TENDER NOTICE No. SASMIRA/FF, FA & PA / 001/2018-2019

THE SYNTHETIC & ART SILK MILLS' RESEARCH ASSOCIATION
(Linked to the Ministry of Textiles, Govt. of India)
SASMIRA, Sasmira Marg, Worli, Mumbai-400 030.
Tel: 91-22-24935351/52, Fax: 91-22-24930225
E-mail: sasmira@vsnl.com / ed@sasmira.org
Website: www.sasmiraagrotech.com, www.sasmira.org

TENDER DOCUMENT FOR FIRE FIGHTING, FIRE ALARM & PUBLIC ADDRESS INSTALLATION AT PROPOSED NEW BUILDING AT SASMIRA, SASMIRA MARG, WORLI, MUMBAI – 400 030.

Tender No.	**SASMIRA/INFRA / FF , FA & PA / 001/2018-2019**
Date	**28th July 2018**

Client	M/s SASMIRA,Sasmira Marg, Worli, Mumbai – 400 030. Tel. No. 2493 5351 - 52 / 2493 8753 - 54 Fax 2493 0225. Email:ed@sasmira.org,purchase@sasmira.org
Receiving Authority	Office of the Director of SASMIRA, Sasmira Marg, Worli, Mumbai – 400 030. Tel. No. 2493 5351 - 52 / 2493 8753 - 54 Fax 2493 0225
Architects	M/s.Master & Associates, Hamam House, 34-38 Ambalal Doshi Marg, Fort Mumbai: 400 001 Tel. No. 2265 4736 / 4606 Fax No. 2270 0173 Email: udaymaster@gmail.com .
Services Consultants	M/s Global Engineering Services Room No-12, First Floor , E Building, Nootan Nagar, Gurunanak Road, Bandra (W) Mumbai-50, Email: emphengg@gmail.com,

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Note: Interpretation of any term /word /clause lies with SASMIRA

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1. DETAILS OF TENDER AND TENDER NOTICE

Sealed Item Rate Tender is invited by **THE SYNTHETIC & ART SILK MILLS' RESEARCH ASSOCIATION (SASMIRA)** from Licenses Fire Fighting Contractor with sufficient experience in the same work quantum. Technical specifications are in respective **Annexure** of this the tender document. Interpretation of the terms & conditions and other related issues in the tender would lie with SASMIRA only. Tenders can be obtained from The Synthetic & Art Silk Mills Research Association (SASMIRA), Sasmira Marg, Worli, Mumbai - 400030. The tender document can also be downloaded from the websites of SASMIRA at www.sasmira.org. However, the Price Bid should be submitted separately. Tender documents are available: From **30.7.2018 at 11.00 AM and** LAST DATE FOR SUBMISSION OF DULY FILLED UP SEALED TENDER AT SASMIRA, MUMBAI is **13.8.2018 upto 5.00 P.M.** On **14.8.2018** the technical bids will be opened at **11.30 A.M. in SASMIRA**. SASMIRA reserves the right to accept or reject any or all the bids either in full or any part at its discretion without assigning any reason thereof. Address for Communication: Executive Director, COE-Agrotech, SASMIRA, The Synthetic & Art Silk Mills Research Association, Sasmira Marg, Worli, Mumbai -400030, Tel: 24935351/52 Fax 24930225.

2. **SCHEDULE FOR INVITATION OF TENDER**

NAME: FIRE FIGHTING, FIRE ALARM & PUBLIC ADDRESS INSTALLATION AT PROPOSED NEW BUILDING AT SASMIRA, SASMIRA MARG,WORLI, MUMBAI- 400 030

To	
Issue of Tender	**From 30.07.2018 at 11.00 hrs**
Pre-bid Clarification Date:	**03.08.2018 at 15.00 hrs at Sasmira, Sasmira Marg, Worli,Mumbai- 400 030**
Tender Due Date	**13.08.2018 upto 17.00 hrs.**
Technical Proposal Opening Date & Time:	**14.08.2018 at 11.30 hrs**
Price Offer Opening Date & Time:	Will be communicated once the technical scrutiny of the tender document will be completed.
Negotiation for L1 L2 & L3 :	Will be communicated After opening of Price offer
Department Name/Authority Name	Executive Director, The Synthetic & Art Silk Mills Research Association, Sasmira Marg, Worli, Mumbai – 400030. Tel: 022-24935351, Fax: 022-24930225 Email: ed@sasmira.org / sasmira@vsnl.com
Tender Submission Address	Executive Director, The Synthetic & Art Silk Mills Research Association, Sasmira Marg, Worli, Mumbai – 400030.
Price Offer	The agency shall submit their best possible price offer in given format as per **Annexure-2.**

3.TENDER APPLICATION FORM
(On letterhead of the Bidder)

To
Executive Director,
The Synthetic & Art Silk Mills Research Association,
Sasmira Marg, Worli,
Mumbai -400030

Dear Sir,

I/We have read and examined the following Tender Documents relating to the **" PROPOSED FIRE FIGHTING, FIRE ALARM AND PUBLIC ADDRESS WORK FOR NEW BUILDING AT SASMIRA, WORLI , MUMBAI -400 030.**

1. Tender Notice
2. Notice to Contractor
3. General Conditions of Contract
4. Specific condition of contract
5. Terms and Conditions of Contract
6. Additional conditions of Contract
7. Technical specification
8. Commercial Bid
9. All annexure of the tender document

I / We have satisfied myself / ourselves as to the location of Site, examined the Drawings and read the conditions of the Contract, Special Conditions, General Conditions, Articles of Agreement and the Specifications etc. and I / We understand that the work are to be completed within 4 Consecutive Calendar Months (incl. monsoon). I / We Agree to Finish the Whole of the Works within 3 Calendar Months from the Date of Commencement of the work, fully understanding that time will be essence of Contract.

I / We understand that you are not bound to accept the lowest or any tender you may receive.

Yours faithfully,

Authorized Signature and Seal

Date & Place:

Encl: Checklist duly ticked, completed and signed

4. CHECK LIST FOR SUBMISSION OF DOCUMENTS

Sr. No.	Check Points for	Tick Mark
A.	**Tender Application Fees of Rs. 5,000.00 in the form of Demand Draft**	
B.	**Envolope-1 consist of**	
B-1.	EMD of Rs. 200,000.00 in the form of Demand Draft	
B-2	Tender Documents (Qualification documents) duly filled, Signed & sealed	
B-3	Details of Completed Similar Project with supporting Ex. Work Orders/Purchase Orders/ Work Completion Certificate from Clint etc.	
B-4	Details of Work in Hands with supporting Ex. Work Orders/Purchase Orders etc.	
C.	**Envelope- 2 consist of Commercial Bid with Authorised Signature & Company Seal**	

5.TENDER NOTICE

Sealed Item Rate Tender are invited for the FIRE FIGHTING, FIRE ALARM & PUBLIC ADDRESS work of " PROPOSED NEW BUILDING AT SASMIRA, WORLI , MUMBAI -400 030 for the contractors should be Licenses Fire Fighting Contractor with sufficient experience in the same work quantum, as criteria is given below.

1)	Earnest Money Deposit		: Rs 2 Lac
2)	Security Deposit Through RA bills		: 4% of value of work
3)	Time Limit		: 4 months.
4)	Date of issue of blank tender		: 30th July 2018
	Tender Papers & Place		Office of the Director of SASMIRA, Sasmira Marg, Worli, Mumbai – 400 030. Tel. No. +91-22-2493 5351 - 52 / 2493 8753 – 54 Fax +91-22-2493 0225
5)	Cost of Each Set of Tender Paper		: Rs. 5,000=00
6)	Last Date & Time of receipt of tender	:	Up to 5.00 P.M. on 13/08/2018 in the Office of the Sasmira & will be Opened on the 14/08/2018 at 11.30 Hrs. SASMIRA, WORLI, MUMBAI.

7) The offer shall be Valid for 270 Days from the date of Opening of the Tender.
8) The Right is reserved to reject any time of tender or a tender or all the tenders without assigning any reasons therefore, the decision for acceptance of tenders will rest with Architect & Owner.
9) No alternative designs will be accepted for this work.
10) No suggestions / conditions will be accepted for this work.
11) ESIC & P.F. is compulsory for all the persons working on site.
12) Tender in **Envelope – 1 / Envelope-2**.
Envelope – 1 (EMD, Pre Qualification Documents Required, Completed Similar Project Details / Works in hands)
Envelope – 2 (Commercial bid with sign & stamp copy)
13) Pre Qualification Criteria – 1) Same Quantum of Job Executed at least 2 or 4 jobs of 50 % the above value of job executed.
2) References of the completed & ongoing projects.
14) Infra & Internal Fire Fighting Work should be start together to Achieve the completion date of the Project. 21/11/2018
15) Contractor should submit Work Schedule or Bar chart along with Tender

6.NOTICE TO CONTRACTOR

Messer: **SASMIRA**

Project: **PROPOSED FIRE FIGHTING, FIRE ALARM AND PUBLIC ADDRESS WORK FOR NEW BUILDING AT SASMIRA, MUMBAI.**

Reference:

Dear Sirs,

1) On behalf of our clients, we have pleasure in inviting you, tender for the aforesaid work.
2) Sealed tenders should be addressed to Office of the Director of SASMIRA, Sasmira Marg, Worli, Mumbai – 400 030. Tel. No. 2493 5351 - 52 / 2493 8753 - 54 Fax 2493 0225, Mumbai and sent to the above address not later than 17.00 Hrs. on 13/08/2018.
3) Drawings & Documents will share in soft copy format.
4) The tender must be obtain for himself, on his own responsibility and at his own expense, all the information which may be necessary for the purpose of filing this tender and for entering into a contract for the execution of the same and must examine the Drawing and inspect the site of the work and acquaint himself with all local conditions and matters prevailing there to.
5) Each of the tender documents is required to be signed by the Person or persons submitting the tender in token of his / their having acquainted himself / themselves with the General conditions, special conditions, Conditions of Contract etc. as laid down. Any tender with any of the documents not so signed will be rejected.
6) The tender form must be filled in English and all the entries must be hand written in Ink. If any of the documents is missing or not signed, the tender shall be considered invalid.
7) Neither erasures nor over writings shall be made in the price schedule or anywhere in the tender documents. Every correction shall be made by crossing the pen cross the incorrect or unrequired portion and writing the correct or required portion above. Any corrections shall bear the dated initials of the tenderer.
8) The intending tenderer shall deposit with the Owners Rs.2,00,000/- (Rs. Two Lakhs Only) by Draft / cheque Earnest Money, as a Guarantee of good faith which amount shall be forfeited as liquidated damages in the event of any waive, refusal or delay in signing the contract. The deposit of unsuccessful tenders will be returned without interest immediately after a decision is taken regarding the award of the contract. A tender not accompanied by Earnest Money Deposit will not be considered. The demand draft in the favor of M/s. SASMIRA, Mumbai
9) The Earnest Money Deposit Rs.2,00,000/- and Security Deposit of 4% of the total contract value paid by the successful tenderer when he submits his tender shall be held by as part of the contract till the completion of the work and will not bear any interest.
10) Within fifteen days of the receipt of intimation from the Employer of the acceptance of his / their tender the successful tenderer shall be bound to enter into the contract by signing an agreement in accordance with the agreement and conditions of the contract

attached herewith, but the written acceptance by the Employer of a tenderer will constitute a binding agreement between the Employer and the person so tendering whether such formal contract is or not subsequently entered into.

11) In addition to the money paid under Para 8 and 9 above, and as further security for the due fulfillment to the contract, FOUR PERCENT of the values of the work done will be deducted from each payment to the contractor and held as retention amount. On the Architect's certifying to the completion of the work the contractor would be paid FIFTY PERCENT of the retention and the remaining FIFTY PERCENT will be retained for a further period of TWELVE MONTHS after the completion certificate is issued by the Architects.
12) All compensations or other sum of money payable by the contractor to our clients under the terms of this contract may be deducted from the Security Deposit or from any sum or sums that may be or may become due to the contractor on any account whatever and in the event of the Security Deposit being reduced by reason of any such deductions the contractor shall, within 15 days of being asked to do so, make good in cash or cheque any sum or sums which may have been deducted from his Security Deposit.
13) Our clients are not concerned with any rise or fall in the prices of any materials. The rates quoted shall include all cost, allowances, Tax of any Other Charges including any enhanced Labour Rates etc., which may be enacted from time to time by the State or Central Government
14) The rates quoted by the contractor shall include all eventualities such as heavy rain, sudden flood etc. which may cause damage to the executed work or which may totally wash out the work. Until the completion certificate is issued to the contractor, our clients will not be responsible for such damage or wash out of construction work.
15) In case where the same items of work is mentioned at one or more places in the schedule of quantities the lowest of the rates quoted by the contractor for item shall be taken for the payment of this item.
16) Time is the essence of the contract; The work should be completed in 3 (Three) months from the date of the Work Order issued to the contractor to commence the work. The successful contractor will have to give a schedule of various items of work to be done so that the work gets complete within the stipulated time.
17) If the contractor fails to complete the work by the scheduled date of completion or within work by the scheduled date of completion or within any sanctioned extended date of completion or within any sanctioned extended time, he will have to pay @ 0.5% of the accepted tendered amount per week subject to a ceiling of 10% of the accepted tendered amount)
18) The following information shall be submitted by the tenderer along-with the submission of tender:
    (a) A list of details of works of Similar Type and Magnitude Carried Out by the Contractor.
    (b) A list of details of other works tendered for and in hand as on the date of

submission of this tender.

(c) A list of details of Technical Personnel with the tenderer.
(d) A Solvency Certificate and Income Tax Clearance Certificate.
(e) Our clients do not bind themselves to accept the lowest or any tender and reserve
(f) GST Details required of the company.

19) The Quantities mentioned in the schedule are only approximate. The work actually carried out and done will be measured from time to time for which payment will be made subject to the terms and conditions of the contract. Any of the Tender Items are subject to additions/deletions by the client/Consultants and no such claims for the same will be entertained.
20) The right to accept or reject any or all tenders in whole or in part, without assigning any reason for doing so.

7. GENERAL CONDITIONS OF CONTRACT

Specifications of works required to be done in execution and completion of the Fire Fighting Works for the Proposed Execution of **SASMIRA (Fire Fighting, Fire Alarm & Public Address System work only)** at MUMBAI under the superintendence and to the entire satisfaction of the Employers.

1. APPLICATION OF SPECIFICATION

This specification form part of the contract and shall be read in conjunction with the other documents forming the contract, viz. special condition, conditions of contract, Articles of Agreement, Tender Form, Schedule of Quantities and Drawings. The contractor must accept and abide by each and every of the documents without exception subject to the conditions of contract.

2. DEFIFINITIONS

2.1. The term "At Own Cost" shall mean that the contractor shall at his own cost furnish materials and labour to complete the item of works to which the term is applied. Rates of various items in the schedule of quantities shall be inclusive of such item.

2.2. "As Indicated" shall mean as indicated in any of the contract documents.

2.3. "As Directed" shall means as directed by the Employer.

2.4. "The Owner / Employer" shall means SASMIRA, MUMBAI

2.5. "Consultants" shall mean Architect M/s. Global Engineering Services, MUMBAI or their authorized representatives.

2.6. "Bills (or Schedule) of Quantities" shall means the list of items giving the quantities and description of work comprised in this contract. The rates in the Bills of Quantities shall apply in assessing the value of the work as carried out.

2.7. "Day Work" shall mean the method of valuing work on the basis of the time spent by the workman, the materials used and the plant employed.

2.8. "Price Cost" (or the initials 'P.C.') shall mean the net sum entered in the Bills of Quantities by the quantity surveyors provided to cover the cost of or others for specific articles of materials to be supplied or work to be done.

2.9. "Provisional Sum" shall mean any sum of money fixed by the Employer and included in the Bill of Quantities to provide for work not otherwise included therein or for unforeseen contingencies arising out of the contract. It is intended to expand, either wholly or in part, under the Employees direction and at his discretion in accordance with the conditions of contract.

2.10. "Schedule of Basic Price" shall mean the schedule in which the contractor insert the basic prices of materials upon which tender has been computed.

3. "Certificate from owner" shall mean the clear certificate regarding the value of work done by the contractor in accordance with the contract and duly verified and measured by Architect/ Consultants / Owner.

4. PRELIMINARIES The documents comprising in the contract shall be:

   4.1. Tender Notice
   4.2. Form of Tender (Letter from contractor)
   4.3. Notice to Contractor
   4.4. Special Conditions
   4.5. General Conditions
   4.6. Conditions of Contract
   4.7. Articles of Agreement
   4.8. Schedule – A : Regarding Supply of Materials
   4.9. Schedule – B : Schedule of Various Works
   4.10. Detailed Specifications of Various Works
   4.11. 1/16 or 1/8 Scale Drawings.

5. CONTRACTOR TO INCLUDE IN HIS RATES: Rates of all items appearing in schedule of quantities shall include for all items listed in the section except those for which the contractor has been specifically asked to provisional sum.

6. ADDRESS: The site of work is:

M/s SASMIRA,Sasmira Marg, Worli, Mumbai – 400 030.
Tel. No. 2493 5351 - 52 / 2493 8753 - 54 Fax 2493 0225.

7. GROUND CONDITIONS

   7.1. Visit the Site and ascertain local conditions.

   7.2. Allow for all extras likely to be incurred due to any official limitations whatsoever.

8. ANNOYANCE TO NEIGHBOUR: To everything possible so as to cause least inconvenience to the occupants of the neighboring properties, if any, for this purpose allow for following directions or executing any works which in the opinion of the Architects / Consultants / Owner, are at any time considered necessary.

9. TIME FOR COMPLETION: Time will be the essence of contract. Complete the whole of the works within the time stated in the Tender subject to conditions of contract.

10. TIME AND PROGRESS CHART: Co-operate with the Architect/ Consultants / Owner from time to time in the preparation of time and progress chart for his use.

11. ASCERTED AND LIQUIDATED DAMAGES: Pay the sum indicated in the Appendix to the conditions of contract as ascertained and liquidated damages for each week or part of a week that the works, remain in completed after the contract date for completion.

12. TREASURE TROVE ETC.: Hand over to the Employer and treasure trove, coins or objects of antiquity which may be found on the site.

13. SUBLETING: Do not sublet to other persons any part of the works without the consent in writing of the Employer through the Architects.

14. PROTECTIVE CLOTHING: Provide all necessary protective clothing for the operatives. Keep at site a standard First Aid Box.

15. TEMPORARY ELECTRIFICATION: Provide and maintain all necessary temporary light fixtures & power to the satisfaction of the Architect / Consultants / Owner.

16. STORES ON THE SITE: Provide for all necessary storage on the site in specified areas for all materials, which are likely to deteriorate by the action of sun, wind, rain or other natural causes, clear away all such stores and leave works in good order on completion of this contract, unless otherwise expressly mentioned herein. Stock materials such as bricks, gravel, sand etc. in such a manner as to facilitate rapid and easy checking of their quantities.

17. DRINKING WATER FACILITIES: Provide at suitable places covered drinking water, accommodation for workers. Drinking water shall be provided in earthen pots or glass jars purchased from the company. Distribution of glass jars to workers all over the works will not be permitted, storage of which shall be restricted to confined spaces only.

18. LAVATORIES: Provide adequate closet and sanitary accommodation for all workmen on site in addition to similar facilities already existing on site. These shall be in accordance with the rules and regulations in the local and public authority or authorities. Maintain the same in good working order and properly disinfected.

19. SAMPLES: Submit samples at own cost of all material proposed to be used for approval and as directed by the Architects. Samples will not be returned to the contractor.

20. TESTING OF WORKS AND MATERIALS: Arrange to test materials and / or portions of the works at own cost if required by the Architects in order to prove their soundness and efficiency if in the opinion of the Architects after any such test the work or the portion of the works is found defective or unsound, it shall be pulled down and re-executed at own cost. Remove defective materials from site forthwith.

21. MECHANICAL PLANT: Besides the provision made in Clause No. 4 of the condition of contract provide to maintain in working order the power driven equipment during the construction of the works as indicated.

22. DIMENSIONS: Figured dimensions are to be taken in preference to scaled, large scale details supersede small scale, and all dimensions shall be checked by the contractor and discrepancies referred to the Architect.

23. KEEPING FOUNDATIONS AND WORKS FREE FROM WATER: Provide and maintain at own cost Electricity or other power driven pumps and / or other plant for keeping foundations and works free from water. Continue to do so until the Building are handed over to the Owner / Employer, arrange for disposal of water so accumulated to the entire satisfaction of the Owner and local authorities.

24. TRADESMEN: All trades men shall be experienced men properly equipped with suitable tools for carrying out works of their respective trades in first class manner, provide such tools special or ordinary which, in the opinion of the Architects / Consultant are considered

necessary to carrying out such works. Tradesmen shall work under an experienced and properly trained Supervisors & Site Engineer. The Site Engineer shall be capable of reading and understanding Drawings.

25. PREPARATION OF BUILDING WORKS FOR OCCUPATION AND USE ON COMPLETION: Thoroughly inspect the whole of the works and put right all deficiencies and defects, after inspection inform the Employer through Architects/ Consultant in writing that the work is ready for his inspection. Making the entire building neat and clean and ready for immediate occupation to the Employer.

26. WEEKLY PROGRESS REPORTS: Furnish to the Architects/ Consultants / Owners particulars for all compiling weekly progress reports on the forms provided by him.

27. SCHEDULE OF QUANTITIES: The quantities will form part of the contract, but the Owner / Employer does not undertake to carry out the whole of the work as shown on the plans and / or appearing in schedule of quantities and reserves the right to modify the same or add part thereof.

28. CONTRACTOR TO PROVIDE ETC.: Provide if required Two Notice Boards on proper supports each 10' x 6' high positions approved by the Architects / Consultants / Owner. Allow for painting and lettering starting name of work, name of the Employer, Name of the Architects, Name of the Contractor and Sub-contractor, all letters except that Name of the Work shall be in letters exceeding 2" in height and all to be approved by the Architects / Consultant .

29. VOUCHERS: Furnish the Architects/ Consultants / Owner with original voucher on request to prove that the materials are as specified.

30. RUBBISH: Keep site clean and tidy at all times to the approval of the work. Clear away all rubbish from time to time and on completion.

31. ORIGIN OF MATERIALS: All material incorporated in the works shall be new and of the best quality obtainable. The Consultant shall be the sole judge as to materials are suitable for use in the works.

32. ACCESS TO WORKS: No Employee of the contractor, other than those authorized by the Owner shall be allowed to live on the site. Proper and convenience means of access to all parts of the works shall be maintained at all parts of the works shall be maintained at all times for the Employer and his representative or other persons authorized by him.

33. GATEKEEPER AND WATCHMEN: The contractor shall provide and pay the wages of all Gatekeepers and Watchmen, for the effective protection of the works and materials at site. The Employer reserves the right to appoint such person to be paid by the contractor.

34. STORES ON SITE: Keep store book with (i) all folios numbered in ink and (ii) all entries in ink to show materials received, issued for use on site and the balance left over from time to time (iii) Allow the Employer free access of store book at all reasonable times.

35. VARIATION ORDERS: Obtain "Variation Orders" for items and rates not covered by the schedule of quantities within seven days of verbal or otherwise instructions from the

Employer or Architects.

36. SUB CONTRACTORS: The contractor shall as soon as practicable before the execution of the contract notify the Employer in writing of the name of the Sub-contractor if any. Nothing contained in the contract, documents shall create any contractual relationship between the subcontractor and the Owner / Employer

8. SPECIFIC CONDITIONS OF CONTRACT

In constructing the special conditions, the words "Employer" , "Contractor, Consultants, Clerk of Work" etc. will have the same meaning as described in the conditions of the contract. The following clause shall be considered as extension to and not in limitation of the obligations of the contractor.

SEALED TENDER should be addressed to **Office of the Director of SASMIRA, Sasmira Marg, Worli, Mumbai – 400 030. Tel. No. 2493 5351 - 52 / 2493 8753 - 54 Fax 2493 0225**, and Mention Tender for "**PROPOSED FIRE FIGHTING, FIRE ALARM AND PUBLIC ADDRESS WORK FOR NEW BUILDING AT SASMIRA", WORLI , MUMBAI -400 030.**

1 No Tender will be received after **5.00 PM on 13/08/2018** under any circumstances what so ever.

2 Tenders will be opened on **14/08/2018 at the office of The Director SASMIRA** in the presence of all Presidents / Board Members.

