number for accessing Battery Unit. To be dust and vermin proof.
7. Wiring Standard : As per NEC and NEMA
8. Primary Function : To provide alarm signal with detector function address To provide pre-alarm signal with detector address To activate relay unit connected to specific detector address
9. Secondary Function : To provide warning in case of dust functions accumulation in Detector To subsequently raise threshold level as per requirement To indicate segment wise fault indication To discriminate between fault and fire conditions To provide priority selection of alarm signal To provide surface mounted keypad /membrane switches for alarm accept, function keys or re-programme.

10. Display Type : 8 lines x 21 characters graphics LCD / LED type alpha numeric
11. Display Requirement : Detector alarm address Detector pre-alarm analog output with
address Detector fault with address Any given detector analog value
12. Approval : FM / UL / ULC
13. Standards : NEPA 72 / LPC
14. Buttons : To give output station address in case of activation
15. Input Power Supply : 220 Volt, AC 50 Hz, Single Phase
16. Output Supply : 17 - 28 Volt, DC, through rectifier
17. Standby Power : 27 Ah. Sealed maintenance free battery including trickle / boost
battery charger
18. Environment : 0-50° Centigrade
19. Printer output : The Panel shall have an optional RS 232 port

MUSIC / PAGING SYSTEM:

System Description:

1 No. Bosch/Ahuja professional grade amplifiers shall drive 54 Nos. of ceiling mounted speakers, which would be strategically located to provide equitable distribution of sound. A 1 CD changer shall be used as a music source. Announcements shall be made with the help of a microphone. Music/Paging system shall be integrated with Fire detection and alarm system for automatic announcement in case of fire. A priority circuit shall enable to ensure that music is superseded whenever the mike is switched ON. As soon as the mike is switched to the ON position, music would be electronically muted allowing the announcements to go through clearly.

Technical particulars for Amplifier :

Music Power: 480W + 480W RMS measured with tone burst.

DIN Power: 250W + 250W RMS (per channel 35V across 8 in a channel mode)

300W in Bridge Mode (70V across 16 ohm)

Distortion:

Harmonic Distortion: <0.05% (Type distortion 0.03% at rated power at 1kHz).

Inter Modulation:

Distortion: <0.5% for frequency 500 & 800Hz acc to IEC 268.

Slew Rate: 70V / SEC.

Power Bandwidth: 20Hz to 20 kHz at 0.1% distortion.

Frequency Response: 10Hz to 50kHz.

Hum & Noise: 90dB below rated output 100dB 'A' weighted.

Input:

Input sensitivity: 775mV (± 0.5 dB).

Input impedance: >100K balanced.

Input attenuation: Adjustable between 0 and >60dB.

Power supply

Mains: 220/240V $\pm 10\%$ 50 Hz to 60 Hz.

Mains Current:

Consumption: Less than 650mA on No load.

Less than 3.2A on rated load.

Fuses: Two 5x20mm fuses are provided on the rear panel, 6.3AT for mains circuit of amplifier and 615MAT for fan mains circuit. 5x20mm DC fuses are provided in the DC circuits inside the amplifier.

Output DC offset: Maintained within ± 20 mV by tracking circuit.

Weight: 21 Kgs. (nett)

Temperature range: Operating-10°C to +45°C.

Storage – 20°C to + 70°C.

Humidity: Upto 98% RH (tested according to IEC 68dB)

Technical Particulars for Speakers:

Power handling capacity: 6Watt.

Sound pressure level (Max.): 96 dB.

Effective frequency range: 70-15000Hz.

Rated in-out voltage: 100Volts.

Rated impedance: 1667 ohm.

Colour: Off White.

Mounting: Clamp type

Overall dimensions: 210mm dia, 90mm height.

Technical Particulars for Microphone:

Uni-directional.

350mm long flexible stem.

On / Off switch.

3 meter cable length / 7 meter cable length

Lockable 3 pole male DIN connector / 6.3mm stereo jack connector.

Technical Particulars for Zone selection console:

The zone selection console shall have a visual display indicating the zones that have been switched on for the announcement. The console permits the relay of an announcement or music in one or more zones at a time as well as all the zones if required simultaneously. The control operator would have access to an "ALL-CALL" switch once pressed shall give him access to all the speakers distributed throughout the installation.

Amplifier Rack:

The sound transmission rack is a custom built housing made of aluminium duly powder coated and should be tailor made for the control equipment that will be used in our control room. It would have louver for ventilation and front and back locking doors to keep equipment safe, dust free and tamper proof.

It would come pre-wired for accepting the control equipment namely the amplifier, CD changer, cassette deck and zone selection console. It shall have a mains panel. At the flick of the switch all the equipments housed within the rack shall be electrically energized. A monitor panel will allow the operator to monitoring the health of the system.

CLOSED CIRCUIT TELEVISION SYSTEM:

Colour Mini Dome Camera

Color mini dome camera shall consist of 1/4" IT CCD for capturing the images housed in the tamper proof Dome with the resolution minimum **1.2 Megapixel** and shall compile for Backlight compensation, 1.5lux, Auto white balancing, Gain control, manual pan/Tilt position mechanism.

NETWORK VIDEO RECORDER

Digital video recorder will be standby system hooked up with a personnel computer having 80GB hard disk drive. Recorder shall be able to record the real time digital image frames. The software driving the DVR shall compile for remote playback and recording without the loose of time frame. The set shall consist of 17" monitor, Keyboard, Mouse and joystick (Optional). The unit shall accommodate **24 channels** of camera input and 4 digital outputs.

Preferred makes of equipments/ accessories.

1. Technical literature and publication about the type of fittings to be offered by the tenderer shall be enclosed with their quotation. Make of all the equipment and accessories must be clearly mentioned against each item.
2. The Successful Tenderer shall submit FOUR sets of a "PRODUCT SUBMITTAL" to LIC, before procuring/ordering the materials.
3. The contractor shall procure/order materials only after certification/ validating of PRODUCT

SUBMITTAL by the LIC / consultant

4. PRODUCT SUBMITTAL shall be submitted within 5 days of release of work permit/order to the LIC / consultant
5. PRODUCT SUBMITTAL shall contain all the technical details pertaining to the materials being used in the execution of work
6. In case, rating, type, make and other details of all the items are not mentioned by the tendered, their quotation is likely to be treated as incomplete. The purchaser the right to select item of ny make suitable to them (Purchaser) in case he has not indicated make specifically or has indicated more one make.

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