3 The owner or the Consultants do not bind themselves to accept the lowest or any Tender and reserve to themselves the right to accept or reject any or all the Tenders either in whole or in part without assigning any reason for doing so.

4 Each Tender document is required to be signed by the person or persons submitting the Tender in token of his / their having acquainted himself / themselves with the general conditions, special conditions, conditions of contract etc. as laid down. Any Tender with any of the documents not so signed will be rejected.

5 The tender forms must be filled in English and all entries must be written in Ink, if any of the documents are missing or not signed, the Tender will be considered invalid.

6 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 invalid. No advice or any change in rate or conditions after the opening of the Tender will be entertained.

7 Intending Tenderers shall deposit as Earnest Money a sum **of Rs. 2,00,000/- (Rs. Two lakhs only)** together with completed Tender papers. Tender, which is not accompanied by the Earnest Money, will not be considered. The Earnest Money will be returned to the Tenderer if his Tender is not accepted but without any interest.

9. Within fifteen days of the receipt of intimation from the CONSULTANTS / OWNER of the acceptance of his / their Tender the successful tenderer shall be bound to implement the contract by signing an Agreement in accordance with the Draft and the schedule of conditions by the written acceptance by the owner of a Tender will

constitute a binding agreement between the Owner and persons so tendering whether such formal contract is or is not subsequently entered into.

10. The contractor must not assign the contract. He should not sublet any portion of the contract except with the written consent of the Consultants.

11. The contractor shall carry out all the Fire Fighting, Fire Alarm & Public Address work strictly in accordance with Drawings, details and instructions of the Consultants / Architects and the Structural Engineer, if in the opinion of the Consultant / Architect or the Structural Engineer, changes have to be made in the Fire Fighting, Fire Alarm & Public Address Design, the contractor shall carry out the same without any extra charges. The Consultants decision in such cases shall be final and shall not be open to arbitration.

12. A schedule of probable quantities in respect of each work and a specification accompany these special conditions. The schedule of probable quantities is liable to alterations by omission, deductions and additions at the discretion of the Consultants. Each Tender should contain not only the rates but also the value of the each item should be total in order to show the aggregate value of the entire Tender. All corrections in the Tender Schedule shall be dully attested by the dated initials of the Tenderer. Corrections which are not attested may entail the rejection of the Tender. The Employers does not undertake to carry out the whole of the work as shown on the plans and taken in the schedule of quantities and reserves the right to modify the same or any part thereof. The contractor shall not be allowed any compensation or damages for the work which is so dropped or canceled by the Employer.

13. The tenderer must obtain for himself on his own responsibility and at his own expenses all the information which may be necessary for the purpose of making a Tender and for entering into a contract and must examine the Drawings and must consider and inspect the site of the work and acquaint himself with all local conditions, means of access to the work, nature of the work, and all matters appertaining thereto.

14. The rates quoted in the Tender shall include all charges for double scaffoldings, temporary electrification, hire for any tools and plants, Electricity Charges. The rates quoted by the tenderer in the schedule of probable quantities will be deemed to be for the finished work to be measured in site. The rates shall be inclusive of Appropriate Taxes or Any Other Duty levied by any Government or Public Bodies. The rates shall be firm and shall not be subject to variations.

15. Rates for items which are not included in schedule of quantities shall be settled by the Consultants & Owner.

16. The Calculations made by the Tenders should be based upon probable quantities of the several of work which are furnished for the Tenderer's convenience in the schedule of quantities, but it must be clearly understood that the contract is not a lump sum contract, that neither the probable value of the entire Tender will form part of the contract and that the owner or the Consultants do not in any way assure the Tenderer or guarantee that the said probable quantities are correct or that the work would correspond thereto.

17. Time shall be considered the essence of the contract. The Tenderer must fill in the period within which he proposed to complete the several stages. The attention of the Tenderer is drawn of the conditions of contract referring to damages for non-completion.

18. Tenders will be considered only from recognized FF, FA & PA contractors. Each Tenderer shall submit with his tender, a list of FF, FA & PA schemes of like nature he has executed giving details as to their magnitude and cost, the proportion of the work done by the contractor in it and the time within which works were completed.

19. Special attention of the Tenderer is drawn to the alternative items in the schedule of probable quantities, the rates and amounts of these alternative items shall be duly filled in and the Tenderer is informed that his Tender will not be considered unless the rates are given for these items. The Consultants / Client reserve the right to adopt any of the alternative items, either in scrutinizing and deciding upon the tenders or later when the works are being executed.

20. The successful tenderer will be provided with lock & key space to keep his material & tool tackles. Client will not be held responsible for any misplacing / theft or missing equipment / material at site.

21. The contractor must note that all FF, FA & PA work shall be carried out strictly in accordance with the FF, FA & PA Drawings prepared by the Consultant and in consultation with them and no claim for extra for any reason will be entertained.

22. The successful Tenderer is bound to carry out any items of work necessary for completion of the job even though such items are not included in the quantities and rates. Schedule and instruction in respect of such additional items and their quantities will be used in writing by the Consultants.

23. The Security Deposit of the successful tenderer will be forfeited if he fails to comply with any of conditions of the contract.

24. Figured dimensions are in all cases to be accepted in preference to scaled sizes. Large scale details take precedence to scaled sizes. Large scale details take precedence over small scale drawings. In case of discrepancy the contractor is to ask for explanation before proceeding.

25. The Architects / Clients / Consultants reserves the right of altering the Drawings and nature of the work and adding to or omitting any item of work or having portions of the same carried out departmentally or otherwise and such alternations or variations shall be carried out without prejudice to the contract.

27. The contractor shall give all notices and pay all fees and shall comply with all Acts and Regulations for the necessary execution of contract. The contractor himself shall meet the Employer or his representative whenever required and so informed by the Employer.

28. The contractor shall provide and pay at his own expense the wages to the Gatekeeper and Watchmen for the effective protection of all the materials to be used upon the works,

workmen and the public. In case of any loss or damages, he will be called upon to make good the same at his own expense, the contractor is not allowed to have his labor camp inside the Site premises.

29. Water and Electricity will be made available by the owner at a single source only. Water meter with pump & distribution lines & Electricity meter with wires & appropriate conduits should be provided by the contractor at his own cost there from. To ensure smooth progress of work, contractor to maintain appropriate D.G. Set in case of power unavailability. For bore well appropriate capacity of pump & submersible pump to be installed & maintained by the contractor at his own cost. Responsibility of maintaining the pumps is on the owner. All water & electricity usage charges will be borne by the client. Separate arrangement to house the electricity & water meters to be done by the contractor at his own cost.
30. The contractor shall make arrangements for and maintain at his own expense, sufficient service of Electric light and power as shall be deemed necessary by the Owner.
31. The contractor should protect all the items at site from rain sun & any other natural calamities client will not be hold responsible for any such loss.
32. The contractor shall provide and maintain at his own expense electrically or mechanically driven pumps and / or other plant to the satisfaction of the Consultant for the above purpose until the Building are handed over. The contractor shall arrange for the disposal of any accumulated waste to the satisfaction of the owner and of the local authorities.
33. The whole of the work will be thoroughly inspected by the Contractor and all deficiencies and defects put right. On complete of such inspection, the contractor shall inform the Consultant / Architect in writing that he has finished the work and it is ready for the Consultant / Architect's inspection. On completion the contractor shall clean the premises occupied by his workforce. He will leave the entire Building neat and clean and ready for immediate occupation and to the complete satisfaction of the Architect / Consultant / Owner.
34. The contractor on starting the work shall furnish to the Consultant / Architect a program for carrying out the work stage by stage in stipulated time. The record showing the progress of work weekly shall be maintained.
35. The contractor will be responsible for the safety and the sound working of the FF , FA & PA works during progress of all the works, and for a further period of 12 months from the date of issue of certificate of completion of work by the Consultants. Any defects in workmanship or materials during the time of works progressing or the contractor at his own cost as provided in the contract.
36. **The contractors quoting for the job should necessarily have their own independent P.F. & E.S.I.C. number & GST No.**
37. The Cement Sand, Bricks required for any of the FF , FA & PA work will in contractor scope only & no extra space will be given to the contractor to stock this material. Contractor should well in advance to plan for all the stocking & protection of these items at his own cost.
38. Owners will make all the foundation in RCC or as required by contractors as per the drawings submitted such as foundation for all the machinery & proposed equipment's if any as per planning. Core cut / Wall Cutting / Filling for FF , FA & PA works in Slab / Beam shall be included in the cost given by contractor.

39. The rules & regulations of Institute will be binding on the contractor.
40. The contractor will be responsible for any loss or damage to Institute property on account of any Act or omission on the part of your personal representative supervision and the same will be made good from the bill amount payable to you to the extent of loss or damage so caused.
41. You will strictly observe all safety measures for your workmen and staff including wearing of helmets
42. The electrical supply will be given by our electrical department only after compliance of the following provisions:
    - Earth leakage circuit breaker connected to main switch of suitable rating.
    - Cable & main switches of proper size.
    - Copper earthing of proper size.
    - The contractor should never use any other supply point other than that given by electrical department.

43. The contractor will pay the workmen minimum wages as enumerated in the minimum wages act and also pay bonus as applicable.
44. No labour camp will be permitted inside the premises.
45. Contractor will comply with the Provident Fund Act rules as applicable

9. TERMS & CONDITIONS OF CONTRACT AGREEMENT

In constructing these conditions, the special conditions, the specifications, the schedule of quantities, Tender And Agreement, the following works shall have the meanings herein assigned to them except where the subject or context otherwise requires:

"Employer" shall mean Partners **M/s. SASMIRA, MUMBAI** and its successors and assigns

"Contractor" shall mean the firm of _____ and all the partners of the said firm and their respective heirs, executors, administrators and permitted assigns.

"Site" shall mean the site of contract works as shown bounded Red on the site plan attached hereto including any buildings and erections thereon and any other land adjoining thereto (inclusive) as aforesaid allotted by the Employers for the contractor's use.

"This Contract" shall mean the Article of Agreement, there conditions, the special conditions, the period schedule of quantities, the specifications, the Appendix and the Drawings etc.

"Act of Insolvency" shall mean any Act of Insolvency defined by the Presidency Towns Insolvency Act of the Provisional Insolvency Act or any amending statue.

"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 addressed and shall be deemed to have been received, when the ordinary course post it would have been delivered.

"Virtual Completion" shall mean that the Building is, in the opinion of Architects, fit for occupation.

Words imputing persons include firms and corporations. Words imputing the singular only also includes the Plural and vice-versa where the context so requires.

CLAUSE – 1 – SCOPE OF CONTRACT

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 Employers. The Employers may from time to time issue further drawings and / or written instructions details, directions and explanations which are hereafter collectively referred to as the Architect's instructions in regard to :

(a) The variations or modifications of Design, Quality or Quality of Work or the Addition or Omission or Substitution of any work.
(b) Any Discrepancy in the drawings or between the schedule of quantities and / or specifications.
(c) The removal from the site of any materials brought thereon by the contractor and the substitution of any other materials therefore.
(d) The removal and / or re-execution of any work executed by the contractor.

(e) The dismissal from the works of any persons employed thereupon.
(f) The opening up for inspection of any works covered up.
(g) The amending and making good of any defects under Clause No. 27.

The contractor shall forthwith comply with and duly execute any work comprised in such Architect's instruction, provided always that verbal instructions, directions and explanations given to the contractor or his foreman upon the work by the Architect or the Employers shall, if involving a variation, be confirmed in writing by the contractor within seven days and if not dissented from in writing within a further period of seven days by the Architects or the Employers such shall be deemed to be Architects instruction within the scope of the contract rate of items not mentioned in the period of schedule quantities shall be fixed by the Architects or the Employers.

In compliance with Architects instructions as aforesaid involves work and / or loss beyond that contemplated by the contract then unless the same were issued owning to some breach of this contract by the contractor, the Employer shall pay to the contractor the price of the said work (as an extra to be valued as hereinafter provided) and / or loss.

CLAUSE – 2 - DRAWINGS AND SCHEDULE OF QUANTITIES

One complete set of the Drawing and Specifications and Schedule of Quantities shall be furnished by the Employer to the contractor, and the Employer shall furnish within such time as they may consider reasonable, one copy of any additional drawing which in their opinion may be necessary for the execution of any part of work, such copies shall be kept on the works and the Architects or the Employers and their representatives shall at all reasonable times have access to the same, and they shall be returned to the Employers by the contractor before the issue of the certificate for the balance of his account under the contract. This Contract and the Signed Drawings and Specification and Schedule of Quantities shall remain in the custody of the Employer, and shall be produced by them at their office as and when required by the Architects or by contractor.

CLAUSE – 3 – CONTRACTOR TO PROVIDE EVERYTHING NECESSARY

The contractor shall provide everything necessary for the proper execution of the works according to intent and meaning of the Drawings, Schedule of Quantities and Specifications taken together whether the same may or may not be particularly shown therein provided that the same can reasonable be inferred there from and if the contractor find any discrepancy therein he shall immediately and in writing refer the same to the Employers whose decision shall be final and binding. Figured dimensions shall be followed in preference to scale. The contractor shall provide himself for ground and fresh water for carrying out of the woks at his own cost.

The Employer shall not charge the contractor for his own unrented ground. The Employer shall be on no account be responsible for the expenses incurred by the contractor for hired ground or water obtained from elsewhere.

The contractor shall supply, fix and maintain at his cost, during execution of any works, all the necessary centering, scaffolding, staging planking, timbering, strutting, shoring, Electrical, fencing, hoarding, watching and lighting by night as well as by day required not only for the

proper execution and protection of any of the said works, but also for the protection of any adjacent roads, street cellars, vaults evens, pavement, walls, houses, buildings and all other erection, matters or things and the contractor shall take down and remove any or all such centering, scaffolding, staging, planking, timbering, strutting, shoring etc. as occasion shall require or when ordered these to do and shall fully reinstate and make good all matters and things distributed during execution of the works, to the satisfaction of the Architects.

CLAUSE – 4 – AUTHORITIES NOTICES AND PATENTS

The contractor shall confirm to the provisions of any acts of the Legislature relating to the works and to the Regulations and By Laws of any Authority and of any water, lighting and other companies and / or Authorities with whose systems the structure is proposed to be connected and shall before making any variations from the Drawings or specifications that may be necessitated by so confirming give the Employers written notice specifying the variation proposed to be made and reasons for making it, and apply for instructions, thereon in case the contractor shall not within seven days receive instructions he shall proceed with the work, confirming with the provision Regulation or Bye Laws in question.

The contractor shall arrange to give all notices required by the said Acts, Regulations of Bye-Laws to be given to any authority and pay to such authority or to any public office all fees that may be properly chargeable in respect of the works and lodge the receipts with Employers.

The contractor shall indemnify the Employers against all claims in respect of patent rights, and shall defend all actions arising from such claims unless he had informed the Employers before any such infringement, and received their permission to proceed and shall himself pay all royalties, license fees, damages, costs and charge of all and every sort that may be legally incurred in respect thereof.

CLAUSE – 5 – SETTING OUT WORK

The contractor shall set out the works 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 expense rectify such error, if called upon, to the satisfaction of the Architects and Employers

CLAUSE – 6 – CONTRACTOR IMMEDIATELY TO REMOVE ALL OFFENSIVE MATTER

All soil filth or other matter of any 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 carried away by the contractor to some pit or place provided by him.

CLAUSE – 7 – MATERIAL AND WORKMAN SHIP TO CONFIRM TO DESCRIPTION

All materials and workmanship shall so far as procurable be of the respective kinds described in priced schedule of quantities and / or specifications and in accordance on the request of Employers, furnish them with all invoices materials comply therewith. The contractor shall at his own cost arrange for and / or carry out any taste of materials which the Architects may required any

material introduced beyond the scope of this specification should be approved by the Architects.

CLAUSE – 8 – ACCESS

The Employers and their representatives shall at all reasonable times have free access to the work and / or to the workshop, factories or other places where the materials are being prepared or constructed for the contract and also to any place where the materials are contract and also to any place where the materials are lying or from which they are being obtained and contractor shall give every facility to Employers and their representatives necessary for inspection and examination and cost of the materials and workmanship except the representative of public authorities, no person shall be allowed on the works at any time without the written permission of the authorities.

If any work is to be done at place other than the site of works a contractor shall obtain the written permission of the Architect for doing so.

CLAUSE – 9 – SUPERVISION AND FOREMAN

The Contractor shall give necessary personnel superintendence during the execution of works and as long thereafter as the Architect may consider necessary until the expiration of the "Defects Liability Period" stated in Appendix hereto. The Contractor shall, also during the whole time when the works are in progress Employ a competent foreman approved by the Architect who shall be constantly in attendance of the building while men are at work. Any directions, explanations, instructions or notices given by the Architect to such foreman shall be held to be given to the Contractor.

CLAUSE – 10 – CLERK OF WORK

The term "Clerk of Works" shall mean the person appointed and paid by the Employers and acting under the orders of the Architects or the Employers to superintended the work. The Contractor shall offer the clerk of works every facility and assistance for examining the works and materials and for checking and measuring time and materials. The Clerk of works shall no power to revoke, alter, enlarge or relax any requirements of the contract or to sanction any day work, additions, deviations or omissions or any extra work whatever except so far as such authority may be specially conferred by a written order of Architects. The clerk of works or any representative of the Architects shall give notice to the contractor or his foremen of non approval of any work or material which in his opinion is not according to the specifications and such work shall be suspended or the use of such material shall be discontinued forthwith. In case of difference of opinion, the decision of the Architects will be final, the work will from time to time be examined by the Architects but such examination shall not any way exonerate the contractor from the obligation to remedy and defects which may be found to exist at any stage of the work or after the same is completed.

CLAUSE – 11 – DISMISSAL OF WORKMAN

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

CLAUSE – 12 – DATE OF COMMENCEMENT AND COMPLETIONS

The contractor shall be allowed admittance to the site on the "Date of Commencement" stated in the Appendix, and he shall there upon and forthwith being the wok regularly proceed with the complete the same on or before the "Date of Completion" stated in the Appendix subject nevertheless to the provision for the extension of time hereinafter contained.

CLAUSE – 13 – ASSIGNMENT

The whole of the works included in the contract shall be executed by the contractor and contractor shall not directly or indirectly transfer, assign or sublet the contract or any part, share or interest therein not shall he take a new partner without the written consent of the Employers through Architects and no subletting shall relieve the contractor or from active superintendence of the works during their progress.

CLAUSE – 14 – SCHEDULE OF QUANITIES

The Schedule of Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the method of measurements mentioned in specifications and shall be considered to be approximately and no liability shall attach to the Architects or the Employers for any error that may be discovered therein.

CLAUSE – 15 – SUB CONTRACTORS

Any specialists, Merchants, Tradesman and other executing any work or supplying and taking any goods for which provisional sums are included in the schedule of quantities and / or specifications who may be nominated or selected by the Employers are hereby declared to be subcontractors and herein referred to as nominated subcontractors.

No nominate sub-contractor shall be employed on or in connection with the works against whom the contractor shall make reasonable objection or (save where the Employers and contractors shall otherwise agree) who will not enter into a contract provided.

(a) That the nominated sub-contractor shall indemnify the contractor against the same obligations in respect of the sub-contract as the contractor is under in respect of this contract.

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

CLAUSE – 16 – VARIATION

The contractor may when authorized and shall when directed in writing by the Architects or the Employers add to or omit from or vary the works shown up on the Drawings or described in specifications or included in the priced schedule of quantities but the contractor shall make no addition, omission or variation without such authorization or direction. A verbal authority or direction by the Architects or the Employers shall if confirmed by the contractor in writing within seven days be deemed to have been given in writing.

No claim for an extra shall be allowed unless it shall have been executed under the provisions of Clause – 4 of the Agreement or by the authority of the Architects or Employers as herein mentioned. Any such extra herein referred to as an authorized extra. No

variation i.e. addition, omission or substitution shall vitiate contract.

In case of lump sum contracts the value of authorized variations shall be adjusted by the Employers and contract amount shall varied accordingly.

CLAUSE – 17 – DAMAGE TO PERSONS, PROPERTY, INSURANCE IN RESPECT OF

The contractor shall be responsible for the all injury to persons, animals or things and for all damage to the structural or decorative part of the property which may arise from the operations or neglect of himself or of any sub-contractor or of any or his or sub-contractor's Employees, whether such injury or damage arise carelessness, accident or any other cause whatever in any way connected with carrying out of this contract. This clause shall held to include inter alia, any damage to buildings, whether immediately adjacent or otherwise, and any damage to roads, streets, footpaths, bridges or as well all damage caused to the buildings and works forming the subject of this contract by forest, rain or other inclemency of the whether. The contractor shall indemnify the Employers and hold them 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 injury or damage under any acts of Govt. or otherwise and also in respect of any award of compensation or damage consequent upon such claim.

The contractor shall reinstate all damage of every sort mentioned in this clause, so as to deliver upon the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

The contractor shall indemnify the Employers against all claims which may be made against the Employers 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 and shall at his own expense arrange to effect and maintain, until the virtual completion of the contract with an approved Employers and Contractor against such risks and deposit such policy or policies with the Employer from time to time during the currency of this contract. The contractor shall also indemnify the Employers against all the Workman's Compensation Act or any other statute in force during the currency of this contract or any common law in respect of any Employees of the contractor any sub-contractor and shall at his own expenses effect and maintain until the virtual completion of the contract, with an approved office a policy of insurance against such risks and deposit such policy or policies with the Employer with time to time during the currency of this contract. The contractor shall be responsible for anything which may be excluded from the insurance policies above referred to and also for all other damages to any property arising out of and incidential to the negligent, or defective carrying out of this contract.

He shall also indemnify the Employers in respect of any costs, charge or expenses arising out of any claim or proceedings and also in respect of any award of compensation of damages arising thereof.

The Employers shall be at liberty and are hereby empowered to deduct the amount of any damages, compensation, cost charges and expenses arising or occurring from or in respect of any such claim or damage from any some or sums due to or to become due to the

Contractor.

CLAUSE – 18 – FIRE INSURANCE

Unless otherwise instructed by the Employers the Contractor shall on signing the contract insure the works and keep them insured until the virtual completion of the contract against the loss or damage by fire and / or earthquake in an office to be approved by the Employers in the joint names of the Employers and the Contractor for such amount and for any future sum if called upon to do so by the Employers, the premium of such further sum being allowed to the contractor as an authorized extra. Such policy shall cover the property of the Employers only and shall not cover any property of the contractor or of any subcontractor of Employee the contractor shall deposit the policy and receipts for the premiums with the Employers within Twenty One days from the date of signing the contract unless otherwise insured by the Employer. In default of the contractor insuring as provided above the Employers, on their behalf may so insure and may deduct the premium paid from any moneys due, or which may become due to the Contractor. The Contractor shall as soon as claim under the policy is settled or the work, reinstated by the insurance office should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire had not occurred and in all respects under the same conditions of contract. The contractor in case of rebuilding or reinstatement after fire, shall be entitled to such extension of time for completion as the Employee may deem fit.

CLAUSE – 19 – DELAY AND EXTENTION OF TIME

If in the opinion of the Employers the works be delayed (a) force measure or (b) by reason of any exceptionally inclement whether or (c) by reason of proceeding taken or threatened by or disputes within adjoining or neighboring owners or public authorities or (d) by the works or delays of other contractor or Tradesmen engaged by the Employers and not referred to in the schedule of quantities and / or specifications or (e) by reason of civil commotion, local combination of workmen or strike or lockout affecting any of the Buildings Trades or (f) by reason of Employer's instructions as per Clause No. 1 (g) in consequence of the contractors not having received in due time necessary instructions from the Employers for which he shall have specifically applied in writing or (h) from other causes which the Employers may certify as beyond the control of the contractor or (i) by reason of non-payment of interim certificates at specified time, the Employers with the consolation with the Architects shall make a fair and reasonable extension of time for completion of the contract works. In case of strike or lockout the contractor shall as soon as may be give written notice thereof to the Employers through Architects but the contractor shall nevertheless constantly use his endeavor to prevent delay and shall do all that may reasonably be required to the satisfaction of the Employers or Architects to proceed with the work.

CLAUSE – 20 – DAMAGES FOR NON COMPLETION

If contractor fails to complete the works by the date of completion stated in the Appendix or within any extended time under Clause 19 here to and Architects certify in writing that in their opinion the same ought reasonably so to have been completed, the contractor shall pay or allow the Employers the sum name in the Appendix as "Liquidate Damages for the period during which shall so remain incomplete and Employer may deduct such damages from any moneys due to the contractor. The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor(s) and shall be reckoned from the date on

which the order to commence work is given to the contractor(s). The work shall throughout the stipulated period of the contract be proceeded with, with all due diligence (time being deemed to be of the essence of the contract on the part of the contractors) and if the contractor(s) makes/make default therein he/they shall pay as compensation the sum which may be determined under Clause-20.

Full work shall be completed in 03 consecutive calendar months including monsoon.
NOTE :- The schedule of progress of work based on design of contractor, approved by the Owners, shall be chalked out mutually by the contractor and the Architect / Engineer-in-charge and got approved from Owners, immediately after issue of work order. Action under Clause-20 shall be taken as per aforesaid schedule
In the event of the contractor(s) failing to comply with any of these conditions he/they shall be liable to pay as compensation, an amount equal to Half percent, or such smaller amount as the Architect & Engineer-in-charge (whose decision in writing shall be final) may decide, of the said estimated cost of the whole work for every week that the due quantity of work remains incomplete, PROVIDED ALWAYS, that the total amount of compensation to be paid under the provisions of this clause shall not exceed **10 percent of the estimated cost** of the whole work as shown in the tender.

CLAUSE – 21 – FAILURE BY CONTRACTOR TO COMPLY WITH THE ARCHITECT'S INSTRUCTIONS

If the contractor after receipt of written notice from the Architects requiring, compliance with such further drawings and / or Architect's instructions, fails within seven days to comply with the same the Employers may with the consent of the Architects employ and pay other persons to execute any such work whatsoever as may be necessary to give effect there to and all costs incurred in connections therewith shall be reconversible from the Architects as a debt or may be detected by them from any moneys due to or to become due to the contractor.

CLAUSE – 22 – MEASUREMENTS OF WORKS

The Architects may from time to time intimate to the Employers and the Contractor that they require the works to be measured and the Employers and the Contractor shall attend or send a qualified agent to assist the Architects or Architect's representative in taking particulars or to give all assistance required by either or them. If the Contractor not attend or neglect or omit to send such agent then the measurement taken by Architect or approved by them shall be taken to be correct measurements of the work, such measurements shall be taken in accordance with the mode of measurements mentioned in the specifications. The Contractor or their Agent may at the time of measurement take such notes of measurements as they may require. All authorized extra works, omissions and all variations made without the Architects knowledge, if subsequently sanctioned by him in writing, shall be included in such measurement.

CLAUSE – 23 – CERTIFICATE AND PAYMENT

The contractor shall be paid by the Employers from time to time by installments on account of the works executed when in the opinion, of the Architects works to the

approximate value named in the Appendix as value of work for Interim Certificate's (or less at the reasonable direction of the Architect) 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 for Interim certificates. The Architects may in their discretion include in the Interim certificate such amount as they may consider proper but not exceeding 75% of the value on account of materials delivered upon the site by the contractor for use in the works and when the site by the contractor for use in the works and when the works have been virtually completed and the Architects shall have certified in writing that these have been so completed the contractor shall be paid by the Employers in accordance with certificate to be issued the sum of money named in the Appendix as installment after virtual completion and the contractor shall be entitled to the payment of the final balance in accordance with the Final Certificate to the issue in writing by the Architects at the expiration of the period referred to as "Defects Liability Period" in the Appendix hereto from the date of virtual completion or as soon as after expiration of such period as he works shall have been finally completed and all defects made good according to the true intent and meaning hereof whichever shall last happen provided always that the issue by the Architects of any certificate during the progress of the works or at or after their completion shall not relieve the contractor from his liability in cases of fraud, dishonesty or fraudulent concealment relating to the works or materials or to any matter deal with the certificate, and in cases of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. No certificate of Employers shall of itself be conclusive evidence that any works or materials to which it relates are in accordance. The Employers with the consultation with the Architects shall have power to withhold any payment if the works of any parts thereof are not being carried out to satisfaction. Payment to the contractor shall be made within the periods named in the Appendix as 'Period for honoring Bills' after such bills have been presented to the Employers through Architects.

CLAUSE – 24 – UNFIXED MATERIALS WHEN TAKEN INTO ACCOUNT TO BE THE PROPERTY OF THE EMPLOYERS

When in any bill of which the contractor has received payment the Employers have included the value of any unfixed materials intended for and / or placed on or adjacent to the works such materials shall become the property of the Employers (for any loss or damage to which the contractor shall be responsible) and these shall not be removed from the site except for use upon works without the written authority of the Employers.

CLAUSE – 25 – CERTIFICATE OF VIRTUAL COMPLETION

The works shall not be considered as completed until the Architects have certified in writing that they have been virtually completed and the defects liability period shall commence from the date of such certificate.

CLAUSE – 26 – DEFECTS AFTER COMPLETION

The defect, shrinkage, settlements or other faults which may appear within the defects liability period stated in the Appendix hereto or if not stated then within Twelve Months after completion of the works, arising in the opinion of the Architects or the Employers from the materials or workmanship not in accordance with the contract shall upon the direction writing of

the Employers and within such reasonable time as shall be specified therein, be amended and

made good by the contractor, at his own cost unless the Employers shall decide that he ought to

be paid for such amending and making good and in case of default the Employers may employ and pay other persons to amend and make good such defects, shrinkage, settlements or other faults, or incidental thereto shall be made good and borne by the contractor and such damage, loss and expenses shall deducted by the Employers from any money due the contractor a sum to be determined by the Architects equivalent to the cost of amending such works and in the event of the amount retained under Clause No. 23 being insufficient, recover the balance from the contractor together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done or materials supplied by any sub contractor employee on the works who has been nominated or approved by Architects as provided Clause No. 15 the contractor shall be liable to make good in the same manner as if such work or material has been done or supplied by the contractor and been subject to the provisions of this clause and Clause No. 1 hereof. The contractor shall remain liable under the provisions of this clause notwithstanding the signing by the Employers of any certificate or the passing of any accounts.

CLAUSE – 27 – EMPLOYERS DELAY IN PROGRESS

The Employers may delay the progress of works in case of rains or otherwise without vitiating the contract and grant such extension of time for the completion of the contract as they may think proper and sufficient in consequence of such delay and the contractor shall not make any claim for compensation or damaged in relation thereto.

CLAUSE – 28 – PROVISIONAL SUM APPLICATION OF

All work for which provisional sum of money as are provided may be selected or ordered from any manufacturer of firms at the discretion of the Architects or the Employers and the Employers reserve to themselves the right of paying direct for any such works. The contractor shall not be entitled to any profits for provisions items.

CLAUSE – 29 – OTHER PERSONS ENGAGED BY EMPLOYEES

The Employers reserve the right to execute any work not included in the contract which they may desire to carry out by other persons and the contractor shall all reasonable facilities and the use of his scaffolding and plant for execution of such work, but is not required to provide any special plants or materials, for the execution of such work except by special arrangements with the Employers. Such work shall be carried out in such manner, so as not to impair the progress of the works 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.

CLAUSE – 30 – SUSPENSION

If the contractor except on the account of any legal restrain upon the Employers preventing the continuance of the work or in case of bills not paid within the period for honoring bills shall suspend the works or in the opinion of the Architects or the Employers shall neglect or fail to proceed with due diligence in the performance of his part of the contract if he make default in respect of Clause No. 1 the Employers shall have the power to given notice in writing to the contractor inquiring that the works be proceeded within a reasonable and with reasonable dispatch such notice shall support to a notice shall have been given, the contractor

shall not be at liberty to remove from the site of the works or from any ground contagious thereto any plant or 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 seven days after such notice has been given to proceed with the works as therein prescribed the Employers may proceed as provided in Clause No.32.

CLAUSE – 31 – TERMINATION BY EMPLOYERS

If the contractor (being as individual or a Firm) commit any 'Act of Insolvency' or shall be adjusted as Insolvent, or shall make an assignment or composition for the benefit of the greater part, in number an amount of this creditors, or shall enter into Deed of assignment with his creditors, or (being an Incorporated Company) shall have another made against him or pass an effective Resolution for winding up either compulsorily or subject to the supervision of the Court 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 unable within seven days after notice to him requiring him to do so to show to the reasonable satisfaction of the employers that he is able to carry out and fulfill the contract and if required by 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 the creditors of the contractors of the contractor shall assign or subject the contract without the consent in writing of the Employers first obtained or if the contractor shall charge or encumber this contractor any payments due or which may become due to the contractor there under, or if the Employers are satisfied that the contractor :

(1) has abandoned the contract or

(2) has failed to commence the works, or has without any lawful excuse under this conditions suspended the progress of the works for 14 days after receiving for the Employers written notice to proceed.

(3) has failed to proceed with the works with such due diligence and failed to make such due progress within the time agreed upon, or

(4) has failed to remove materials from the site or to pull down or replace works within seven days after receiving from the Employers written notice that the said material or work were condoned and rejected by the Employers under conditions, or

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

(6) has to the detriment of good workmanship or in defiance of the Architect's instructions to the contrary sublet any part of the contract.

Then and in day of the said cases the Employers with the written consent of the Architects may not withstanding any previous waiver after giving seven days notice in

writing to the contractor determine the contract, but without thereby affecting the powers of the Architects or the obligations land liabilities of the contractor, the whole of which shall continuous to be in force as fully as if the contract had not been so determined and has if the works subsequently executed had been executed by or on behalf of the contractor. And further the Employers with
the consent of the Architects or their agents or servants may enter upon and take possession of the works and all plant, tools, scaffolding, sheds, machinery steam and other power utensils, and materials laying, in the premises or the adjoining lands or roads and use the same as their own property or may employ the same by means of their own servants and workman in carrying on the completing the works or by Employee any other contractors or other persons or person to complete the works, and contractor shall not in any way interrupt or do any matter or thing to prevent or hinder such other contractor or persons or person Employed for completing and finishing or using the materials and plants for the works, when the work shall be completed or as soon thereafter as convenient the Employers shall give a notice in writing to the contractor to remove his surplus materials and plants and should the contractor fail to do so within a period of 14 days after receipt thereof by him the Employers may sell the same by public auction and shall give credit to the contractor for the amount so realized. The Architects shall there after ascertain and certify in writing under their hand what (if anything) shall be due or payable to or by the Employers for the value of said plant and materials so taken possession of by the Employers and expenses or loss which the Employers, shall have been put to in getting the works to be so completed and the amount, if any owing to the contractor and the amount which be so certified shall there upon be paid by the Employers to the contractor or by contractor to the Employer to the contractor or by contractor to the Employer as the case may be and the certificate of the Architect shall be final and conclusive between the parties.

CLAUSE – 32 – TERMINATION OF CONTRACT BY CONTRACTOR

If the payment of the amount payable by the Employers with interest as provided for hereinafter shall be in arrears and unpaid for thirty days after notice in writing requiring payment of the amount with interest as aforesaid shall have been given by the contractor to the Employers, the contractor shall be at property to determine the contract by notice in writing as to the Employer through the Architect and shall be entitled to recover from the Employers payment for all works executed and for loss he may sustain due to any plant or materials supplied or prepared for the purpose of the contract.

In arriving at the amount of such payment the net rates contained in the contractor's original tender shall be followed in accordance with Clause – 16 thereof.

CLAUSE – 33 – DISPUTES BE FINALLY DETERMINED BY ARCHITECT

The decision, opinion, direction certificate of or valuation with respect to al or any of the matters under Clauses 1, 3, 13, 19 (a, b, c, d, f and h) 27, 31 and 32 hereof (which matters are herein referred to as expected matters) shall be final and conclusive and binding on the parties hereto and shall be without appeal and other decisions opinion, direction certificate or valuation of the Employers or any refusal of the Architect or the Employers to give any of the same shall be subject to the write of arbitration and review in the same way in all respects (including the provision as to opening the reference) as if were a decision of the

Architects under Clause No. 36.

CLAUSE – 34 – DEPOSIT

The amount deposited by contractor shall be retained with the Employers and it shall be virtual completion of the works. In case of default if any of the foregoing conditions the deposit amount shall be forfeited to the Employers.

CLAUSE – 35 – SETTLEMENT OF DISPUTES, ARBITRATION

All disputes of any kind whatever arising out of or in connection with the contractor carrying out the works (whether during the progress of the works or after there completion or whether before or after the determination of abandonment or breach of the) shall be referred to and settled by the Architect's who shall state their decision in writing, such decision may be in the form of a final certificate or otherwise. The decision of the Architects with respect to any of the excepted matters shall be final and without appeal as stated in Clause No. 34 but either the Employers or Contractor be dissatisfied with the decision of the Architects or any matter question or the dispute of any kind (except any of the excepted matter) or as to the withholding by the Employers of any bills to which the contractor may claim to entitled, then and in any such either party (the Employers or the Contractor) may within twenty eight days after receiving notice of such through the Architect requiring that such matters in dispute the arbitrate upon such written notice shall specify the matters which are dispute and such dispute or difference of which such written notice has been given and no other shall be and is hereby referred to the sole arbitration and final decision of a single arbitrator being a fellow of Indian Institute of Architects to be agreed upon and appointed by both the parties in case of disagreement as to appointment of a single Arbitrator, to the Arbitration of the Two Arbitrators both being fellow of the Indian Institute of Architects, one to be appointed by each party which arbitrators shall before taking upon themselves the burden of reference appoint an umpire.

The Arbitrator, Arbitrators or the Umpire shall have power to open up, review and revise any certificate, opinion, decision, requisition or notice save in regard to the expected matters referred to in Clause No. 34 and to determine all matters in dispute which shall be submitted to him or them and of which notice shall have been given as aforesaid.

Upon every or such reference the cost of and incidental to the reference and award respectively shall be in the direction of the Arbitrator or Arbitrators or the Umpire who may determine the amount thereof or direct the same to be taxed as between attorney or client or as between party and part, and shall direct by whom and to whom and in what matter the same shall be borne and paid.

This submission shall be deemed to be a submission to arbitration within the meaning of Arbitration act, 1940 or any statutory modification thereof. The award of the Arbitrators or arbitrator or the Umpire shall be final and binding on the parties. Such reference except as to the withholding by the Employer of any Bills under Clause No. 31 to which the contractor claims to be entitled shall not be opened or entered upon until after the completion or alleged completion of works or until after the practical completion of the works or until after the practical cessation of the works arising from any Clause unless with the written consent of the Employers shall not withhold the payment of the interim bill, not the contractor except

with consent in writing of the Architect in any way delay in carrying out the works by reason if any such matter, question or dispute being referred to Arbitration but shall proceed with the work with all due diligence and shall until the decision of the Arbitrator or Arbitrators or the Umpire shall relieve the contractor of his obligations to adhere strictly to the Architects instructions with regard to the actual carrying out of the works, the Employers and the contractor hereby also agree that arbitration under this clause shall be condition, president to any right of action under the contract.

CLAUSE – 36 – SPECIALISTS JOB

If during the course of the work the Architect or the Employer change the design, so that it becomes a specialists job or satisfy that work is too special for the said contractor and the contractor cannot do it on account of patents lack of knowledge or equipment etc. the Employer with the consultation of the Architects shall be free to have the same done by the another contractor who is specialist for the particular work, and will enter in to direct contract with such a specialist will enter into direct contract with such a specialist contractor without vitiating other conditions of the said sum involved in such a change shall not exceed 25% of the contract amount.

CLAUSE – 37 – EXTRAS

The contractor shall when order in writing by the Employer, perform extra work and furnish extra materials not covered by the specifications or included in the schedule, but forming an inseparable part of the work contracted for, on the same conditions in all respects in which he agrees to do the main work. Extra work and supply of such material shall be carried out at a rate settled by the written agreement between the Contractor and Employers. The rates of the extra work and materials shall either by determined by (i) Estimate and Mutual acceptance in Lump sum or (ii) based upon the unit prices named in the contractor or subsequently agreed upon the in writing between the Contractor and the Employers. If none of the above methods is agreed upon the Contractor provided he receives an order as above, shall proceed with the work. In such case and in case wherein the judgment of the Employers it is impracticable because of the nature of the work or any other reason to fix the price in the order, the extra work and material shall be paid for at actual necessary cost as determined and certified by the Architect.

CLAUSE – 38 – MEDICAL AID

Medical aid for the contractor's shall be agreed by the Contractor at his own cost. The contractor shall provide First Aid Boxes on the work site. The boxes shall always be filled in with all required medicines.

CLAUSE – 39 – NIGHT WORK

When work has to be carried out at night, the contractor shall obtain written permission of the Architects. In the event of such permission being granted proper arrangements for supervision, lights etc. shall be made to the satisfaction of the Architects.

CLAUSE – 40 – CONTRACTOR TO KEEP SITE CLEAN

The contractor shall be responsible to keep the site and place where labour is housed in good sanitary condition to the entire satisfaction of the local health authority and shall

provide at his expense equipment and appliances that may be required for this purpose in keeping with any rules and Bye Laws governing the housing and employment or labour.

CLAUSE – 41 – AGREEMENT FEE

The successful contractor will have entered in to agreement in form specified on a stamp paper of required amount. The stamp charge shall be borne by the contractor.

10. ADDITIONAL CONDITIONS OF CONTRACT

1. SCOPE OF WORK TO BE DONE BY CONTRACTOR:-

1. Contractor has to complete all the **Fire Fighting, Fire Alarm & Public Address work** as specified in the Detailed Services Drawings.
2. Work will also include making good / repairing any broken / damaged portions of the building at his own cost. If the contractor fails to do the same, then the same will be done departmentally by the owner & the cost incurred in making good the same will be deducted from the RA Bills / Final Bill / Security Deposit due to the contractor as deemed fit by the owners.
3. During any stage of the construction, if it is observed that the safety / durability of the structure is compromised by the contractor then the best possible necessary remedial measures will be undertaken & the cost for the same will be borne by the contractor.
4. Contractor has to maintain all necessary safety precautions including the usage of safety nets, helmets, gloves, Safety shoes, safety belts etc. at his own cost. The responsibility to keep the site accident free along with completion in the stipulated time rests with the contractor.

Annexure-1

SASMIRA
SASMIRA MARG, WORLI
MUMBAI-400 030

PROJECT

PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT WORLI, MUMBAI.

TENDER FOR SUPPLY & INSTALLATION OF FIRE FIGHTING, FIRE ALARM AND PUBLIC ADDRESS SYSTEM FOR PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT WORLI, MUMBAI

TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING

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S E C T I O N - I

TECHNICAL SPECIFICATIONS FOR
FIREFIGHTING & FIRE ALARM SYSTEM

PIPING FOR FIRE FIGHTING

1.0 Scope

1.1 The scope of work covers, supply, laying, testing and commissioning of the entire piping system for the Fire Fighting Installation ie. Fire Hydrant and sprinkler systems.

2.0 Standards

2.1 The following standards shall be applicable:

i) IS 1239	Mild Steel Tubes & Tubular And fittings
ii) IS 1879	Malleable iron fittings
iii) IS 778	Gun Metal gate, globe and Check valves
iv) IS 1537	Vertically cast iron double Flanged pipes
v) IS 7181	Horizontally cast double Flanged pipes.

All standards should be the latest NBC.

3.0 Hydrant Mains

3.1 External

3.1.1 Underground external mains shall be either

a) Mild steel pipes ERW conforming to IS 1239 upto 150mm. Pipes of 200 mm and over shall be factory fabricated ERW pipes to IS 3589 or BS 3601.

3.1.2 Pipes shall be given two coat of hot bitumen before being laid in position.

3.1.3 Mild steel pipes, when laid underground, shall be protected against corrosion by two coats of hot bitumen and two wraps of fibre glass tissue over the entire length including fittings & valves. Fittings shall be weldable wrought iron fittings

suitable for butt-welding. The welded joints shall be random selected for testing in consultation with the Engineer.

3.1.4 Valves 65 mm dia and below shall be heavy duty gun metal full way gate valves or globe valves conforming to IS 778 - 20 Kg/sqcm class. Valves shall be tested at manufacturer's works and ISI stamped. Sluice valves above 80 mm shall be cast iron double flanged, with rising spindle conforming to and stamped to ISI 780-20 kg class. Exposed valves shall be provided with wheel for operation and underground valves cap-tops. Contractor shall provide suitable operating keys for sluice valves with tops.

3.1.5 Underground mains shall be laid not less than 750 mm below the ground level and shall be at least 2m away from the building face and supported on concrete pedestals at every 3.5 m and held on with galvanized iron clamps. Concrete thrust anchors shall be provided at all bends and tees as shown on drawing and as directed. All excavation for pipe laying shall be carried out with sufficient width for making proper joints. Backfilling shall be done only after the piping is hydro-statically pressure tested. Piping shall be constantly kept clean till tested.

3.1.6 all valves shall be housed in brick masonry chambers over 150 mm cement concrete (1:3:6) foundation. The brick walls of the chamber shall be plastered inside and outside with 20mm cement sand plaster 1:4 with a floating coat of neat cement. Chambers shall be 650 x 650 mm clear for depths upto 900 mm and 1000 x 1000 mm for depths beyond. Each chamber shall have a cast iron surface box approved by the local Fire brigade.

3.1.7 Piping laid above ground shall be supported on cement concrete pedestals raising the bottom of the pipe at least 150 mm over the ground level and held to the pedestals with galvanized clamps. Pedestals shall be made at 3.0 m center to center and as shown on drawings. Cement concrete thrust anchors shall be provided at all tee-off points and change of direction as shown on drawings and as required. Pipes laid on walls and ceiling shall have galvanized steel brackets

3.2 Internal

3.2.1 all internal pipes shall be, unless otherwise specified, heavy quality galvanised mild steel tubes to IS 1239 using wrought G.I steel heavy-duty screwed fittings. Flanges shall be provided to mate with valves and other equipment and shall conform to IS 6392. Flanges shall be screwed type.

3.2.2 All fittings for sprinkler piping shall be extra heavy duty galvanised M.S screwed type suitable for the pressure encountered in sprinkler piping. All tap-offs from vertical riser to floor piping shall have flange or union connections. All flow switches shall have flanges or unions on both sides.

3.2.3 Valves shall be as for external piping.

3.2.4 all pipes shall be of approved make and best quality without rust marks. Pipes and fittings 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 and fittings shall be fixed truly vertical horizontal or in slopes as required in a neat workmanship manner. Pipes shall be securely fixed to walls and ceilings by suitable supports at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceiling and walls.

3.2.5 all pipes shall be adequately supported from ceiling or walls through structural supports fabricated from mild steel structural e.g. rods, channels, angles and flats generally as shown on drawings. Fasteners shall be shear type anchor fasteners in concrete walls and ceilings and wrought steel spikes of at least 75mm long in brick walls. All pipes supports shall be painted with 1 coats of red oxide primer and two coats of black enamel paint. Pipe supports shall be as follows:

Upto 50 mm	nominal bore	1.75m
63 mm to 100 mm	nominal bore	2.0 m
Over 100 mm	nominal bore	2.5 m

3.2.6 All low point loops in the piping shall be provided with 25mm gun metal full-way valves with rising spindle for draining the system. All valves shall have screwed brass caps. Likewise 25mm gunmetal air vents shall be provided at all high point loops to prevent air locking.

3.2.7 All piping shall have flanged joints at about 25m intervals to facilitate easy maintenance.

3.3 Painting

3.3.1 All exposed piping for firefighting shall be distinctly painted 'Fire Red' shade 536 to IS:5-1978. Pipes shall first receive two coats of red oxide primer uniformly applied and two coats of oil paint applied thereafter. All pipes supports shall be painted black as specified for support & clamps.

4.0 **Testing & commissioning**

4.1 All piping after installation shall be tested for a hydrostatic test pressure of 20 Kg/Sqcm maintained for 24 hours. All joints and valves shall be checked for leaks and rectified and retested. During testing all valves except drain & air valves shall be kept fully open.

5.0 **Makes of Materials**

5.1 The following makes of materials are listed as conforming to the specifications. in ANNEXURE II.

6.0 **Mode of measurement**

6.1 All external piping shall be measured along the center line of the pipe and paid per unit length and shall include:

i) All pipes & fittings

ii) Bituminous coating

6.2 All internal piping shall be measured similarly but shall include for the pipe supports and clamps instead of excavation.

6.3 All valves, air valves, drain valves together with flanges or tail pieces shall be measured per unit.

6.5 All excavation and concrete supports and thrust blocks shall be measured as per drawing and paid for per cum.

SECTION : 2.3

SPRINKLER SYSTEM

1.0 **Scope**

1.1.1 The scope of work shall cover supply, installation, testing and commissioning of the sprinkler system covering the following:

1). Sprinklers
2). Sprinkler Piping
3). Branch flow switches connected to the building fire alarm system.

2.0 **Standards**

2.1.1 The sprinkler installation shall confirm to and meet with the requirement ser out by the following

1). Fire insurance association of India – Tariff Advisory Committee rules
2). Local Fire Brigade and Fire Engineering authorities

3.0 **Sprinklers**

3.1 Sprinklers shall be thermo-sensitive glass-bulb actuated type and be standard products from an established company of repute and standing and approved by appropriate authority for fire fighting duty.

3.2 All Sprinklers shall be brass castings polished chrome or white (polyester) as approved and rated for 12.0 Kg/sq.cm WG and factory tested for 34 kg/sq.cm. Sprinklers shall be pendant or side wall type as specified and shown on drawings. All sprinklers shall be provided with an adjustable escutcheons finished same as sprinkler head. Wherever shown and specified sprinklers shall be concealed type.

3.3 Temperature classifications of sprinklers in each space shall be as shown on the drawings or as required. Sprinklers shall be selected for the coverage shown on the drawings and ordinarily is 12/12 mm with K factor of 115 (meteoric). Wherever the specified sprinkler is not adequate, the tenderer may offer appropriate size required.

4.0 **Piping**

4.1 All piping shall be as specified under “Piping for Fire fighting” and the schedule of work for piping.

5.0 **Testing**

5.1 Entire sprinkler piping shall be tested with the sprinklers in position to a hydrostatic test pressure of 1.5 times the casing pressure of the pump and maintained for a period of 24 hours at the end of which there shall be no loss in pressure.

All branches shall be tested and witnessed and attested by the Engineer in Charge. All the operating tests shall be carried out in the presence of Consultant,

6.0 Make of Materials

All materials and equipments used shall be approved ISI stamped. The list of makes of materials is listed in ANNEXURE 2.1-4.

7.0 Mode of Measurement

7.1 Sprinklers shall be identified as pendant, sidewall, or concealed and paid for per unit.

7.2 For Piping refer section on Piping for Fire fighting.

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PROJECT

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TENDER FOR SUPPLY & INSTALLATION OF FIRE FIGHTING , FIRE ALARM AND PUBLIC ADDRESS SYSTEM FOR PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT
WORLI, MUMBAI

SECTION - II

LIST OF APPROVED BRANDS/MAKES OF EQUIPMENTS REQUIRED UNDER THIS TENDER.

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LIST OF APPROVED MAKES FOR EQUIPMENT & MATERIALS SUPPLIED BY FIRE FIGHTING CONTRACTOR

HYDRANT SYSTEMS:-

S.No.	Details of Materials / Equipment	Manufacturer's Name
1.	C.I. (L.A.) Pipes	Electro Steel Culcutta Kesoram Calcutta IISCO
2.	G.I. / M.S. Pipes (IS : 1239 / IS : 3589)	Tata Steel Jindal (Hissar)
3.	Standard M.S. Fittings	Industrial Valves and Company
4.	Forged Steel Fittings	VS Engineering JK Forging
5.	Gun Metal / Forged Brass Valve	Itap **(Art – 1510)** RB **(Art – 090)** IBP
6.	CI Sluice Valve	Kirloskar Indian Valve Company
7.	Butterfly Valve (IS : 13095 - C.I. Body, S.S. Disc, PN-16)	Danfoss - **Sylax** Audco **(IBF 2SS)** Advance **(12 HCE0FWL)**
8.	Wafer type check valve (dual plate type PN-16)	Danfoss – Socla **(895 CV)** Advance **(AV-WP-11)**
9.	A) 'Y' Strainer	Danfoss **(Y333),** Hammer
	B) Pot Strainer	Emerald, C& R,
10.	Paints	Asian Paints Berger Shalimar Paints Nerolac

11.	Anti Vibration Mounting	Kanwal Industrial Corporation Dunlop Resistroflex
12.	Pressure Switch	System Sensor Indfoss
13.	Pressure Gauge (---- PSI, 4" dial, S.S. bourden tube - Glycerine filled)	Waaree H Guru Fiebig
14.	Double / Single Headed Landing Valve (As per IS)	Minimax New Age Safeguard
15.	Gun Metal Brach Pipe (As per IS)	Minimax New Age Safeguard
16.	Sprinkler Heads	Tyco Viking Spray Safe
17.	Water Flow Switch	System Sensor
18.	Pipe Protection wrapping	Pypkote (IWL) Coatek (Rustech)
19.	Welding Rods	Advani Orlicon SS ESAB COSMOS
20.	Pumps	CRI Pumps Khirloskar Pumps
21.	Pressure Reducing Valve	Honeywell RB Lahri Valve
22.	Air Valve	RB, ITAP, VARIE
23.	Hot dip galvanizing	Jenco Industrial Corporation Chincholi Bunder Road, Devrukhkar Wadi, Near Link Road, Malad (W), Mumbai - 64 (Tel : 2872 5402 / 2872 5765)

Notes :

1. The first brand name specified to be considered while filling up the tender and fire pumps with Motors to be Approved as per Fire Norms. In case the considered brand is not available, then contractor to take permission of the Clients for using the other specified brand.

2. All materials are subject to physical check and approved by Architect / Consultants.

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PROJECT

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TENDER FOR SUPPLY & INSTALLATION OF FIRE FIGHTING, FIRE ALARM AND PUBLIC ADDRESS SYSTEM FOR PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT WORLI, MUMBAI

TECHNICAL SPECIFICATIONS FOR FIRE ALARM

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INTELLIGENT ADDRESSABLE FIRE ALARM SYSTEM
TECHNICAL SPECIFICATIONS
CHAPTER-A: SYSTEM DESCRIPTION

1.0 SITE CONDITIONS, SPECIAL CONDITIONS AND GENERAL DESCRIPTION

The Fire Alarm System supplier shall furnish and install a fully integrated Fire Detection cum Voice Evacuation system.

It is proposed to have a single, unified and integrated Fire Alarm cum Voice Evacuation system to meet the Life Safety Standards defined in NFPA standards and NBC standards.

The Fire Alarm System shall consist of Smoke detectors, Heat Detectors, and combination detectors selected as per specific requirements of the area to be installed in, as well as various input / output modules.

It is proposed to have Fire Detection Panels distributed at various floors, in the LV shafts.

Distributed on the floors are also the Voice and Fire Fighter's Telephone command Centers, in direct peer-to-peer network with the Fire Alarm Panels.

Every Staircase shall be provided with a Fire Fighter's telephone station comprising of a Firefighters telephone and jack, and a cabinet to house the same securely.

Voice evacuation speakers to meet the sound pressure levels as decreed by NFPA 72, NFPA 101 shall be deployed in the entire complex. Exit sounders, which shall emit a distinct temporal sound signature to help occupant evacuate the floor shall be deployed at the Fire Exit Staircases.

Digital Voice amplifiers shall be deployed on floor levels as per the attached schematics.

Touch Screen Panels, which shall enable the Fire Fighters to have immediate first hand information of any fire scenario, along with the facility to display auxiliary information which shall be programmed to facilitate fire fighting, shal lbe deployed at the entrances to the individual sections of the building, as depicted in the Schematic.

In Conclusion, a Truly Peer to Peer network of intelligent nodes shall be deployed to ensure life safety of the occupant of the building, and shall be programmed to ensure the fastest detection and safe evacuation of the occupants.

The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

The system shall be an active/interrogative type system where each addressable device is repetitively scanned, causing a signal to be transmitted to the main fire alarm control panel (FACP) indicating that the device and its associated circuit wiring is functional. Loss of this signal at the main FACP shall result in a trouble indication as specified hereinafter for the particular input.

The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones, and shall include provisions for the system operator to override automatic messages system wide or in selected zones.

The system shall be support additional, alternate Fire Command Centers, which shall be capable of simultaneous monitoring of all system events. Alternate Fire Command Centers shall also support an approved method of transferring the control functions to an alternate Fire Command Center when necessary. All Fire Command Centers shall be individually capable of assuming Audio Command functions such as Emergency Paging, audio zone control functions, and Firefighter's Telephone communication functions.

Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.

The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

2.0 SCOPE OF WORK

A. A intelligent reporting, microprocessor controlled fire detection cum Voice Evacuation system shall be installed in accordance with the specifications and drawings.

The basic system comprises of Main Addressable Intelligent fire alarm panels, Voice and Fire Fighters Telephone Command Systems, Network Repeaters,Touch Screen Displays, networked on a peer to peer network as the headend of the System.

The Low side of the System shall comprise of the intitiating devices such as the smoke / Heat / Combination Sensors, Manual Pull Stations etc.

Notification Applicances shall include Hooter cum Strobes, Speakers and Speaker cum Strobes, Flashers, Alarm Bells etc.

All the above components shall be connected by interconnecting flexible copper cables, Fire Survival PVC grade, laid in GI conduits, or Armoured Cable for physical protection.

The scope shall include laying of the cables described above, citing of the various components to the direction of the architects and consultants, networking and programming to achieve the desired functionality.

B. The system shall be designed such that each signaling line circuit (SLC) is limited to only 80% of its total capacity at initial installation.

1. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.

2. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
3. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
4. Speaker circuits may be controlled by NAC outputs built into the amplifiers, which shall function as addressable points on the Digital Audio Loop.
5. Notification Appliance Circuits (NAC) speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone which ever is greater.
6. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.

7. Notification Appliance Circuits (NAC) speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
8. Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions.
9. Speaker circuits shall be arranged such that there is a minimum of one speaker circuit per smoke zone.
10. Speaker circuits shall be electrically supervised for open and short circuit conditions. If a short circuit exists on a speaker circuit, it shall not be possible to activate that circuit.
11. Audio amplifiers and tone generating equipment shall be electrically supervised for abnormal conditions. Digital amplifiers shall provide built-in speaker circuits, field configurable as four Class B (Style Y), or two Class A (Style Z) circuits.
12. Digital amplifiers shall be capable of storing up to two minutes of digitally recorded audio messages and tones. The digital amplifiers shall also be capable of supervising the connection to the associated digital message generator, and upon loss of that connection shall be capable of one of the following system responses:

    a. The digital amplifier shall automatically broadcast the stored audio message.
    b. The digital amplifier shall switch to a mode where a local bus input on the digital amplifier will accept an input to initiate a broadcast of the stored message. This bus input shall be connected to a NAC on a local FACP for the purpose of providing an alternate means of initiating an emergency message during a communication fault condition.
    c. Speaker circuits shall be either 25 VRMS or 70VRMS. Speaker circuits shall have 20% space capacity for future expansion or increased power output requirements.
    d. Two-way emergency telephone (Fire Fighter Telephone) communication shall be supported between the Audio Command Center and up to seven (7) remote Fire Fighter's Telephone locations simultaneously on a telephone riser.
    e. Means shall be provided to connect FFT voice communications to the speaker circuits in order to allow voice paging over the speaker circuit from a telephone handset.
    f. The digital audio message generator shall be of reliable, non-moving parts, and support the digital storage of at least 16 or 32 minutes of tones and emergency messages, shall support programming options to string audio segments together to create up to 1000 messages, or to loop messages and parts of messages to repeat for pre-determined cycles or indefinitely.

C. Basic System Functional Operation

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The System Alarm LED shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. The minimum 80 to 960-character LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. Printing and history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

6. The audio portion of the system shall sound the proper audio signal (consisting of tone, voice, or tone and voice) to the appropriate zones

3.0 CODES AND STANDARDS

The publications listed below form a part of this specification. The publications are referenced in text by the basic designation only.

A. Underwriters Laboratories Inc. (UL) - USA:

No. 50	Cabinets and Boxes
No. 268	Smoke Detectors for Fire Protective Signaling Systems
No. 864	Control Units for Fire Protective Signaling Systems
No. 268A	Smoke Detectors for Duct Applications.
No. 521	Heat Detectors for Fire Protective
No. 228	Door Closers-Holders for Fire Protective Signaling Systems.
No. 464	Audible Signaling Appliances.
No. 38	Manually Actuated Signaling Boxes.
No. 346	Waterflow Indicators for Fire Protective Signaling Systems.
No. 1481	Power supplies for Fire Protective Signaling Systems.
No. 1076	Control Units for Burglar Alarm Proprietary Protective Signaling Systems.
No. 1971	Visual Notification Appliances.

NFPA CODE 70 (NEC)
NFPA 72 Fire Alarm Code
NFPA 101 Life Safety Code

B. National Building Code of India, 2005.
C. All requirements of the Authority Having Jurisdiction (AHJ).

3.1 APPROVALS

3.1.1 The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc /
FM Factory Mutual

3.1.2 The Fire Alarm Control Panel and all transponders shall meet the modular listing requirements of Underwriters Laboratories, Inc.

3.1.3 Each sub-assembly, including all printed circuits, shall include the appropriate UL modular label.

3.1.4 This includes all printed circuit board assemblies, power supplies, and enclosure parts. Systems that do not include modular labels may require return to the factory for system upgrades, and are not acceptable.

4.0 PRODUCT / MATERIAL SPECIFICATIONS

4.1 General

This section of the specification includes the furnishing, installation, and connection of a microprocessor controlled, analog addressable, intelligent fire alarm equipment required to form a complete coordinated system ready for operation.

It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciators, power supplies, and wiring as shown on the drawings and specified herein.

The panel shall further extend fire and fault outputs, and on line data of status of all compoenents, to the BMS for critical alarm monitoring, and it shall be possible to connect a interface card for open Protocol based (Commonly BACnet, Modbus or eqv.) output to enable a software level integration with the BMS System.

The Panel shall be with integral voice evacuation cum Fire Fighters telephone system to relay evacuation messages in case of a fire emergency.

Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Central Monitoring Stations (Fire Command Center Room) and designated personnel, and if required, in other buildings at the site via a multiplex communication network.

The system shall also support independent gas release circuits for activation of various Fire Suppression systems, as required.

The system shall include hardware, modules to facilitate cross zoning of specific sensors, abort release functions, time delay and inputs for pressure switch and 24V output for Output operations.

The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

The main panel is to be located in the BMS Room on the Lower Basement Floor. All the other panels shall be distributed throughout the building complex, and shall be of multiple loops to accommodate all the sensors and devices with the spare loop capacity of 20% on every loop.

All the sensors and devices are connected to floor panels and all output circuits are activated from the same.

The Hooters cum Strobes / Speaker Strobes (Refer layout plans) are located at strategic locations to ensure audible alarm and voice messages reach every corner of the floor.

The panel shall be capable to zone all the sensors and devices and shall be able to activate outputs against activation of zone.

Wherever Applicable, The sensors located in Server Room shall be programmed in 2 separate zones per room to facilitate cross zoning, time delay and output to Gas Release system Panel in these rooms.
The panels shall be supplied with UPS power 230V AC and shall have its in-built battery backup and battery charger for 24 hours of standby operation, and the system shall be able to function for 30 minutes in full Alarm Condition, even during a Power Failure.

4.2 Basic Performance:

- Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 6 (Class A) Signaling Line Circuits (SLC).

- Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.

- Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.

- On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

- Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

The System Alarm LED shall flash.

A local piezo electric signal in the control panel shall sound.

The LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

The audio portion of the system shall sound the proper signal (tone or voice) to the appropriate zones.

The fire alarm system shall detect all changes in status of monitored points and shall initiate appropriate acts to alert/evacuate occupants, provide event annunciation and activate auxiliary controls as specified herein.

The system shall accept process and evaluate the following types of input signals:

- Automatic Fire Detectors
- Manual Alarms
- Supervisory (Tamper) Condition
- Trouble

The system shall store a record of alarm, supervisory and trouble events in non-volatile history file. This file shall contain the most recent 1000 events, with time and date of each event. It shall be possible to select the number of events to be viewed in the history file by date, so the entire file does not have to be downloaded. The history file shall remain intact in the event of a loss of AC and battery power.

The system shall be capable of being expanded and field reprogrammed at any time up to the predetermined maximum capacity of the system, without the requirement to return the operating system to the factory for program changes. All field programming shall be done by an authorized manufacturer's representative.

Intelligent, Analog and Addressable input devices shall receive power and communication protocol signals over a single pair of wires per channel (SLC) from the control unit.

Each channel (SLC) shall support Minimum of 99 or 159 analog and / or addressable devices.

Channels shall be field programmable for NFPA 72(1993) Style 4 and 6 operations, with capability for Style 7 when used with approved loop isolation units.

Photoelectric, Laser and Thermal detectors shall be of the Intelligent, analog addressable type, and shall provide dual level alarm and pre-alarm reporting. Pre-alarm shall serve as early warning of an impending alarm condition, and shall generate a trouble condition in the panel.

Each detector head shall incorporate a microprocessor which provides for distributed system intelligence. The micro shall provide full monitoring and control of the device with memory for storage of pre-set sensitivity levels and other detection device parameters. For security purposes and system integrity no mechanical addressing switches shall be allowed for field devices. All setting of device parameter shall be done electronically.

System Power shall be adequate to accommodate all connected addressable and analog input devices in alarm simultaneously and shall be capable of operating all connected addressable output relays while all addressable inputs are in alarm. Prior to owner / contractor acceptance of installed system, manufacturer or his representative shall demonstrate 100% system alarm status with no loss of performance.

Activation of any manual alarm station or any other approved alarm initiating device (excluding Automatic Fire Detectors which will be described later) shall immediately result in the following:

Display the alarm condition on the LCD Displays of all the Peer-to-Peer networked Panels, Network Repeaters and Slave Repeaters, Touch Screen Displays.

Visual alarm signals shall be provided as indicated on the plans.

System shall shutdown/redirect all HVAC system fans, dampers, etc.; close fire doors, recall elevators, etc., in accordance with the schedule provided and with appropriate local/national code.

Operation of the system alarm silence switch shall silence all alarm audible connected to the system, with the exception of circuits programmed for the non-silence waterflow feature. When properly configured, a silence command shall not extinguish visual alarm appliances. Circuits containing alarm visual circuits shall not be silenceble except upon system reset.

The system alarm LED and all other associated alarm displays shall remain illuminated until the alarm condition has been corrected and the panel has been reset.

A connected system printer (if supplied) shall record all the status changes that take place within the fire protection system, including alarm / trouble restoration. All status changes shall be logged.

The activation of an Automatic Fire Detector shall provide for all operations.

Alarm Verification per device in accordance with NFPA 72 - 1993 and UL 864.

Positive Alarm Sequence in accordance with NFPA 72 -1993 and UL 864.

Analog-Addressable smoke detectors shall be equipped with a Day/Night Sensitivity Mode which may be selected by either manual or automatic input.

Because certain smoke detector environments change from day (occupied) to night (unoccupied), a more sensitive or Night setting may be desirable. Adjustable sensitivity smoke detector values shall be distinctly identified in the system memory and by display.

Supervisory conditions shall cause a distinct annunciation at the panel. The system printer shall record supervisory events in a manner consistent for all status changes.

The fire alarm panel shall fully supervise its operation. The physical opening or cutting of the wiring to any initiation, alarm indicating, signaling line, or associated supervisory monitoring circuit shall cause distinct annunciation via the LCD display.

Analogue signals from detectors shall be processed in such a way as to discriminate, as far as possible, between sources of fire and false alarms, and shall identify detectors that are becoming dirty. As a minimum, multi-state indications, i.e. normal, fire, fault and pre-alarm warning, shall be provided for each detector.

It shall be possible to interrogate detectors to determine their analogue values and display these on the alphanumeric display of each control panel. There shall be the facility to display an individual detector's value separately as well as values of all detectors together. It shall also be possible to set a value and display the addresses of all those detectors with values above that value.

The controlling software of the system shall be configured to group detectors and manual call points into zones.

Output signals, for example, to sounder circuits and interfaces, corresponding to individual device inputs and/or their related zones, shall be configurable in the controlling software of the system. They shall be freely assignable; i.e. each input shall be capable of being programmed to operate any, some, or all outputs.

It shall be possible to modify the configuration of zones and reconfigure the relationship between inputs and outputs. This shall be site programmable.

The system shall be immune to EMC-related interference. In particular, the Contractor shall take into account the use of VHF/UHF radio communication systems, mobile telephones, pagers and computers, and other electrical equipment used in the building.

The system shall be installed in accordance with the manufacturer's instructions. In particular, the Contractor shall take due note of, and shall comply with, the manufacturer's instructions on circuit design, minimum signal strengths, loadings and end-of-line terminations, where appropriate.

4.3 Wiring Arrangements

It shall be the responsibility of the Contractor to determine the number of loops and other circuits required for the system.

Where the system is distributed, the network linking the control panels shall be capable of being extended in the future to link to further compatible control panels. The capacity of the network shall be expandable by 25%.

4.4 Circuit Design

Each detection loop shall originate and terminate at the control and indicating equipment.

The number of loops required for the system shall be determined on the basis of device capacity, total loop length and the area of coverage of each loop. The maximum area coverage per loop shall not exceed 10,000m².

Each loop shall incorporate a minimum of 25% spare device capacity for possible future use. The spare capacity shall relate to manual call points, detectors, sounder and beacons (where relevant) and loop interfaces in any combination.

All wiring shall be monitored for faults.

Loop wiring shall tolerate a single open-circuit fault without affecting any device on the same loop. Loop wiring shall also tolerate multiple open-circuit or short-circuit faults in one area, without affecting the devices in any other area or on any other loop or circuit.

Removal of a device from a loop shall not cause any remaining devices in the system to become inoperative.

It shall be possible to disable detectors on the system. The controlling software shall permit individual detector disablement and detector group disablement. As a minimum, a group shall correspond with the detectors in a particular zone. Group detector disablement shall not render manual call points in the same area inoperative.

Short-circuit isolators shall be provided at the beginning and end of each loop. Also, a single short circuit or open-circuit fault on an automatic fire detector circuit shall neither disable protection within an area of more than 2,000m², nor on more than one floor of the building plus a maximum of five devices (automatic detection, manual call points, sounders or a combination of these) on the floor immediately above and five devices on the floor immediately below that floor.

Where the system is distributed, the network between control panels shall be configured as a loop and shall be capable of tolerating a single open- or short-circuit without loss of communication between panels. It shall be a 'peer to peer' network that is not wholly dependent on a single, centralized processor or panel. In the event of failure of the network, each control panel on the network shall be capable of operating in a 'stand-alone' mode and thus generating fire alarm warnings in response to activation of a device connected to it.

4.5 False Alarms

Great care shall be taken, at the design stage, to minimize the likelihood of false alarms occurring in the new or modified system.

Devices shall be of types appropriate to the local environment. For example, optical smoke detectors shall not be installed in areas where there is likely to be steam or dust present. Also, manual call points shall be fitted with transparent hinged covers where there is the possibility of accidental operation, e.g. in kitchens or service areas.

4.6 SYSTEM COMPONENTS

4.6.1 System Architecture

The system shall have a centralized structure. The locations of control and indicating equipment shall be

as shown on the Contract Drawings.

A centralized system has one set of control and indicating equipment in a single location in the building. (The control panel may also be connected to repeater or mimic panel(s) elsewhere in the building.) This means that all detection loop wiring, and separate sounders wiring (if appropriate) will emanate from the centrally located control and indicating equipment. Centralized systems are suitable where the lengths of loop and sounder cables do not become excessive because of the size of the building.

4.6.2 Main Components

All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the riser/connection diagram for all specific system installation/termination/wiring data.

All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

4.6.3 CABLING

All fire alarm system wiring must be as specified here in.

Wiring shall be in accordance with local, state and national codes (NBC of India, IS 2189, NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 1.5 Sq. mm for initiating device circuits and signaling line circuits, for notification appliance circuits.

The Cables used shall be annealed tinned copper conductor XLPE / Elastomeric Insulted insulated
Fire Survival multicore armoured cable (600/1000V) with Copper conductor having cross-linkable halogen free Ethylene Propylene Rubber (EPR) insulation and LSZH inner & outer sheath. Basic design as per BS 7846, IEC-502, IEC-61034. Fire performance tests as per BS 8491:2008 Cat.3 (120 mins) for above 20 mm overall dia & for below 20 mm overall dia as per BS 6387 C.W.Z. & BS EN 50200 PH-120 + Annex-E. BRE GLOBAL / LPCB certified.

4.6.4 FIRE ALARM CONTROL PANEL OR NETWORK NODE

The main FACP Central Console shall be a suitable to accommodate required number of devises having 1 Loop as spare for detectors & devices as well. It shall contain a microprocessor based Central Processing Unit (CPU).

The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, panel modules including initiating circuits, control circuits, and notification appliance circuits, local and remote operator terminals, printers, annunciators, and other system controlled devices.

In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:

- Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.

- Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
- Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.

- Visually and audibly annunciate any trouble, supervisory, security or alarm condition on operator's terminals, panel display, and annunciators.

When a fire alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

- The system alarm LED shall flash.

- A local piezo-electric audible device in the control panel shall sound a distinctive signal.

- The backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

- Printing and history storage equipment shall log and print the event information along with a time and date stamp.

- All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

When a trouble condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

The system trouble LED shall flash.

- A local piezo-electric audible device in the control panel shall sound a distinctive signal.

- The LCD display shall indicate all information associated with the trouble condition, including the type of trouble point and its location within the protected premises.

- Printing and history storage equipment shall log and print the event information along with a time and date stamp.

- All system outputs assigned via preprogrammed equations for a particular point in trouble shall be executed, and the associated system outputs (trouble notification appliances and/or relays) shall be activated.

When a supervisory condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

- The system trouble LED shall flash.

- A local piezo-electric audible device in the control panel shall sound a distinctive signal.

- The LCD display shall indicate all information associated with the supervisory condition, including the type of trouble point and its location within the protected premises.

- Printing and history storage equipment shall log and print the event information along with a time and date stamp.

- All system outputs assigned via preprogrammed equations for a particular point in trouble shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

When a security alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

- The system security LED shall flash.

- A local piezo-electric audible device in the control panel shall sound a distinctive signal.

- The backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

- Printing and history storage equipment shall log and print the event information along with a time and date stamp.

- All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

When a pre-alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

- The system pre-alarm LED shall flash.

- A local piezo-electric audible device in the control panel shall sound a distinctive signal.

- The backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

- Printing and history storage equipment shall log and print the event information along with a time and date stamp.

- All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

4.6.5 Operator Control

4.6.5.1 Acknowledge Switch:

a) Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition. In addition, the FACP shall support Block Acknowledge to allow multiple trouble conditions to be acknowledged with a single depression of this switch.

b) Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.

c) Signal Silence Switch:

Depression of the Signal Silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition. The selection of notification circuits and relays that are silence able by this switch shall be fully fielded programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

4.6.5.2 Drill Switch

Depression of the Drill switch shall activate all programmed notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

4.6.5.3 System Reset Switch

Depression of the System Reset switch shall cause all electronically latched initiating devices to return to their normal condition. Initiating devices shall re-report if active. Active notification appliance circuits shall not silence upon Reset. Systems that de-activate and subsequently re-activate notification appliance circuits shall not be considered equal. All programmed Control-By-Event equations shall be re-evaluated after the reset sequence is complete if the initiating condition has cleared. Non-latching trouble conditions shall not clear and re-report upon reset.

4.6.5.4 Lamp Test

The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal.

4.6.5.5 Scroll Display Keys

There shall be Scroll Display keys for FIRE ALARM, SECURITY, SUPERVISORY, TROUBLE, and OTHER EVENTS. Depression of the Scroll Display key shall display the next event in the selected queue allowing the operator to view events by type.

4.5.5.6 Print Screen

Depression of the PRINT SCREEN switch shall send the information currently displayed on the display to the printer.

System Capacity and General Operation

1) The control panel shall be capable of expansion via up to 10 SLC modules. Each module shall support a maximum of 318 analog/addressable devices for a maximum system capacity of 3180 points. The system shall be capable of 3072 annunciation points per system regardless of the number of addressable devices and shall support up to 96 panel circuits which may consist of either inputs or outputs.

2) The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit liquid crystal display, individual, color coded system status LEDs, and a QWERTY style alphanumeric keypad for the field programming and control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either the owner or installing company.

3) All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel.

4) The FACP shall be able to provide the following software and hardware features:

a) Pre-signal and Positive Alarm Sequence: The system shall provide means to cause alarm signals to only sound in specific areas with a delay of the alarm from 60 to up to 180 seconds after start of alarm processing. In addition, a Positive Alarm Sequence selection shall be available that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs shall automatically activate immediately.

b) Smoke Detector Pre-alarm Indication at Control Panel: To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real-time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel: alert and action.

c) Alert: It shall be possible to set individual smoke detectors for pre-programmed pre-alarm thresholds. If the individual threshold is reached, the pre-alarm condition shall be activated.

d) Action: If programmed for action, and the detector reaches a level exceeding the pre-programmed level, the control panel shall indicate an action condition. Sounder bases installed with either heat or smoke detectors shall automatically activate on action Pre-Alarm level, with general evacuation on alarm level.

e) The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.

f) Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.

g) NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the requirements of NFPA 72.

h) Programmable Trouble Reminder: The system shall provide means to automatically initiate a reminder that troubles exist in the system. The reminder will appear on the system display and (if enabled) will sound a piezo alarm.

i) On-line or Off-line programming: The system shall provide means to allow panel programming either through an off-line software utility program away from the panel or while connected and on-line. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop.

j) History Events: The panel shall maintain a history file of the last 4000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. The control panels shall also maintain a 1000 event Alarm History buffer, which consists of the 1000 most recent alarm events from the 4000 event history file.

k) Smoke Control Modes: The system shall provide means to perform FSCS mode Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.

l) The system shall provide means for all SLC devices on any SLC loop to be auto programmed into the system by specific address. The system shall recognize specific device type ID's and associate that ID with the corresponding address of the device.

m) Drill: The system shall support means to activate all silenceable fire output circuits in the event of a practice evacuation or “drill”. If enabled for local control, the front panel switch shall be held for a minimum of 2 seconds prior to activating the drill function

n) Passwords and Users: The system shall support two password levels, master and user. Up to 9 user passwords shall be available, each of which may be assigned access to the programming change menus, the alter status menus, or both. Only the master password shall allow access to password change screens.

o) Two Wire Detection: The system shall support standard two wire detection devices specifically all models of System Sensor devices, Fenwal PDS-7125/7126 and CPD-7021, Hochiki model SLK-24F/24FH, Edwards 6250B/6270B and 6264B and Simplex models 2098-9201/9202 and 9576.

p) Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions

q) Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.

r) Environmental Drift Control: The system shall provide means for setting Environmental Drift Compensation by device. When a detector accumulates dust in the chamber and reaches an unacceptable level but yet still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.

s) Custom Action Messages: The system shall provide means to enter up to 100 custom action messages of up to 160 characters each. It shall be possible to assign any of the 100 messages to any point.

t) Print Functions: The system shall provide means to obtain a variety of reports listing all event, alarm, trouble, supervisory, or security history. Additional reports shall be available for point activation for the last Walk Test performed, detector maintenance report containing the detector maintenance status of each installed addressable detector, all network parameters, all panel settings including broad cast time, event ordering, and block acknowledge, panel timer values for Auto Silence, Silence Inhibit, AC Fail Delay time and if enabled, Proprietary Reminder, and Remote Reminder timers, supervision settings for power supply and printers, all programmed logic equations, all custom action messages, all non-fire and output activations (if pre-programmed for logging) all active points filtered by alarms only, troubles only, supervisory alarms, pre alarms, disabled points and activated points, all installed points filtered by SLC points, panel circuits, logic zones, annunciators, releasing zones, spal zones, and trouble zones.

u) Local Mode: If communication is lost to the central processor the system shall provide added survivability through the intelligent loop control modules. Inputs from devices connected to the SLC and loop control modules shall activate outputs on the same loop when the inputs and outputs have been set with point programming to participate in local mode or when the type codes are of the same type: that is, an input with a fir alarm type code shall activate an output with a fire alarm type code.

v) Resound based on type for security or supervisory: The system shall indicate a Security alarm when a monitor module point programmed with a security Type Code activates. If silenced alarms exist, a Security alarm will resound the panel sounder. The system shall indicate a Supervisory alarm when a monitor module point programmed with a

supervisory Type Code activates. If there are silenced alarms, a Supervisory alarm will resound the panel sounder.

w) Read status preview - enabled and disabled points: Prior to re-enabling points, the system shall inform the user that a disabled device is in the alarm state. This shall provide notice that the device must be reset before the device is enabled thereby avoiding activation of the notification circuits.

x) Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen.

y) Multi-Detector and Cooperating Detectors: The system shall provide means to link one detector to up to two detectors at other addresses on the same loop in cooperative multi-detector sensing. There shall be no requirement for sequential addresses on the detectors and the alarm event shall be a result or product of all cooperating detectors chamber readings.

z) Tracking/Latching Duct (ion and photo): The system shall support both tracking and latching duct detectors either ion or photo types.

aa) ACTIVE EVENT: The system shall provide a Type ID called FIRE CONTROL for purposes of air-handling shutdown, which shall be intended to override normal operating automatic functions. Activation of a FIRE CONTROL point shall cause the control panel to (1) initiate the monitor module Control-by-Event, (2) send a message to the panel display, history buffer, installed printer and annunciators, (3) shall not light an indicator at the control panel, (4) Shall display ACTIVE on the LCD as well a display a FIRE CONTROL Type Code and other information specific to the device.

bb) NON-FIRE Alarm Module Reporting: A point with a type ID of NON-FIRE shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display a message at the panel LDC. Activation of a NON-FIRE point shall activate control by event logic but shall not cause any indication on the control panel.

cc) Security Monitor Points: The system shall provide means to monitor any point as a type security.

dd) One-Man Walk Test: The system shall provide both a basic and advanced walk test for testing the entire fire alarm system. The basic walk test shall allow a single operator to run audible tests on the panel. All logic equation automation shall be suspended during the test and while annunciators can be enabled for the test, all shall default to the disabled state. During an advanced walk test, field-supplied output point programming will react to input stimuli such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch the input. The advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device and wiring operation/verification.

ee) Control by Event Functions: CBE software functions shall provide means to program a variety of output responses based on various initiating events. The control panel shall operate CBE through lists of zones. A zone shall become listed when it is added to a point's zone map through point programming. Each input point such as detector, monitor module or panel circuit module shall support listing of up to 10 zones into its programmed zone map.

ff) Permitted zone types shall be general zone, releasing zone and special zone. Each output point (control module, panel circuit module) can support a list of up to 10 zones

including general zone, logic zone, releasing zone and trouble zone. It shall be possible for output points to be assigned to list general alarm. Non-Alarm or Supervisory points shall not activate the general alarm zone.

gg) 1000 General Zones: The system shall support up to 1000 general purpose software zones for linking inputs to outputs. When an input device activates, any general zone programmed into that device's zone map will be active and any output device that has an active general zone in its map will be active. It shall also be possible to use general zone as arguments in logic equations.

hh) 1000 Logic Equations: The system shall support up to 1000 logic equations for AND, OR, NOT, ONLY1, ANYX, XZONE or RANGE operators that allow conditional I/O linking. When any logic equation becomes true, all output points mapped to the logic zone shall activate.

ii) 10 trouble equations per device: The system shall provide support for up to 10 trouble equations for each device, which shall permit programming parameters to be altered, based on specific fault conditions. If the trouble equation becomes true, all output points mapped to the trouble zone shall activate.

jj) Control-By-Time: A time based logic function shall be available to delay an action for a specific period of time based upon a logic input with tracking feature. A latched version shall also be available. Another version of this shall permit activation on specific days of the week or year with ability to set and restore based on a 24 hour time schedule on any day of the week or year.

kk) Multiple agent releasing zones: The system shall support up to 10 releasing zones to protect against 10 independent hazards. Releasing zones shall provide up to three cross-zones with four abort options to satisfy any local jurisdiction requirements.

ll) Alarm Verification, by device, with timer and tally: The system shall provide a user-defined global software timer function that can be set for a specific detector or indicating panel module input. The timer function shall delay an alarm signal for a user-specified time period and the control panel shall ignore the alarm verification timer if another alarm is detected during the verification period. It shall also be possible to set a maximum verification count between 0 and 20 with the "0" setting producing no alarm verification. When the counter exceeds the threshold value entered, a trouble shall be generated to the panel.

Central Processing Unit

1) The Central Processing Unit shall communicate with, monitor, and control all other modules within the control panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the system display by the Central Processing Unit.

2) The Central Processing Unit shall contain and execute all control-by-event (including Boolean functions including but not limited to AND, OR, NOT, ANYx, and CROSSZONE) programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.

3) The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.

4) The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.

5) Consistent with UL864 standards, the CPU and associated equipment are to be protected so that voltage surges or line transients will not affect them.

6) Each peripheral device connected to the CPU shall be continuously scanned for proper operation. Data transmissions between the CPU and peripheral devices shall be reliable and error free. The transmission scheme used shall employ dual transmission or other equivalent error checking techniques.

7) The CPU shall provide an EIA-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.

8) The CPU shall provide two EIA-485 ports for the serial connection to annunciation and control subsystem components.

9) The EIA-232 serial output circuit shall be optically isolated to assure protection from earth ground.

10) The CPU shall provide one high-speed serial connection for support of network communication modules.

11) The CPU shall provide double pole relays for FIRE ALARM, SYSTEM TROUBLE, SUPERVISORY, and SECURITY. The SUPERVISORY and SECURITY relays shall provide selection for additional FIRE ALARM contacts.

Display

1) The system display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

2) The display assembly shall contain, and display as required, custom alphanumeric labels for all intelligent detectors, addressable modules, and software zones.

3) The system display shall provide a backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide ten Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, and CPU FAILURE.

4) The system display shall provide a QWERTY style keypad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels with up to ten (one Master and nine User) passwords shall be accessible through the display interface assembly to prevent unauthorized system control or programming.

5) The system display shall include the following operator control switches: ACKNOWLEDGE, SIGNAL SILENCE, RESET, DRILL, and LAMP TEST. Additionally, the display interface shall allow scrolling of events by event type including, FIRE ALARM, SECURITY, SUPERVISORY, TROUBLE, and OTHER EVENTS. A PRINT SCREEN button shall be provided for printing the event currently displayed on the 2 X 40-character LCD.

Loop (Signaling Line Circuit) Control Module

1) The Loop Control Module shall monitor and control a minimum of 198 or maximum 318 intelligent addressable devices. This includes 99 or 159 intelligent detectors (Ionization, Photoelectric, or Thermal) and 99 or 159 monitor or control modules.

2) The Loop Control Module shall contain its own microprocessor and shall be capable of operating in a local/degrade mode (any addressable device input shall be capable of activating any or all addressable device outputs) in the unlikely event of a failure in the main CPU.

3) The Loop Control Module shall provide power and communicate with all intelligent addressable detectors and modules on a single pair of wires. This SLC Loop shall be capable of operating as a NFPA Style 6 (Class B) circuit.

4) The SLC interface board shall be able to drive an NFPA Style 6 twisted shielded circuit up to 12,500 feet in length. The SLC Interface shall also be capable of driving an NFPA Style 6, no twist, no shield circuit up to 3,000 feet in length. In addition, SLC wiring shall meet the listing requirements for it to exit the building or structure. "T"-tapping shall be allowed in either case.

5) The SLC interface board shall receive analog or digital information from all intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular device. Each SLC Loop shall be isolated and equipped to annunciate an Earth Fault condition. The SLC interface board software shall include software to automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information may also be used for automatic detector testing and the automatic determination of detector maintenance requirements.

Enclosures

1) The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

2) The back box and door shall be constructed of 0.060 steel with provisions for electrical cables connections into the sides and top.

3) The door shall provide a key lock and include a transparent opening for viewing all indicators. For convenience, the door shall have the ability to be hinged on either the right or left-hand side.

4) The control unit shall be modular in structure for ease of installation, maintenance, and future expansion.

Digital Voice Command Center

1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.

2. Function: The Voice Command Center equipment shall perform the following functions:

    a. Operate as a supervised multi-channel emergency voice communication system.
    b. Operate as a two-way emergency telephone system control center.
    c. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.
    d. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.

e. Provide all-call Emergency Paging activities through activation of a single control switch.
f. As required, provide vectored paging control to specific audio zones via dedicated control switches.
g. Provide a factory recorded "library" of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.
h. Provide a software utility capable of off-line programming for the VCC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the VCC shall not inhibit the emergency operation of other nodes on the fire alarm network.
i. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 fire-listed analog audio amplifiers and SCL controlled switching.
j. The Digital Voice Command shall be modular in construction, and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.
k. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.

Power Supply:

1. The Addressable Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.
2. The Addressable Main Power Supply shall provide the required power to the CPU using a switching 24 VDC regulator and shall incorporate a battery charger for 24 hours of standby power using dual-rate charging techniques for fast battery recharge.
3. The Addressable Main Power Supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge. The supply shall be capable of charging batteries ranging in capacity from 25-200 amp-hours within a 48-hour period.
4. The Addressable Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
5. The Addressable Main Power Supply shall be power-limited per UL864 requirements.

Auxiliary Field Power Supply - Addressable

1. The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24VDC power. The power supply shall also include and charge backup batteries.
2. The addressable power supply for the fire alarm system shall provide up a minimum of 6.0 amps of 24 volt DC regulated power for Notification Appliance Circuit (NAC) power or 5 amps of 24 volt DC general power. The power supply shall have an additional .5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply. It shall include an integral charger designed to charge 7.0 - 25.0 amp hour batteries.
3. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as two Class "A" and two Class "B" or four Class "B" only circuits. All circuits shall be power-limited per UL 864 requirements.
4. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.

5. The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.
6. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire. Data on the SLC shall be transmitted between 24 VDC, 5 VDC and 0 VDC at approximately 3.33k baud.
7. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.
8. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of eight or sixteen hours shall be Dip-switch selected.
9. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be Dip-switch selectable.
10. The addressable power supply mounts in either the FACP backbox or it's own dedicated surface mounted backbox with cover.
11. Each of the power supply's four output circuits shall be DIP-switch selected for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.
12. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor. When the power supply's output circuit is selected as General 24VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
13. When selected for Notification Appliance Circuits, the output circuits shall be individually DIP-switch selectable for Steady, March Time, Dual Stage or Temporal.
14. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.
15. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.
16. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

Field Charging Power Supply (FCPS)

The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.

1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.
2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
3. The FCPS shall include an attractive surface mount backbox.
4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.
5. The FCPS include power limited circuitry, per 1995 UL standards.

System Circuit Supervision

1. The FACP shall supervise all circuits to intelligent devices, transponders, annunciators and peripheral equipment and annunciate loss of communication with these devices. The CPU

shall continuously scan above devices for proper system operation and upon loss of response from a device shall sound an audible trouble, indicate which device or devices are not responding and print the information in the history buffer and on the printer.

2. Transponders that lose communication with the CPU shall sound an audible trouble and light an LED indicating loss of communications.
3. Sprinkler system valves, standpipe control valves, PIV, and main gate valves shall be supervised for off-normal position.
4. All speaker and emergency phone circuits shall be supervised for opens and shorts. Each transponder speaker and emergency phone circuit shall have an individual ON/OFF indication (green LED).

Field Wiring Terminal Blocks

1. All wiring terminal blocks shall be the plug-in/removable type and shall be capable of terminating up to 12 AWG wire. Terminal blocks that are permanently fixed to the PC board are not acceptable

Audio Amplifiers

1. The Audio Amplifiers will provide Audio Power (@25 Volts RMS) for distribution to speaker circuits.
2. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).
3. The audio amplifier shall include an integral power supply, and shall provide built-in LED indicators for the following conditions:

    - Earth Fault on DAP A (Digital Audio Port A)
    - Earth Fault on DAP B (Digital Audio Port B)
    - Audio Amplifier Failure Detected Trouble
    - Active Alarm Bus input
    - Audio Detected on Aux Input A
    - Audio Detected on Aux Input B
    - Audio Detected on Firefighter's Telephone Riser
    - Receiving Audio from digital audio riser
    - Short circuit on speaker circuit 1
    - Short circuit on speaker circuit 2
    - Short circuit on speaker circuit 3
    - Short circuit on speaker circuit 4
    - Data Transmitted on DAP A
    - Data Received on DAP A
    - Data Transmitted on DAP B
    - Data Received on DAP B
    - Board failure
    - Active fiber optic media connection on port A (fiber optic media applications)
    - Active fiber optic media connection on port B (fiber optic media applications)
    - Power supply Earth Fault
    - Power supply 5V present
    - Power supply conditions - Brownout, High Battery, Low Battery, Charger Trouble

    The audio amplifier shall provide the following built-in controls:

    - Amplifier Address Selection Switches
    - Signal Silence of communication loss annunciation Reset
    - Level adjustment for background music
    - Enable/Disable for Earth Fault detection on DAP A
    - Enable/Disable for Earth Fault detection on DAP A

- Switch for 2-wire/4-wire FFT riser

5. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.
6. Includes audio input and amplified output supervision, back up input, and automatic switch over function, (if primary amplifier should fail).
7. System shall be capable of backing up digital amplifiers.

Audio Message Generator (Prerecorded Voice)/Speaker Control:

1. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.
2. Actuation of any alarm initiating device shall cause a prerecorded message to sound over the speakers. The message shall be repeated four (4) times. Pre- and post-message tones shall be supported.
3. A built-in microphone shall be provided to allow paging through speaker circuits.
4. System paging from emergency telephone circuits shall be supported.
5. The audio message generator shall have the following indicators and controls to allow for proper operator understanding and control:

   LED Indicators:
   - Lamp Test
   - Trouble
   - Off-Line Trouble
   - Microphone Trouble
   - Phone Trouble
   - Busy/Wait
   - Page Inhibited
   - Pre/Post Announcement Tone

Controls with associated LED Indicators:

1. Speaker Switches/Indicators

   a. The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.
   b. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.

2. Emergency Two-Way Telephone Control Switches/Indicators

   a. The emergency telephone circuit control panel shall include visual indication of active and trouble status for each telephone circuit in the system.
   b. The telephone circuit control panel shall include switches to manually activate or deactivate each telephone circuit in the system.

Remote Transmissions:

1. Provide local energy or polarity reversal or trip circuits as required.
2. The system shall be capable of operating a polarity reversal or local energy or fire alarm transmitter for automatically transmitting fire information to the fire department.
3. Provide capability and equipment for transmission of zone alarm and trouble signals to remote operator's terminals, system printers and annunciators.
4. Transmitters shall be compatible with the systems and equipment they are connected to

such as timing, operation and other required features.

System Expansion

Design the main FACP and transponders so that the system can be expanded in the future (to include the addition of twenty percent more circuits or zones) without disruption or replacement of the existing control panel. This shall include hardware capacity, software capacity and cabinet space.

Field Programming

1) The system shall be programmable, configurable and expandable in the field without the need for special tools, laptop computers, or other electronic interface equipment. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.

2) It shall be possible to program through the standard FACP keyboard all system functions.

3) All field defined programs shall be stored in non-volatile memory.

4) Two levels of password protection shall be provided in addition to a key-lock cabinet. One level shall be used for status level changes such as point/zone disable or manual on/off commands (Building Manager). A second (higher-level) shall be used for actual change of the life safety program (installer). These passwords shall be five (5) digits at a minimum. Upon entry of an invalid password for the third time within a one minute time period an encrypted number shall be displayed. This number can be used as a reference for determining a forgotten password.

5) The system programming shall be "backed" up on a 3.5" floppy diskette utilizing an upload/download program. This system back-up disk shall be completed and given in duplicate to the building owner and/or operator upon completion of the final inspection. The program that performs this function shall be "non-proprietary", in that, it shall be possible to forward it to the building owner/operator upon his or her request.

The installer's field programming and hardware shall be functionally tested on a computer against known parameters/norms which are established by the FACP manufacturer. A software program shall test Input-to-Output correlations, device Type ID associations, point associations, time equations, etc. This test shall be performed on an IBM-compatible PC with a verification software package. A report shall be generated of the test results and two copies turned in to the engineer(s) on record.

Specific System Operations

1) Smoke Detector Sensitivity Adjust: Means shall be provided for adjusting the sensitivity of any or all analog intelligent smoke detectors in the system from the system keypad or from the keyboard of the video terminal. Sensitivity range shall be within the allowed UL window.

2) Alarm Verification: Each of the Intelligent Addressable Smoke Detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification function shall be programmable from 5 to 50 seconds and each detector shall be able to be selected for verification during the field programming of the system or anytime after system turn-on. Alarm verification shall not require any additional hardware to be added to the control panel. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

3) System Point Operations -
Any addressable device in the system shall have the capability to be enabled or disabled through the system keypad or video terminal.

4) System output points shall be capable of being turned on or off from the system keypad or the video terminal.

5) Point Read: The system shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point shall be annunciated for the parameters listed:

. Device Status.
Device Type.
Custom Device Label.
Software Zone Label.
Device Zone Assignments.
Analog Detector Sensitivity.
. All Program Parameters.

System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system statuses:

System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 4000 system events. Each of these events will be stored, with time and date stamp, until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed; one event at a time, and the actual number of activations may also be displayed and or printed. History events shall include all alarms, troubles, operator actions, and programming entries.

The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.

Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time.

If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system will enter the trouble mode, and the particular Intelligent Detector will be annunciated on the system display, and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

The system shall include the ability (programmable) to indicate a "pre-alarm" condition. This will be used to alert maintenance personal when a detector is at 80% of its alarm threshold in a 60 second period.

Addressable Devices

1) Addressable devices shall provide an address-setting means using rotary decimal switches / Soft Programming.
2) Addressable devices shall use simple to install and maintain decade (numbered 0 to 9) type address switches.
3) Detectors shall be Analog and Addressable, and shall connect to the fire alarm control panel's Signaling Line Circuits.
4) Addressable smoke and thermal detectors shall provide dual (2)status LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the flashing mode operation of the detector LEDs can be programmed off via the fire control panel program.
5) The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity can be automatically adjusted by the panel on a time-of-day basis.

6) Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7) The detectors shall be ceiling-mount and shall include a separate twist-lock base which includes a tamper proof feature.

The following bases and auxiliary functions shall be available :

Sounder base rated at 85 DBA minimum.

FORM-C Relay base rated 30VDC, 2.0A

Isolator base

The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

Addressable Pull Box (manual station)

1) Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2) All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3) Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

Intelligent Photoelectric Smoke Detector

The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
The detector **SHALL NOT** respond to refrigerant gas.

Intelligent Self Acclimatising Multi Sensor Detector

The intelligent multi sensor detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine it's environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.

The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).

The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal

sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

The detector **SHALL NOT** respond to refrigerant gas.

Intelligent Thermal Detectors

Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

Intelligent Duct Smoke Detector

1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

Addressable Dry Contact Monitor Module

1) Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.

2) The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.

3) The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

4) For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

Addressable Control Module

1) Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

2) The control module shall mount in a standard 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box, or to a surface mounted back box.

3) The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

4) Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised, UL listed remote power supply.

5) The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

Isolator Module

Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.

If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.

The isolator module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.

The isolator module shall mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

LCD Alphanumeric Display Annunciator:

The alphanumeric display annunciator shall be a supervised, back-lit LCD display containing a minimum of 960 characters for alarm annunciation in clear English text.

The LCD annunciator shall display all alarm and trouble conditions in the system.

Up to 32 LCD annunciators may be connected to an EIA 485 interface. LCD annunciators shall not reduce the annunciation or point capacity of the system. Each LCD shall include vital system wide functions such as, System Acknowledge, Silence and Reset.

LCD display annunciators shall mimic the main control panel displays and shall not require special programming.

The LCD annunciator shall have switches which may be programmed for System control such as, Global Acknowledge, Global Signal Silence and Global System Reset. These switch inputs shall be capable of being disabled permanently or by a key lockout function on the front plate.

Serially Connected Annunciator Requirements

1. The annunciator shall communicate to the fire alarm control panel via an EIA 485 (multi-drop) two-wire communications loop. The system shall support two 6,000 ft. EIA-485 wire runs. Up to 32 annunciators, each configured up to 96 points, may be connected to the connection, for a system capacity of 3,072 points of annunciation.
2. An EIA-485 repeater shall be available to extend the EIA-485 wire distance in 3,000 ft. increments. An optional version shall allow the EIA-485 circuit to be transmitted over Fiber optics. The repeater shall be UL864 approved.
3. Each annunciator shall provide up to 96 alarm and 97 trouble indications using a long-life programmable color LED's. Up to 96 control switches shall also be available for the control of Fire Alarm Control Panel functions. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge and lamp test switch, and custom zone/function identification labels.

4. The annunciator may be field configured to operate as a "Fan Control Annunciator". When configured as "Fan Control," the annunciator may be used to manually control fan or damper operation and can be set to override automatic commands to all fans/dampers programmed to the annunciator.
5. Annunciator switches may be programmed for System control such as, Global Acknowledge, Global Signal Silence, Global System Reset, and on/off control of any control point in the system.
6. An optional module shall be available to utilize annunciator points to drive EIA-485 driven relays. This shall extend the system point capacity by 3,072 remote contacts.
7. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above

Battery

1) Shall be 12 volt, Lead Acid Maintenance free type.

2) Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 30 minutes of alarm upon a normal AC power failure.

3) The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

Battery Charger

1) Shall be completely automatic, with constant potential charger maintaining the battery fully charged under all service conditions. Charger shall operate from a 240-volt 50/60 hertz source.

2) Shall be rated for fully charging a completely discharged battery within 48 hours while simultaneously supplying any loads connected to the battery.

3) Shall have protection to prevent discharge through the charger.

4) Shall have protection for overloads and short circuits on both AC and DC sides.

Speakers:

1. All speakers shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.
2. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3m).
3. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
4. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

Audible/Visual Combination Devices:

1. Shall meet the applicable requirements of Section A listed above for audibility.
2. Shall meet the requirements of Section B listed above for visibility.

Programmable Electronic Sounders:

1. Electronic sounders shall operate on 24 VDC nominal.
2. Electronic sounders shall be field programmable without the use of special tools, at a sound level of at least 90 dBA measured at 10 feet from the device.
3. Shall be flush or surface mounted as shown on plans.

Strobe lights :-

shall meet the requirements of the ADA, UL Standard 1971, be fully synchronized, and shall meet the following criteria:

1. The maximum pulse duration shall be 2/10 of one second
2. Strobe intensity shall meet the requirements of UL 1971.
3. The flash rate shall meet the requirements of UL 1971.

Alphanumeric LCD Type Annunciator:

1. The alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of 160 characters for alarm annunciation in clear English text.
2. The LCD annunciator shall display all alarm and trouble conditions in the system.
3. An audible indication of alarm shall be integral to the alphanumeric display.
4. The display shall be UL listed for fire alarm application.
5. It shall be possible to connect up to 32 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel.
6. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire loop connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.
7. The system shall allow a minimum of 32 terminal mode LCD annunciators. Up to 10 LCD annunciators shall be capable of the following system functions: Acknowledge, Signal Silence and Reset, which shall be protected from unauthorized use by a keyswitch or password.
8. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

Fixed Emergency Telephone Handset

1. The telephone cabinet shall be painted red and clearly labeled as "Emergency Telephone." The cabinets shall be located where shown on drawings.
2. The handset cradle shall have a switch connection so that lifting the handset off of the cradle shall send a signal to the fire command center, which shall audibly and visually indicate its on-line (off-hook) condition.
3. On activating the remote phone, the phone earpiece shall sound a telephone ring signal until the master handset is lifted.
4. The two-way emergency telephone system shall support a minimum of seven (7) handsets on line without degradation of the signal.

Interactive Touch Screen Display :

This specification includes the furnishing, installation, connection, and testing of an interactive firefighters' display; including Underwriters Laboratories (UL) listed application software and hardware complete and ready for operation.

The basic system shall be Underwriters Laboratories (UL) listed for :No. 864 Control Units or Fire Protective Signaling Systems (Ancillary listing)

An interactive firefighters' display shall be installed in accordance to the project specifications and drawings. The interactive firefighters' display system shall include, but not be limited to, a touch screen interface, network communications media, power supplies, and wire / fiber optic media as shown on the drawings and specified herein.

The interactive firefighters' display shall support fire alarm, supervisory, and security events from the fire alarm control panel(s). The interface shall display building floor plans with respective active fire alarm

devices, water supplies, evacuation routes, access routes, gas, power and HVAC shutoffs, chemical hazards, and structural hazards in the building.

The system shall include an easy one-touch method of viewing building, emergency contacts, the facility site plan, and active event information.

A supervised interface to fire alarm control panels and network shall be made available. The system shall be electrically supervised and monitor the integrity of all conductors.

Fire Fighter's Display : Performance requirements

A. The network will interface and report the individually monitored system's alarm status via a user-friendly Graphical User Interface (GUI) based software.

B. The software shall operate under Microsoft® Windows® XP Embedded platform as manufactured by Microsoft Corporation.

C. The GUI based software must be capable of graphically representing the facility being monitored with floor plans and icons depicting the actual locations of the fire alarm device locations.

D. The software shall use a 1280 pixel x 1024 pixel GUI display capable of showing a large primary floor plan display, a site plan representative of an aerial view of the facility, the first active fire alarm on the system.

E. The software shall permit automatic navigation to the screen containing an icon that represents the first fire alarm device in alarm in the event of an off-normal condition.

F. The fire alarm device icon shall be visible only when it is in an alarm (or active) condition.

G. The software shall display the activated smoke detectors in a time sequence to track smoke progression.

H. The software shall allow the importation of externally developed floor plans in Windows Metafile (WMF), JPEG (JPG), Graphics Interchange Format (GIF) and Bitmap (BMP) format.

I. The software shall provide a intuitive and easy way to navigate to different screens representing floors and areas within a facility.

J. The system shall provide for continuous monitoring of all fire alarm conditions regardless of the current activity displayed on the screen.

K. The software shall display "YOU ARE HERE" along with icons representing standard building objects (stairs, elevators, etc) to be shown on the floor plan.

L. The software shall allow icons that represent hazardous materials stored in a facility.

M. The software shall provide a screen that displays preprogrammed building contact information.

N. The software shall provide a screen the displays building occupancy and other general building information.

O. The software shall allow a site plan to be imported that shows an aerial view of the facility.

P. The software shall display all active fire, supervisory, and security events within an event list.

Q. The system shall operate on an UL listed Embedded platform operating at no less than 700 MHz on the Microsoft® Windows® XP Embedded platform.

R. The Embedded platform shall have: no less than 256 megabytes of RAM, a flash drive with no less than 1 Gigabytes of storage space, 100 Base-T Ethernet NIC card, and USB ports.

S. The Embedded platform shall have a minimum 19" touchscreen display.

T. The Embedded platform shall come equipped with all necessary gateway modules to allow connection to the network it monitors as standard equipment.

U. A UL listed Ethernet Hub shall be provided for connection of multiple interactive displays and/or gateways.

MONITORING NETWORK

A. The monitoring network shall consist of a network based on proven ARCNET® technology.

B. The network shall have the ability to use fiber optic cable (single-mode and multi-mode), wire (twisted pair copper media in a style 4 or style 7 configuration), or combination wire/fiber communications with support of up to 103 nodes.

1. Wire networks shall support 12 AWG, 1 Pair Shielded to 24 AWG, 4 Pair Unshielded following the manufacturer's guidelines.
2. Fiber optic networks shall support 62.5/125µm cable 8dB limit (50/125µm cable 4.2dB limit)
3. Wire to fiber conversions using repeaters

C. High-speed data communications (312,500 BPS).

D. True peer-to-peer communications between fire alarm control panels.

PC Based Graphical Station for Central Monitoring :-

This specification includes the furnishing, installation, connection, and testing of a PC based graphical facilities monitoring system; including Underwriters Laboratories (UL) listed application software and hardware complete and ready for operation.

The basic system shall be Underwriters Laboratories (UL) listed for Standard 864 Control Units for Fire Protective Signaling Systems (9th edition)

The system shall comply with requirements of NFPA Standard No. 72 for Proprietary signaling System Receiving Unit except as modified and supplemented by this specification.

The PC based graphical facilities monitoring system shall be installed in accordance to the project specifications and drawings.

The PC based graphical facilities monitoring system shall include, but not be limited to, one or more PC based graphical workstations, all input/output devices, network communications media, control equipment, auxiliary control devices, power supplies, and wire / fiber optic media as shown on the drawings and specified herein.

A supervised interface to fire alarm control panels and networks shall be made available.The system shall include an interface to digital alarm communicator receivers for wide area network monitoring.

The system shall allow a mixture of different technologies and manufacturers' equipment to operate on the same network and provide the operator with a consistent look and operation for all monitored equipment.

The system shall support a variety of topologies and media and shall provide an industry standard open

architecture transport layer protocol.

Using standard RS 232 ports on existing and future monitoring and control systems used by the facility, the system shall connect to and interpret status change data transmitted from the ports and provide graphic annunciation, control, history logging and reporting as specified herein.

The system shall be electrically supervised and monitor the integrity of all conductors.

Graphical Workstation Performance Requirements

A. The network will interface and report the individually monitored system's status via a user-friendly Graphical User Interface (GUI) based software workstation.

B. The software shall operate under Microsoft® Windows® XP Professional as manufactured by Microsoft Corporation.

C. The GUI based software must be capable of graphically representing each facility being monitored with floor plans and icons depicting the actual locations of the various systems; and / or sensors' locations.

D. The software shall use a 1024 X 768 GUI display capable of showing a large primary floor plan display, a key map representative of a larger view of the primary display and its relationship to the facility being monitored, the current operator, number of fire, supervisory, pre-alarms, troubles, and security events within the network as well as outstanding events and acknowledged events.

E. The workstation shall have the ability to support graphic printing of all data including graphical floor plans, system activity, history, and guidance text. A Windows compatible printer shall be supported for the graphics and report printer options.

F. The workstation software shall permit automatic navigation to the screen containing an icon that represents the system or sensor in the event of an off-normal condition.

G. The system/sensor icon shall indicate the type of off-normal condition and shall flash and change to the color associated with the off-normal condition (e.g., RED for ALARM and YELLOW for TROUBLE).

H. The software shall allow the attachment of text (TXT) files, sound (WAV) files, image (BMP) files and video (AVI) files to each system or sensor icon allowing additional information to be provided to the system operator for responding to the off-normal condition.

I. The software shall allow the importation of externally developed floor plans in Windows Metafile (WMF), JPEG (JPG), Graphics Interchange Format (GIF) and Bitmap (BMP) format.

J. The software shall provide auto-navigation to the screen containing the icon of any system or sensor when an event is initially annunciated. In addition, operator navigation to screens containing outstanding events shall be accomplished by "clicking on" the event from either the acknowledged or unacknowledged event.

K. History Manager. The software shall contain a History Manager, which shall record all system events with a time and date stamp as well as the current system operator's name.

1. The system shall provide for the ability to store all off-normal events experienced by the various sub-systems that are monitored by the system.
2. All events shall be recorded with a time and date stamp and the system operator shall be provided with the ability to log a pre-defined response or a custom comment for each off-

normal event and have that comment stored in the history file with the time, date and operator name.

3. Provide for the ability to conduct searches and generate subsequent reports, based on all events for a single system / device address, a specific node, a specific type of off-normal condition and date range (mm/dd/yy to mm/dd/yy) or combinations of these search parameters. The number of entries in the history file that match the determined search criteria will be displayed.
4. The History Manager shall signal a need to back-up the history file at 100,000 events and then remind the operator at intervals of 100 events thereafter.
5. It shall be possible to pre-select data fields for reporting and then saving the report as a template with a file name. It shall also be possible to schedule the pre-defined report to print at a designated time.

L. Alarm Monitoring. The system shall provide for continuous monitoring of all off-normal conditions regardless of the current activity displayed on the screen.

1. If an operator is viewing the history of a sub-system and an alarm condition should occur, the system shall automatically navigate to the graphic screen showing the area where the off-normal event is occurring.
2. The system shall prioritize all off-normal events as defined by Underwriter's Laboratories into the following categories: fire alarms, troubles, supervisory alarms, pre-alarms and security alarms.
3. The system shall display a running count of all events by type in an alarm event counter window. The event counter window shall include five counters, defaulted to Alarm, Trouble, Security, and Supervisory events.
4. The system shall show a running list of all unacknowledged events and acknowledged events and allow the system operator to acknowledge an event by "double-clicking" on that event in the Unacknowledged Events box. The Unacknowledged and Acknowledged Events boxes shall contain an abbreviated description of the off-normal condition.
5. The details of the condition may be viewed by selecting event in the unacknowledged events box.
6. The system shall allow the attachment of user-definable text files, image files and sound files, to each device / system monitored in order to facilitate the operators and response personnel's response to the off-normal condition.
7. The system shall record all events to the system's hard drive. A minimum of 100,000 events may be stored.

M. Reports & Logs:

1. The system shall provide for the ability to generate reports based on system history.
2. The system shall allow the system operator to enter custom comments up to 255 characters for each event and have those comments recorded in the system's history file.

N. Boolean Logic

1. An automated event response application shall be provided to automatically perform actions across the entire system based on network activity.
2. The event response application shall allow event responses (actions) based on predefined user conditions using simplified Boolean logic.
3. Actions shall be configured to be executed immediately or timed as required.

O. Control Aspects of System Software

1. The system shall provide for the direct control of all outputs associated with Input / Output dry contact relay points on Network Input/Output Nodes In addition, the system shall have the ability to control and program a sub-system through a terminal mode window (ASCII

terminal type connection) interface to microprocessor-based sub-systems via an RS 232 serial Network Input/Output Nodes if available as an ancillary feature.

2. The system shall have the ability to monitor and control multiple control panels.
3. Discrete I/O Network Input/Output Nodes interfaces allow the system operator to initiate a change of state for the associated dry contacts.
4. A scheduling utility shall be included with the workstation to configure the I/O points on these Network Input/Output Nodes for automated activate/deactivate, and Arm/Disarm (depending on device type) status.
5. The workstation shall provide configuration utilities for monitoring and control profiles. These profiles shall be user definable for distribution of monitoring and control allowances for operators per workstation.
6. Terminal mode interfaces using serial Network Input/Output Nodes (if available for the specific system) shall be available to allow full programming and control of the system being monitored and shall provide the operator with the ability to take advantage of all features supported by a CRT attached to the associated individual sub-system.
7. Under no condition shall any sub-system be required to rely on the network for any data processing required to perform its particular function. Each individual sub-system shall be in effect "stand-alone" as to insure it's continued operation should a disruption in communication with the system be experienced.

P. The software shall be password protected and provide for the definition of security profiles for operator access control.

Q. The software shall contain provision for defining monitoring profiles of pre-selected Network Input/Output Nodes for monitoring. This shall include provision for status types within the selected NODES.

R. The software shall contain provision for defining control profiles of pre-selected Network Input/Output Nodes for control.

1. The system administrator shall be provided means to select which signals can be controlled by selected Workstation.

S. The software shall support live voice paging for mass notification to evacuation system over Internet Protocol (IP).

Workstation for the PC Graphical Station :

A. The system shall be a Facilities Monitoring System.

B. The system shall operate on an IBM compatible UL listed Intel Pentium III processor operating at no less than 800 MHz on the Microsoft® Windows® XP Professional platform.

C. The workstation shall have: no less than 256 megabytes of RAM, a hard drive with no less than 20 Gigabytes of storage space, a minimum of 8 megabytes of video RAM, a CD-R/W for system backup, internal supervisory CPU watchdog board with audible annunciator, 100 Base-T Ethernet NIC card, a 104 key keyboard, and a mouse type pointing device.

D. The workstation shall come equipped with all necessary gateway modules to allow connection to the network it monitors as standard equipment. All workstations shall support Ethernet communications when multiple workstations are required.

E. The workstation shall support an SVGA monitor and be supplied with a 17" flat screen LCD monitor.

F. The computer shall be capable of networking to additional computers and these computers shall

be capable of operating as workstations and/or gateways for local area or wide area networks.

G. Alarm annunciation shall appear on all workstations and may be silenced at each local workstation.

1. Only one workstation and operator shall be in command of the system for global alarm acknowledgement at any time.

Printer Support:

A. Support one or more Windows® compatible printers to be located and connected each workstation for graphics and report printing.

B. Support one model PRN-5 (or PRN-6), 80-column dot matrix tractor feed industrial grade printer for event and date-stamped printouts of off-normal events and status changes per workstation.

MONITORING NETWORK

A. The monitoring network shall consist of a network based on proven ARCNET® technology.

B. The network shall have the ability to use fiber optic cable (single-mode and multi-mode), wire (twisted pair copper media in a style 4 or style 7 configuration), or combination wire/fiber communications with support of up to 103 nodes.

1. Wire networks shall support 12 AWG, 1 Pair Shielded to 24 AWG, 4 Pair Unshielded following the manufacturer's guidelines.
2. Fiber optic networks shall support 62.5/125µm cable 8dB limit (50/125µm cable 4.2dB limit).
3. Wire to fiber conversions using repeaters.

C. High-speed data communications (312,500 BPS)

D. True peer-to-peer communications.

INTEGRATION NETWORK

A. The integration network shall be capable of monitoring a minimum of 100 nodes (Network Input/Output Nodes and routers) on an integration gateway consisting of, but not limited to:

1. Intelligent or conventional fire alarm control panels.
2. Competitor's intelligent or conventional fire alarm control panels.

B. Up to 99 gateways shall be connected via Ethernet for a total local area combination of up to 12672 (99x128) nodes.

C. Local area networks shall consist of a free topology network using twisted pair copper media in a bus, star, T-tap, or ring style 7 configurations at 78 Kilo baud.
Transmit/receive twin fiber (multi-mode 62.5/125 µm) strand FT-10 point-to-point topology and bi-directional FO-10 networks shall also be available. Wide area networks shall be supported by the use of network expansion routers.

1. Free topology (FT-10 style) wire network run allows multiple T-taps within a 1,500-foot (457.2 m) radius; 8,000 foot (2438.4 m) point-to-point using twisted pair; or 6,000-foot (1828.8 m) bus topology.

2. Free topology (FT-10 style) fiber network can also use fiber-optic cabling. Operates at 78.5 Kbaud.
3. Fiber optic (FO-10 style) network allows bus or ring topology using only fiber-optic cabling; node-to-node distance of over 10,000 feet (3048 m) with message regeneration. FO-10 style operates at 1250 Kbaud and utilizes multi-mode bi-directional fiber media (single fiber strand) in a bus or loop configuration.

D. Provide routers, repeaters or bridges where required to increase distance, alter network configuration or change media or to extend to remote facilities over alternate communications media including UL listed dial-up PSTN telephone, leased line, multimode fiber or Ethernet connectivity.

1. Dial-up units shall dial a local number and stay connected. Upon loss of carrier, a supervisory alarm shall be indicated at the workstation and the units shall automatically redial to connect.
2. Network expansion routers shall support public switched telephone circuits, two-wire or four-wire leased lines, and CAT5 Ethernet networks.

E. Network interface software shall be by the same manufacturer as the hardware portion of this specification.

F. The integration network shall utilize Network Input / Output Nodes to interface between the individual buildings' systems to be monitored by the integration network. The Network Input/Output Nodes shall act as a translator from the building system's specific panel communications protocol to the integration network protocol as well as serve as a transceiver from the building system panel to the integration network.

1. Network Input/Output Nodes shall be available in configurations that will allow transparent communications via RS 232 serial data ports with intelligent fire alarm control panels, security systems, and CCTV systems.
2. Network Input/Output Nodes shall be available in configurations that will allow monitoring of dry contacts, switched voltages, conventional security devices, access control panels and conventional fire alarm control panels using scheduled, automated and manual control.
3. Network Input/Output Nodes shall be UL listed to Standard 864 and 1076 and be provided with their own enclosure or be available in chassis mount configurations.
4. Network Input/Output Nodes shall operate at 24 VDC and obtain their power from the monitored control panel or a UL listed battery backed auxiliary power supply. All terminals shall be transient protected to 2400V and LEDs shall be provided for status, service and diagnostics.

G. Digital Alarm Communicator Receiver Network

1. The system shall provide a digital alarm communicator receiver (DACR) gateway with a RS 232 interface to the following digital alarm communicator receivers for wide area event reporting: Ademco 685, Silent Knight 9500 and 9800, Radionics 6600.
2. Each gateway shall support up to 10 digital alarm communicator receivers for alarm and trouble information from reporting devices.

H. Workstation Network:

1. Computers shall be networked using Ethernet supporting the use of TCP/IP protocol for local area systems.
2. The network shall be capable of supporting multiple clients (e.g., workstations, configuration applications, automated response applications) and up to ninety-nine (99) gateways.
3. A UL listed Ethernet Hub shall be provided for connection of multiple workstations, gateways, clients, and/or network printers.

4. System shall be UL listed to communicate between clients and gateways over a business computer network (shared IP).

PC Graphical Station : System Setup & Conifuration :

A. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes.

B. The factory trained technician shall install initial data and artwork at each workstation including:

C. Distribution of monitoring, control and security profiles as requested by owner.

D. Area diagrams, floor plans, key maps and screen titles.

E. Auto-navigation criteria.

F. Guidance text as provided by owner.

6.0 SUBMITTALS AND DOCUMENTATION

Pre Commissioning

Prior to handover, the Contractor shall furnish with 'as fitted' drawings / wiring diagrams.

As fitted' drawings shall indicate the layout of all equipment, layout of aspirating smoke detector pipework, cable routes and cable sizes/types used. Wiring schematics, including cable termination details, shall also be provided by the Contractor.

'As fitted' CAD drawings shall be prepared using a software package capable of providing dwg format and two electronic copies shall be made available in that format. Also, four sets of A0 prints shall be provided to the Engineer.

Prior to handover, the Contractor shall also furnish GSI with O&M manuals. In addition to the manufacturer's technical data sheets on all components of the system and standard operating and maintenance instructions, the O&M manuals shall include specially written sections covering the specific operation of the system and any special maintenance requirements.

Three printed copies of the O&M manuals shall be supplied along with a copy in electronic form in a format that is computer readable, e.g. the Microsoft Office™ range of software i.e. Word™, Excel™, etc.

The following documentation shall also be provided at handover:

- The site-specific software as loaded into each control panel, to be supplied in both electronic format and printed listing for secure storage on site by GSI.

- Alarm audibility and/or intelligibility information. (This can be recorded on the 'as fitted' drawings.)
- Test results for all system wiring.
- Commissioning testing results/listings.
- Standby battery calculations.

Contract Documentation

The Fire Alarm contractor shall provide a complete set of documents describing the system and its design concepts, installation, final testing, commissioning, and required operating and maintenance procedures.

As a minimum, the following documentation shall be provided for the system:

1. System description.
2. Checklist of equipment and components.
3. Installation instructions.
4. Equipment connection diagrams showing wiring detail of Addressable Device positions with addresses.
5. Standby battery calculations showing system power requirements and formulas used to calculate specified power.
6 Final testing instructions.
7. Commissioning instructions.
8. Certification documents.
9. Log book.
10. System operating instructions.
11. Routine maintenance instructions and schedules.
12. Remote monitoring link description and operating instructions (if this option is being provided).

As a minimum, the following drawings shall be provided for the system:

1. System schematic diagram.
2. Cabling and wiring diagram.
3. Detailed equipment connection diagrams.
4. Building plan showing zoning and location of fire controller, detectors, call points, sounders and ancillary devices.

The Fire Alarm contractor shall provide a complete set of system operating and service manuals for the following:

1. Fire controller
2. Detectors
3. Call points
4. Sounders
5. Ancillary devices
6. Remote monitoring link (if this option is being provided).

The date for submission of all documentation shall be in accordance with the schedule provided by the Fire Alarm contractor and as agreed with the customer.

6.2 AS-BUILT DRAWINGS & OPERATING MANUALS

6.2.1 The Contractor shall submit As-Built drawings that have been reviewed and deemed satisfactory by the Engineer. Final submission shall include four (4) sets of A1 size, one set of A3 size and two sets of electronic copy (AutoCAD files) on CD-ROM disc.

6.2.2 The Contractor shall submit three (3) copies of an operating manual that have been reviewed and deemed satisfactory by the Engineer

The manual should include:

- General description of equipment and system.

- OPERATING INSTRUCTION FOR ALL EQUIPMENT AND SYSTEM.
- SCHEDULE OF EQUIPMENT CLEARLY STATING THE TYPE, MAKE, MODEL, SERIAL NUMBER, QUANTITY, CAPACITY, LOCATION AND DATE OF INSTALLATION.
- MANUFACTURER'S LITERATURE INCLUDING CATALOGUES, WIRING DIAGRAMS, TECHNICAL DESCRIPTION, ETC.
- RECOMMENDED FREQUENCY AND DETAILED TASK LIST FOR ROUTINE MAINTENANCE FOR EACH SYSTEM AND EQUIPMENT
- FINAL FACTORY AND SITE TESTING RESULTS FOR EACH EQUIPMENT AND EACH SYSTEM WITH SIGNATURES OF WITNESSES.
- Emergency contact lists for 24-hour, 365-days including duty and backup personnel.

6.5 CLOSE-OUT DOCUMENTS

1. Submit final copies of the shop drawings outlined as above. These final submittals shall reflect all field modifications and change orders required to complete the installation. Submit the following quantities of record submittal drawings immediately following receipt of notification of substantial completion. Auto CAD drawing or VISIO files of all shop drawings on or CD ROM disks.
2. Three complete sets of documents located in a Spiral Bound notebook and organized by subject with divider tabs.

6.6 CLOSEOUT MINIMUM REQUIREMENTS

The Life Safety Contractor shall ensure the following are completed at hand-over:

6.6.1 Any snagging to be documented and agreed date determined for clearance.

6.6.2 All passwords/PIN numbers, levels and operators recorded.

6.6.3 Disk copies of all system and data files supplied.

6.6.4 Proprietary software manuals & disks.

6.6.5 Consumables, printer ribbons, printer paper at agreed levels.

6.6.6. All equipment access keys handed over.

6.6.7 Complete sets of O&M manuals left with system, any agreed amendments/additions required to be documented and a target date for completion agreed.

6.6.8 Training of engineers and operators to be checked complete or program for completion agreed.

FINAL INSPECTION:

At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

INSTRUCTION:

Provide instruction as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

7.0 *QUALITY ASSURANCE*

7.1 GENERAL

7.1.1 The Life Safety System shall be furnished, engineered, and installed by Trained Engineers of the Contractor.

7.1.2 The contractor shall have extensive knowledge in the System Network Integration or shall be a factory trained and certified Integrator.

7.1.3 The contractor shall employ technicians who have completed the factory authorized training. The contractor shall employ technicians to provide instruction, routine maintenance, and emergency service within 24 hours upon receipt of request.

7.2 SYSTEM INTEGRATOR QUALIFICATIONS

7.2.1 The system integrator must be an authorized representative in good standing of the manufacturer of the proposed hardware and software components.

7.2.2 The system integrator shall have an office that is staffed with designers trained in integrating interoperable systems and technicians fully capable of providing LonWorks instruction and routine emergency maintenance service on all system components.

7.2.3 The system integrator shall have in house capabilities to provide control strategies for Life Safety Systems for the whole building control. This includes interfaces with HVAC, lighting, Access, Fire Detection,Fire Suppression and Protection, and security applications.

7.2.4 The system integrator shall have a service facility, staffed with qualified service personnel, capable of providing instructions and routine emergency maintenance service for networked control systems.

7.3 HARDWARE AND SOFTWARE COMPONENT MANUFACTURER QUALIFICATIONS

7.3.1 The manufacturer of the hardware and software components must be primarily engaged in the manufacture of Life Safety based systems as specified herein, and must have been so for a minimum of Ten(10) years.

7.3.2 The manufacturer of the hardware and software components shall have a technical support group accessible via a toll free number that is staffed with qualified personnel, capable of providing instruction and technical support service for networked control systems.

7.3.3 The manufacturer & Bidder (if separate Entities) of the hardware and software components must have experience of no less than Six(6) similar projects, which have extensive hardwired and Software level integration with various building Utilities & building systems as 7.3.4 These projects must be on-line and functional such that the Client / Owners/Users representative should be able to visit such as installtion and observe the system in full operation, when demanded by the Client.

7.4 QUALITY ASSURANCE DURING EXECUTION

7.4.1 Physical Examination :-

A. Verify that systems are ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

C. The project plans shall be thoroughly examined for control device and equipment locations, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

D. The contractor shall inspect the site to verify that equipment is installable as show, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

E. The Control System Contractor shall examine the drawings and specifications for other parts of the work, and if head room or space conditions appear inadequate or if any discrepancies occur between the plans and his work and the plans for the work of others, he shall report such discrepancies to the Architect/Engineer and shall obtain written instructions for any changes necessary to accommodate his work with the work of others.

7.5 FIELD QUALITY CONTROL

7.5.1 All work, materials and equipment shall comply with the rules and regulations of applicable local, state, and National codes and ordinances as identified in Part 1 of this Section.

7.5.2 Contractor shall continually monitor the field installation for code compliance and quality of workmanship. All visible piping and/or wiring runs shall be installed parallel to building lines and properly supported.

7.5.3 Contractor shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

7.6 IDENTIFICATION OF HARDWARE AND WIRING

7.6.1 All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 2" of termination with a cable identifier and other descriptive information.

7.6.2 Permanently label or code each point of field terminal strips to show the instrument or item served.

7.6.3 Identify control panels with minimum 1 inch letters on nameplates.Identify all other control components with permanent labels.

7.6.4 Identifiers shall match record documents.

7.6.5 Identify room sensors relating to terminal box or valves with nameplates.

8.0 GENERAL DESIGN FEATURES / PERFORMANCE CRITERIA

Refer Chapter 4 “Product Specifications”

9.0 DELIVERY, STORAGE AND HANDLING :-

9.1 CONTRACTOR’S RESPONBILITY

- It shall be the responsbility of the Contractor to ensure delivery of the equipment to the site free of

any damages to the latter.

- Any Loading / Unloading Charges or incindental expenses thereof shall be borned by the Contractor for safe transit and storage of the equipment, and no further claim shall be made to the clien on this account.
- It shall be the responsibility of the Contractor to inward all material with proper emphasis on documentation and clearance from the Consultant / Client and project managers.
- Any Damaged Equipment supplied to the site shall be immediately replaced under notice to the client's project Supervisor / Manager at site.
- The Contractor shall provide for a safe and secure storage of the Equipment supplied under Lock and Key and shall indemnify the client against any on-site damage or theft of the Equipment, for which the contractor has relaised the monies form the Client.

9.2 PROTECTION

9.2.1 The Contractor shall protect all work and material from damage by his/her work or workers, and shall be liable for all damage thus caused.
9.2.2 The Contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted.
9.2.3 The Contractor shall protect his/her work against theft or damage, and shall carefully store material and equipment received on-site that is not immediately installed.
9.2.4 The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

9.3 CLEANING

9.3.1 This contractor shall clean up all debris resulting from his or her activities daily.
9.3.2 The contractor shall remove all cartons, containers, crates, etc. under his control as soon as their contents have been removed.
9.3.3 Waste shall be collected and placed in a location designated by the Construction Manager or General Contractor.
9.3.4 At the completion of work in any area, the Contractor shall clean all of his/her work, equipment, etc., making it free from dirt and debris, etc.
9.3.5 At the completion of work, all equipment furnished under this Section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas.
9.3.6 Any metal cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

10.0 GENERAL INSTALLATION PROCEDURES AND REQUIREMENTS.

Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

All cables, junction boxes, cables supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

Manual Pull Stations shall be suitable for surface mounting or semi flush mounting as shown on the plans, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

Typical Operational Requirement:

Actuation of any manual station, smoke detector heat detector or water flow switch shall cause the following operations to occur unless otherwise specified:

Activate all programmed speaker circuits.

Actuate all strobe units until the panel is reset.

Light the associated indicators corresponding to active speaker circuits.

Release all magnetic door holders to doors to adjacent zones on the floor from that the alarm was initiated.

Return all elevators to the primary or alternate floor of egress.

A smoke detector in any elevator lobby shall, in addition to the above functions, return all elevators to the primary or alternate floor of egress.
Smoke detectors in the elevator machine room or top of hoist way shall return all elevators in to the primary or alternate floor. Smoke detectors or heat detectors installed to shut down elevator power shall do so in accordance with ANSI A17.1 requirements and be coordinated with the electrical contractor.

Correct installation, combined with the use of high quality equipment, components and cabling, ensures that the fire detection and alarm system shall operate as designed and provide many years of trouble-free service.

The Fire Alarm contractor shall install the alarm system in accordance with the documented installation instructions.

The Fire Alarm contractor shall provide all relevant installation documentation required for each component of the system.

Installation of the system shall be in accordance with the recommendations set out in NFPA-72

The Fire Alarm contractor shall be responsible for the correct setting of all equipment and components of the system in accordance with previously agreed plans and drawings.

All cabling and wiring shall be tested before they are connected to the fire controller and its associated devices.

WARNING If the tests are carried out after the cables and wires have been connected to the controller and its devices, components within the controller and the devices will be damaged by high voltages used during testing.

Materials

All cabling and wiring to be used in the system shall be copper Armoured with conductor not less than area 1.5mm² in cross section.

Wiring used for driving devices requiring high currents (e.g. bells, etc.) shall limit the voltage drop to less than 10% of the nominal operating voltage.

Cables used for the transmission of system data and alarm signals shall be in accordance with the types recommended by the manufacturer of the fire alarm system.

The ends of all cables shall be sealed by means of proprietary seals and associated glands. No heat shall be applied to any seal or termination. Cable tails shall be insulated by means of blank PVC sleeving anchored and sealed into the seal.

Where protection of the cable glands is required or terminations are on display, the glands shall be enclosed in red coloured shrouds of the appropriate British Standard colour.

All cables to brick/concrete shall be securely fixed by means of copper saddles sheathed with red PVC. These saddles shall be provided near bends and on straight runs at intervals no greater than recommended in the British Standards or by the manufacturer.

Where multiple cables are to be attached to a wall or soffit, copper saddles shall enclose all cables and shall be secured by means of suitable masonry plugs and two round head plated woodscrews

Where multiple cables are to be attached to the top of horizontal trays they shall be neatly run and securely fixed at suitable intervals. Copper or plastic cable fixings shall be used.

At detector and sounder locations, cables shall be terminated in approved galvanized junction boxes. All other devices forming part of the system shall utilize dedicated /custom back boxes.

Installation of Detectors

All detectors (and bases) shall be installed in accordance with guidelines set out in NFPA -72 and the installation instructions provided by the manufacturer.

All detectors shall be installed in the exact locations specified in the design drawings; thus providing the best possible protection.

The type of detector installed in each particular location shall be the type specified in the design drawings.

All detector bases shall be securely fixed to approved boxes and allow for easy fitting and removal of detectors.

Cable and wire entries to detector bases shall be fitted with grommets to prevent possible damage to the insulation.

Cable and wire strain relief clamps shall be provided at all entries to detector bases.

Cable entries of detector bases used in environments with abnormal atmospheric or operating conditions shall be appropriately sealed to prevent ingress of dust, water, moisture or other such contaminants.

Installation of Control Devices

All control devices (e.g. call points, sounders, interface modules, etc.) shall be installed in accordance with the guidelines set out in NFPA-72 and the installation instructions provided by the manufacturer.

All control devices and associated modules shall be installed in the exact locations specified in the design drawings.

The type of control device installed in each particular location shall be the type specified in the design drawings.

All control devices and associated modules shall be securely fixed, and if required, marked with appropriate notices, warnings, signs as applicable.

Cable and wire entries to all control devices and associated modules shall be fitted with grommets or glands so as to prevent possible damage to the insulation.

Cable and wire strain relief clamps shall be provided at entries to control devices and associated modules as required.

Cable entries of control devices and associated modules used in environments with abnormal atmospheric or operating conditions shall be appropriately sealed to prevent ingress of dust, water, moisture or other such contaminants.

Installation of Fire Controller Equipment

The fire controller equipment shall be installed in accordance with the guidelines set out in NFPA-72 and the installation instructions provided by the manufacturer.

The fire controller and its associated component parts shall be installed in the location specified in the design drawings.

The type of fire controller and its associated component parts installed shall be the type specified in the design drawings.

The fire controller equipment shall be securely fixed, and if required, marked with appropriate notices, warnings, signs as applicable.

Cable and wire entries to the fire controller and associated devices shall be fitted with grommets or glands to prevent possible damage to the insulation.

Cable and wire strain relief clamps shall be provided at entries to fire controller and associated devices as required.

The fire alarm system mains power connections to the fire controller equipment shall be accordance with the guidelines set out in the relevant British Standards and the installation instructions provided by the manufacturer.

The fire alarm system mains power isolating switch shall be coloured red and clearly labelled 'FIRE ALARM: DO NOT SWITCH OFF'.

Each circuit of the system shall be connected to the fire controller via associated fuse or circuit breaker devices located within the fire controller unit.

All cables from the fire controller equipment to the detection and alarm devices shall be clearly labelled as part of the fire detection and alarm system.

11.0 TESTING AND COMMISSIONING, TRAINING

Initial testing can be carried out as per following but not limiting to :-

Sr No	Description	Visual	Test Readings	Documentation
1	All cables are tested for continuty,insulation,resistance etc.			√
2	Carry out visual checks on all panels,cables,interphase modules etc.to ensure they are clean and free from any mechanical damage	√		
3	Check for proper termination & feruling	√		
4	Check input A/C supply voltage		√	
5	Check location/spacing of Detectors as per standards	√		
6	All device are addressed as per drawing		√	
7	Check Distribution of Detector / Loops / Zones as per Drawing.		√	
8	Check all Modules / Detectors, for healthy blinking status.	√		
9	Apply Smoke / Aerosol to random detectors & check output of the same in panel, shall display proper address/Loop/zone.Check for activation of approriate speaker circuits with message.		√	
10	Check distribution of Amplification Zones as per approved shop drawings		√	
11	Check tripping of AHU / Fan / Access doors etc. on activation of detectors.		√	
12	Activation of Hooter circuits as programme ,PA evacuation message/alert message/emergency message		√	
13	All the manual call point are working properly		√	
14	Hooter / Strobe are working as programmed		√	
15	If power fails, whether panel working on battery supply		√	
16	Panel display and all key working properly		√	
17	Check for seamless integration with BMS		√	

1. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

2. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

3. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

4. Verify activation of all flow switches.

5. Open initiating device circuits and verify that the trouble signal actuates.

6. Open signaling line circuits and verify that the trouble signal actuates.

7. Open and short notification appliance circuits and verify that trouble signal actuates.

8. Ground initiating device circuits and verify response of trouble signals.

9. Ground signaling line circuits and verify response of trouble signals.

10. Ground notification appliance circuits and verify response of trouble signals.

11. Check presence and audibility of tone at all alarm notification devices.

12. Check installation, supervision, and operation of all intelligent smoke detectors during a walk test.

13. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

14. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

15. <u>COMMISSIONING</u>

Pre Commissioning

At final commissioning of each system, the Contractor shall confirm that:

All detection devices, including point detectors, beam smoke detectors, flame detectors, and aspirating smoke detectors and inputs are tested and operate correctly.

All manual controls, whether manual call points or centrally located controls, operate correctly.

The correct indications are given at the control and indicating equipment, including the repeater panels, mimic panels and graphics PC central control and display terminal.

All outputs operate, in the required manner, including alarm sounders or voice alarm system loudspeakers, visual indicators and connections to ancillary services and other systems. In particular, the Contractor shall check that audibility levels of sounders and/or audibility and intelligibility of voice alarm broadcasts are correct.

The fire detection and fire alarm system complies with the operational sequence detailed in Section 5 of this Specification.

The standby batteries are adequately sized. (Measurements of the quiescent and alarm loads shall be taken and compared to calculated values used at the design stage.) Calculations and measurements shall be submitted to the Engineer.

Commissioning shall be fully documented and the documentation submitted to the Engineer.

The Contractor shall demonstrate each fire detection and fire alarm system to the satisfaction of the Engineer by conducting a series of witnessed acceptance tests as directed by the Engineer. This shall take place after the above final commissioning and following receipt of the commissioning documentation by the Engineer. Acceptance testing shall include the actuation of all devices in the system, simulation of

various faults and operation of all manual controls.

Following commissioning, a system soak period of not less than one week shall follow, unless the system incorporates fewer than 50 automatic fire detectors, in which case no soak test is necessary.

Both the installation and the commissioning activities shall be undertaken as a single continuous operation.

Upon completion of the installation activity, the Fire Alarm contractor shall Test, Start-up, Commission and Handover the system to the customer.

The Fire Alarm contractor shall make use of the following documents to record test results and details of commissioning tests:

Cable Test Sheets
Installation Check Report
System Layout Drawing(s)
System Schematic Diagram(s)

The Fire Alarm contractor shall be responsible for inspecting and testing the complete system, including:

1. Detectors
2. Call Points
3. Sounders
4. Ancillary Devices
5. Fire Controller Equipment and Associated Devices
6. Auxiliary Equipment (e.g. Plant Interface Module, etc.)
7. Operating and Control Software.

The fire controller and associated devices and modules shall be tested in accordance with the guidelines set out in NFPA-72 and the testing instructions provider by the manufacturer.

The Fire Alarm contractor shall start up and operate the system for a trial period to ensure that it operates correctly.

The Fire Alarm contractor shall test all functions of the system, including the software, to ensure that it operates in accordance with the requirements of the design specification and relevant standards.

The Fire Alarm contractor shall undertake audibility tests during which the sounders may be operated continuously over a period of two hours. (Should the customer require these tests to be carried out at a separate visit, or out of normal working hours, this can be arranged at additional cost.)

Commissioning of the system shall constitute practical completion

Following the satisfactory completion of installation, testing and start up, the Fire Alarm contractor shall demonstrate to the customer that the system successfully performs all of the functions set out in the design specification.

The Fire Alarm contractor shall provide the customer with an agreed quantity of spare parts testing equipment and consumables which are to be used during routine maintenance and testing of the system.

The Fire Alarm contractor shall provide a customer appointed fire system supervisor with on-site training in the use, operation and maintenance of the system and explain the procedures to be followed in the event of fire and false alarms. The system supervisor shall also be shown how to carry out routine maintenance and testing procedures, and how to keep the Log Book. (also see Section 9).

The Fire Alarm contractor shall prepare a report detailing all tests performed during installation and commissioning of the system. The report shall include the results of the tests and details of any specific settings or adjustments made. Any outstanding tasks or activities which are to be completed at another time shall also be included in the report.

The Fire Alarm contractor shall present an Acceptance Certificate for signature by the customer.

TRAINING OF OPERATING PERSONNEL:

- All training shall be by the Building Controls Contractor and shall utilize specified manuals, as-built documentation, and the on-line help utility.
- Operator training shall include four initial eight-hour sessions.
- The initial operator training program shall be to establish a basic understanding of Windows based software, functions, commands ETC.
- Special Emphasis shall be laid by the Trainer on imparting knowledge to the participants on extracting the maximum mileage out of the Head-end application to achieve energy monitoring and efficiency.
- Participants should be trained in the concept of maximum demand load management and the process logic applied by the IBMS system to achieve the same.
- The training shall encompass as a minimum:

1. Troubleshooting of input devices, i.e., bad sensors.
2. Sequence of operation review.
3. Sign on - sign off.
4. Selection of all displays and reports.
5. Use of all dialogue boxes and menus.
6. System initialization.
7. GUI Software.
8. Network Management Software.

12.0 INTERFACING WITH OTHER SERVICES.

- Interfacing with Third Party Service providers and Equipment Providers is a integral and most important part of the scope of works of the IBMS vendor.
- It shall be the Contractor's responsibility to study and inclulate the Design Logics of various Utilities being provided by third parties
- It is expected and assumed for granted that the Contractor shall study of third party drawings to locate equipment / locate Marshalling boxes to pick up signals relevant to Control and Monitoring of Life Safety
- The Contractor shall also prepare and share data related to software level integrations to the IBMS contractor on .net / xml / or conventional integration on MODBUS / LONWORKS / BACNET / DALI / M-BUS / JBUS / OPC Platforms, made availabe either on Serial interface or on a IP Platform.
- The Contractor shall be responsible to ensure that all information relevant to Interfacing with Other Services and Other Systems is collated an put to use to ensure a fully operational Life Safety System as per technical requirements put forth in the Tender, and to the descrition of the Architect / Client / Consultant as Directed from Time to Time.
- During Execution, it shall be Contractor's responsibility to follow Co-ordinated drawings and interface with other Services and contractors for proper laying and installtion of equipment such that there is no fouling of services in any manner.

13.0 MODE OF MEASUREMENTS

13.1 At various Logical Stages of the project, the Contractor shall ensure that joint measurements are taken, recorded and filed after the approval from the project managers / Consultants.

13.2 The contractor shall provide their own blank measurement sheets for the approval of the project managers /consultants to ensure confirmance to minimum information requirement on the subject document.

13.3 All Cabling Nodes for the Life Safety Systems – i.e., from the Notification Equipment to the Floor Fire Panels, and from Fire Panels to the Signalling Appliances shall be measured for SLC and NAC cabling. Communication cable between various network Nodes shall be measured separately at per meter basis.

13.4 Ethernet LAN Cabling from Equipment to Switches and Between Floor Switches to Main Network switch shall be measured as Networking Cabling at per meter basis.

13.5 Against the scheme and the Drawing plans, Equipment utilised and Spares shall be cross checked by the Consulting Engineer, the Contractor and the project manager as installed on site.

13.6 Equipment actually installed at site, against the individual line items shall be checked for confirmance, and joint measurement taken for Quantities, and then Certified.

14.0 OPERATION AND MAINTENANCE

14.1 The Contractor shall offer prices against the Operations and Maintenance contracts as asked for in the Tender.

14.2 Operations would mean manning the Life Safety System stations 24 x 7. This would entail the contractor providing for atleast 5 nos. or more of trained technical manpower of Diploma Engineer level on their payroll, present on the site at any given time. This team shall be responsible for smooth operation of the IBMS System, Reports generation, trend viewing, analysis and reports to the Facility Management team / Client.

14.3 It shall be the Contractors responsibility to provide their appointed Operations team to provide all tools, instrumentation and other accessories to enable them to fulfill the desired function.

14.4 The Client shall enter in to a Service level Agreement with the Contractor for the purpose of the Operations contract. Such a Agreement will list the response time to a client requirement and related parameters. The Agreement may also list a of events / alarms to the escalation matrix based on the response required for the event.

14.5 The Contractor shall provide the Replacement warranty for the components installed, while under the defects liablity period.

14.6 Under the DLP, the Contractos shall undertake all necessary maintenanace and repair / replacement actitivities to ensure 99.9% uptime of all the installed Equipment and the Life Safety system as a whole.

14.7 On the Completion of the DLP, the client may chose to enter in to a Comprehensive or non Comprehensive maintenance contract with the Life Safety Contractor for the purpose of regular planned and Emergency Maintenance of the system.

14.8 A Separate Maintenance Agreement and linked service parameters shall be defined in the SLA.

14.9 As a Minimum, whether under DLP or under Maintenance Contract post DLP, the expected reolution time shall be as follows :

- for minor complaints / maintenance issues : Max 4 Hours
- for Major Maintenance issues: Max 24 hours
- for Replacement of Level1 Importance components: Max 12 hours
- for Replacement of Level 2 Importance compoenents: Max 48 hours.

According to the recommendations in Codes, fire systems should be regularly maintained under a maintenance agreement.

Fire and planning authorities, and in certain cases insurers, have powers to check that fire systems are maintained. Failure to maintain the fire detection and alarm system could contribute to death or injury in the event of fire.

The customer shall be responsible for ensuring that daily, weekly and monthly routine maintenance is carried out in accordance with the recommendations set out in NFPA 72 and the service and maintenance instructions provided by the Fire Alarm contractor or manufacturer.

The Fire Alarm contractor shall provide detailed information about the maintenance services which can be provided after hand over of the system.

If requested, the Fire Alarm contractor shall prepare and submit a draft maintenance contract for consideration by the customer.

The draft contract shall include complete details of all materials and labour required to maintain the system in correct working order. It shall also include details of the testing procedures which will be carried out and specify the proposed number of visits per year.

SPARE PARTS PROPOSAL

15.1 It is expected that the Contractor advises the client the minimum spares that need to be stocked on site.

15.2.1 Further, the Contractor needs to Stock key components that may affect the working of the Life Safety system at his own premises without any additional cost implilcation to the client, and ensure the minimum reolution times as defined in 14.9; or as defined and agreed in the SLA are met with.

a) List of Parts recommended to be kept on site (the total price of this section shall be in line with the tender BOQ Requirement).

b) List of Parts expected to have planned replacement within the first 5 years of operation.

c) List of Parts that are normally kept in the Contractor's Delhi warehouse, for delivery to site within 12 hours.

d) List of Parts that would be required to be ordered/imported (including expected delivery times).

CHAPTER B
LIST OF APPROVED MAKES OF EQUIPMENT AND MATERIALS

B.1 The equipment and materials to be used in the execution of this contract shall be selected from the following list unless otherwise specifically agreed by Consultants / Client.

B.2 The successful contractor shall prepare a list of equipment and materials selected from the approved list, proposed to be used by him for execution of the contract. Before placing orders on suppliers or delivering the equipment and materials to site, the Contractor shall obtain approval from Consultants / Client, whose decision shall be final and binding on the contractor.

B.3 Any equipment of material not specified under here but required for execution of the work shall be as per Technical Specification, of best quality, preferable with ISI approval and from a reputed manufacturer for which the prior approval of the Consultants/Client is required.

B.4 All the Components of the system given below from ***SI No 1 to 11 shall be of the same manufacturer."***

Sr.No.	Item Description	Manufacturer
1	Analog Addressable Optical Smoke Detectors	NOTIFIER / SECUTRON – MIRCON / KIDDE
2	Analog Addressable Thermal Detectors	NOTIFIER / SECUTRON – MIRCON / KIDDE
3	Analog Addressable Multi Criteria Photo Electric Smoke cum Heat Detectors	NOTIFIER / SECUTRON – MIRCON / KIDDE
4	Addressable Manual call Box	NOTIFIER / SECUTRON – MIRCON / KIDDE
5	Intelligent Analog Addressable Main Fire Alarm Control Panel with Battery Backup	NOTIFIER / SECUTRON – MIRCON / KIDDE
6	Addressable Input Module	NOTIFIER / SECUTRON – MIRCON / KIDDE
7	Addressable Output Module	NOTIFIER / SECUTRON – MIRCON / KIDDE
8	Addressable Photo Electric Smoke Detectors with Sound Base	NOTIFIER / SECUTRON – MIRCON / KIDDE
9	Addressable False Isolator	NOTIFIER / SECUTRON – MIRCON / KIDDE
10	Strobe with base plate	NOTIFIER / SECUTRON – MIRCON / KIDDE
11	Two (2) Tone Piezo Sounder (700Hz to 1200Hz)	Baliga / Monsher
Sr.No.	**Item Description**	**Manufacturer**
12	Control Cables	LAPP KABEL / POLYCAB/ BELDEN / RR
13	P.C	COMPAQ, DELL, HP
14	RACEWAY / TRUNCKING	Legrand / MK
15	NETWORK CABLE CAT-6 & CAT-5E	Legrand / AVAYA
16	2 WATTS SPEAKER	NOTIFIER / SECUTRON – MIRCON /

		BOSCH.
17	15 WATTS SPEAKER	BOSCH / SYSTEM SENSOR
18	30 WATTS SPEAKER	BOSCH / SYSTEM SENSOR
19	AMPLIFIERS (FOR CAR CALLING SYSTEM)	BOSCH / TOA
20	CALL STATION	BOSCH / TOA

CHAPTER: C

LIST OF STANDARDS AND CODES APPLICABLE

The Fire Alarm system shall comply with latest requirements of NFPA standard No. 72 for protected premises signaling system, Indian Standards IS 2189, IS 2175, IS 11360 and local Statutory Regulations. The system shall be as per above IS standards but not limited to it.

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. Underwriters Laboratories Inc. (UL) - USA:

a. No. 268 Smoke Detectors for Fire Protective Signaling Systems

b. No. 864 Control Units for Fire Protective Signaling Systems

c. No. 268A Smoke Detectors for Duct Applications

d. No. 521 Heat Detectors for Fire Protective Signaling Systems

e. No. 464 Audible Signaling AppliancesNo. 38 Manually Actuated Signaling Boxes

f. No. 346 Water flow Indicators for Fire Protective Signaling Systems

g. No. 1076 Control Units for Burglar Alarm Proprietary Protective

h. No. 50 Cabinets and Boxes

B. Signaling Systems

a. No. 1971 Visual Notification Appliances

C. Local and State Building Codes.

a. All requirements of the Authority Having Jurisdiction (AHJ).

SIGNATURE OF WITNESS **(SIGNATURE OF THE TENDERER)**

DATE : / /2018 **DATE : / /2018**

DIVISION OF WORK

By Fire Alarm Contractor		By Others
1	Fire Alarm system along with all accessories, supports for mounting detectors back to back in case its above False Ceiling and or Below False Floor.	Cut-outs in the False ceiling for installing Detectors.
2	SITC of General & Fire Mimic Panels as shown on drawing will all controls.	Required cut–out with front access door if placed in cabinet for installing Mimics
3.	Hand Appliances with necessary supports.	All four walls/partitions of the server room shall be two hour Fire Rated (By Civil Contractor) and to be taken to the slab level.
4	Installation of Relay modules and shutting off the AC units (as mentioned in Boq) through FACP.	All the opening around the services shall be sealed with two hour Fire Rated sealant (By Civil Contractor)
5	Connectivity with other systems as shown on IBMS block drawing.	

SASMIRA
SASMIRA MARG, WORLI
MUMBAI-400 030

PROJECT

PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT WORLI, MUMBAI.

TENDER FOR SUPPLY & INSTALLATION OF FIRE FIGHTING, FIRE ALARM AND PUBLIC ADDRESS SYSTEM FOR PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT WORLI, MUMBAI

TECHNICAL SPECIFICATIONS FOR PUBLIC ADDRESSABLE SYSTEM

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JULY - 2018

TECHNICAL SPECIFICATIONS

1.General

The PA system for the IDBI Bank, BKC at Mumbai shall be fully digital public address sound management system with system objective to allow announcement from more than one location having facility to play music during idle time. Paging facility shall also be provided to facilitate staff call or car call as the case may be. The system shall be public address cum emergency sound systems compliant to international standards for Public Address, Evacuation and emergency sound systems like IEC 60849.

The general scope of work shall comprise of: system design, supply, installation, testing and commissioning of PA system in the IDBI Bank with manual and automatic announcement facility. Car/taxi call system also forms part of this facility as an integral part. The audio system should be of microprocessor based sound management system to make announcements from more than one location and also shall be capable of integrating with the Fire Alarm Panel for automatic announcements in case of emergency.

The following authorizations from OEM shall be made available by Bidder:

Authorization that the items quoted by the tenderer is in production and would be supported for service for at-least 3 years from the date of tender.

Technical Compliance to the specifications for Main PA Controller, Amplifier, Microphone and Speakers, this should be vetted by Manufacturer.

No obsolete products should be quoted.

The bid not accompanying the above Authorizations shall be rejected.

The PA system shall comprise of the following:-

Digital Call station with Microphones and zone selection Keys.
Digital Car Call Console
Speakers
Digital Amplifiers with LCD Display.
Digital Central Controller for sound management and control.
Power supply units
Multi Disc CD Player
Rack housing the control system
Distribution network / cables
The equipment racks containing control equipments distribution system, amplifiers etc

The building PA system shall have announcing stations as under:

Main Control Room: 1 no with zoning Announcement facility & **highest priority**
Car Call : 2 nos.

The system shall also have in-built provision of playing music through MP3 player. Normally music shall be played through speaker network in all the areas. However, the system shall automatically override music of the relevant zone for announcements to be heard. Playing of music shall be switch selectable from control room.

The building shall be divided into 8 zones (Floor wise) with suitable marking provided in the announcement consoles for identifying the zones. By selection, the user shall be able to transmit his/her announcements to particular zone, in the Building.

The distribution network in the control room shall receive the input signals from consoles or music input, process it and then distribute it through speakers.

Digital Signal Processing techniques shall be used for equalization in the Corridors.

Generally ceiling ring speakers shall be used in public /Corridor area having false ceiling.. For car call system, horn speakers shall be used.
In the equipment room, all speakers and microphones data cables shall be terminated in the main junction box.

2. SCOPE OF WORK

The scope of work involves complete design, system engineering, supply, installation; testing and commissioning of fully digital public address sound management system.
The supply and installation are to be as per schedule of quantity to meet the system design and performance requirements.
To terminate the cables and make connectivity as per the system design and site requirement.
Wiring diagrams and wiring specifications shall be provided by the successful tenderer. The tenderer is fully responsible for the wiring and the quality of the sound system. Interconnections and termination of cables for the PA system shall be the responsibility of the tenderer.
To measure to acoustic parameters of various zones and customize the equipments for optimum speech intelligibility.
Testing and commissioning of the system
Training and documentation
Maintaining the system during one year warranty period commencing from the date of commissioning of the building

3. SYSTEM DESIGN

The public address system shall meet the following requirements:
The system should be of Digital Controller with Digital audio and Digital Control for sound system management and control. The system should be expandable to virtually any number of inputs (approx 20) without adding any new hardware for the control system. For future expansion only amplifiers, call station shall be added and these shall be programmable through the central controller.
The system shall be capable of delivering high quality output and intelligibility. The output of call station should be digital type on single fibre / cat 5 cable i.e. signal from announcement location to central control room shall be digital for distortion free performance. The complete system from microphone till the output of amplifier shall be digital, where transmission to speakers is through 100V signal. The Digital amplifiers shall have low distortion, less power consumption and shall be Digital Class D technology.
The offered system shall support broadcasting and routing of the digital announcements by automatic announcement sub-system that is external to the PA system and shall have necessary provision for input as well as processing the announcements. The system shall have appropriate potential free contacts and signal inputs for interfacing.
The system architecture shall be such that it allows for future expansion at low cost. The system shall be modular for ease of maintenance.
The system shall provide for selection to allow a certain type of announcement to be routed to a specific zone in the building.
The system shall support around 20 levels of priority with various priority levels for different announcements.
The system shall have a provision for playing continuous soft background music round the clock in all public areas / Corridoors. For inviting attention of announcement a pleasing chime shall precede every announcement. The tone of the chime shall be programmed to be different for

emergency announcements. The system shall provide facility to select different chime for different call station based on user requirement from the central control software. The music shall be cut off during the announcements.
The PA system shall support the broadcasting and routing of the alarm / speech generated by fire detection and alarm system (an independent system) with provision for connecting audio line for processing.

The PA system shall have the following features:-

Provision to avoid echo during transmission by suitable feedback design
Amplifiers to give distortion-free announcements with peaking margin of 2.
Monitoring facility through speaker / headphones for individual amplifier output.
Facility for switching ON and OFF of the music from equipment rack and software.
The control system shall be of total digital, completely programmable and expandable.
The control system shall be easily configurable and programmable using front LCD panel controls or through external PC. The complete system shall be capable of monitoring for any error .The system should provide complete supervision of all system elements like call station controller, amplifier and shall report any error via the software or front LCD display.
The system shall have facility for selective call for different zones with provision of avoiding priority conflicts.

4. THE ARCHITECTURE

Professional microphones mounted on the announcement consoles shall feed the distribution system controller. Announcement console shall be provided with zone selection that shall be programmed to route the microphone inputs to one or several power amplifiers. These amplifiers in turn shall feed the loudspeakers located in the geographical and / or functional zones with background music or announcements. However, the local announcement consoles installed in the building shall be programmed to automatically route the announcements originating from these local announcement consoles to the corresponding local area only.
The offered distribution controller shall be equipped with an audio switching and routing matrix as required. Each of these outputs shall be further distributed to several power amplifiers that drive the loudspeakers located in the public address zones corresponding to each output. The internal wiring of the offered distribution system controller shall be made installer friendly and shall have provision of interconnections and termination of various units and sub-units.

A. PARTICULAR SPECIFICATIONS

All equipment like controller, amplifiers, call station, processors shall be of same make for full integration, single point monitoring, easy maintenance, spares stocking by department.
All equipment shall be UL/IEC60849/EN 60849 certified.

1.1 Network controller

The control unit is the heart of the public address system. The unit is capable of routing audio channels, delivering power to the system, fault reporting and controlling of the system. The audio inputs can be calls from call stations, background music or local audio inputs. This unit can work either in stand-alone mode or with a PC connected to it. The PC connected to the network controller unit shows all status changes in the system with the configuration and diagnostic &

logging software.

The unit can be installed freestanding on a tabletop or mounted in a 19" rack. It shall have the following functions:

- There shall be control inputs, which should be freely programmable. These can be programmed for actions to be done in the system and assigned priorities.
- The network controller shall have analogue audio line outputs for fire alarm signals, music sources etc.
- The network controller shall have the capability to handle at least 20 levels of priorities and 20 zones, 20 call station.
- The network controller shall monitor the status of all equipment in the system and report status changes.
- Attention and alarm tone definitions shall be stored in the network controller. These tones can be accessed by any call stations or control inputs for announcement broadcast or alarm broadcast.
- The network controller shall have an internal real time clock.
- The network control unit shall have extensive audio processing possibilities for audio inputs and audio outputs. Parametric equalisation, limiter, and gain can be adjusted with the configuration software.
- The controller should have LCD display to display status information, faults from amplifiers, call station etc.

1.1 (b) Power amplifiers

The main function of the power amplifier is the amplification of audio signals for the loudspeakers. It shall be possible to select the output voltages of 100V, 70V or 50V by changing jumpers. The power amplifiers are provided with a LCD character display for fault monitoring and status display. The Power amplifiers shall be class -D digital type. The unit shall be certified to be compliant to IEC60849 and compliant to other relevant local standards.
The equipment can be used as 19" rack mounting.

- The power amplifiers shall have 2 auxiliary audio inputs for Noise sensing Device.
- The System should have built in automatic volume control circuit.

- The amplifier monitoring and changeover facility shall be incorporated in the power amplifier. The changeover relays shall be included in the unit. In case of failure of any working amplifier, the standby amplifier shall automatically come in the circuit.
- The unit shall incorporate digital audio processing possibilities for equalisation and audio delay

1.1 (c) CD Player

CD Player shall be 5 disc carousel CD changer with MP3 and WMA decoders. It shall be able to play not only Cds but also MP3 and WMA encoded CD-R/RW discs.

1.1 (D) Equipment Rack

The equipment such as control system, amplifier, MP3 player etc shall be mounted on a standard steel rack. Car call system shall be in a separate rack.
The racks shall be located at not less than 750 mm clear from the wall of the equipment room. If two or more racks are required, the racks shall be mounted side by side.
Items of the same function shall be grouped together, either vertically or side by side. All operational Controls except the main's on-off switches shall be symmetrically arranged at a convenient height at lower than 750 mm and not higher than 1700 mm from the floor
All audio input and inter-connections shall be made with approved shielded cable and plug connection; Output connections shall be screw/terminal type. All Power supply connectors (AC&DC) shall be provided with approved plugs. All inputs & outputs, inter connections, test points shall be accessible at the rear of the equipment. racks for testing and maintenance. Each item of equipment shall be readily removable from the rack without disturbing other items and / or connections. One spare amplifier shall be provided as suitable standby to the amplifier installed in that rack.

Power Supply:-

Input: 230 V ± 10%, 50 Hz single phase
Output: 24 V or as required to suit system design.

1.2. Call station

The call station is to be used for making a manual or pre-recorded call to any pre-assigned zones or executing a predefined action. The call station shall have a fixed microphone to transmit speech over the network and a press-to-talk key. The unit shall be certified to be compliant to IEC60849 and compliant to other relevant local standards.

- The call station shall have a speech filter to improve intelligibility
- The call station unit can be connected with a call station keypad.
- Analogue-to-digital audio conversion shall be performed at the call station.

- The call station shall also have a digital signal processor, which can be used for audio processing. It can be used to adjust sensitivity, limiter and parametric equalizer.
- The keypad is used in combination with the call station unit for making a manual or pre-recorded announcement to any pre-assigned zones or executing a predefined action. The keypad shall have 8/16/24 keys as per requirement.
- The unit shall be certified to be compliant to IEC60849 and compliant to other relevant local standards.
- The call station keypad keys can be programmed for the following actions:
- Control system functions: live speech call, BGM off, BGM volume control.
- Select resources: BGM selection, pre-recorded message selection, attention and alarm tone selection,Zone selection, system control output selection

1.2 (b) Car Call Console

- Car Call console shall be fully digital type housed in weatherproof metallic housing with Press to talk button. It shall have built in limiter, complete supervision via main network controller. It shall be IEC 60849 compliant. It shall have control outputs for LED busy indication with Built in DSP circuit.

1.3 (a) Ceiling Speaker

- Ceiling speaker shall be full range 6W RMS loudspeaker with wide frequency range and built in LMT. Speaker shall have provision for mounting on Surface box.

1.3 (b) Horn Speaker

- Horn Speaker shall be 15 W RMS Speaker with 22.5 Peak power, built in LMT.

LIST OF ACCEPTABLE MAKES

SL	Equipment	Makes
1	Digital Public Address and Emergency Sound System Controller	BOSCH/BOSE/ELECTROVOICE / MERLAUD / JBL /SENSROMATIC/SHURE/GENT/DYNACORD
2	Announcement console / Digital Call Stations / Remote call station interface	BOSCH/BOSE/ELECTROVOICE / MERLAUD / JBL /SENSROMATIC/SHURE/GENT/DYNACORD

3	Power Amplifiers	BOSCH/BOSE/ELECTROVOICE / MERLAUD / JBL /SENSROMATIC/SHURE/GENT/DYNACORD
4	CD Player	DENON / TASCAM / SONY
5	Ceiling Speaker	BOSCH/BOSE/ELECTROVOICE / MERLAUD / JBL /SENSROMATIC/SHURE/GENT/DYNACORD
6	Horn Speaker	BOSCH/BOSE/ELECTROVOICE / MERLAUD / JBL /SENSROMATIC/SHURE/GENT/DYNACORD
7	Fibre Optic Network Cable	SKYTONE/CAPCAB/OPTRONIX / BOSCH /
8	CAT 6 Cable	SKYTONE/CAPCAB/OPTRONIX
9	GI conduit	BEC/NIC/VIMCO
10	Two Core Twin Twisted Speaker Cable 24/.2 mm.	SUNTRAK / SKYTONE / CAPCAB

Annexure-2

SASMIRA
SASMIRA MARG, WORLI
MUMBAI-400 030

PROJECT

PROPOSED NEW BUILDING FOR SASMIRA COLLAGE AT WORLI, MUMBAI.

Commercial Bid

COST SUMMARY - ESTIMATE		
PART	**DESCRIPTION**	**AMOUNT**
A	FIRE FIGHTING	
B	FIRE ALARM SYSTEM	
C	PA SYSTEM	
	GRAND TOTAL	

SR.NO.	DESCRIPTION	UOM	TOTAL QTY	RATE	AMOUNT
A	**FIRE PUMP ROOM EQUIPMENT**				
1.0	**DIESEL ENGINE PUMP**				
	Supplying, Installation, Testing and Commissioning of diesel engine driven main fire pump suitable for automatic operation and consisting of following : complete in all respect as required. Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal to ensure a minimum pressure of 3.5 kg/sq.cm. at highest and farthest outlet at specified flow of 2850 LPM at 65 metres m. head conforming to IS 1520. Suitable HP, 1800-2400 RPM air cooled with radiator diesel engine conforming to relevant BS & IS standard complete with auto starting mechanism 12/24 Volts electric starting equipment, Diesel Tank, exhaust pipe extended upto 1m. outside pump house duly insulated with 50 mm. thick glass wool with 1.0 mm. thick aluminium sheet cladding, residential silencer, instruments and protection as per specification, stop solenoid for auto stop in the event of fault with audio indication, painted with post office red colour etc. as reqd. M.S.fabricated Common base plate, coupling, coupling guard, foundation bolts etc.as required. Suitable cement concrete foundation duly plastered with anti vibration pads.	Nos.	1.00		
2.0	**ELECTRIC HYDRANT PUMP**				
	Supply, erection, testing & commissioning of electrical motor driven main pump suitable for automatic operation centrifugal type with stainless shaft, bronze impeller with mechanical seal to ensure min. presure of 3.2 Kg/Cm2 at highest delviery point and capable to deliver 2850 LPM at 65 MWC. conforming to IS 8034 -2002.	Nos.	1.00		
3.0	**SPRINKLER PUMP**				

	Supply, erection, testing & commissioning of electrical motor driven main pump suitable for automatic operation centrifugal type with stainless shaft,bronze impeller with mechanical seal to ensure min. presure of 3.2 Kg/Cm2 at highest delviery point and capable to deliver 2400 LPM at 45 MWC. conforming to IS 8034 -2002.	Nos.	1.00		
4.0	**HY DRANT JOCKEY PUMP**				
	Supply, erection, testing & commissioning of electrical motor driven main pump suitable for automatic operation centrifugal type with stainless shaft,bronze impeller with mechanical seal to ensure min. presure of 3.2 Kg/Cm2 at highest delviery point and capable to deliver 180 LPM at 65 MWC. conforming to IS 8034-2002.	Nos	1.00		
5.0	**SPRINKLER JOCKEY PUMP**				
	Supply, erection, testing & commissioning of electrical motor driven main pump suitable for automatic operation centrifugal type with stainless shaft,bronze impeller with mechanical seal to ensure min. presure of 3.2 Kg/Cm2 at highest delviery point and capable to deliver 180 LPM at 45 MWC. conforming to IS 8034-2002.	Nos	1.00		
6.0	**BOOSTER PUMP**				
	Supply, erection, testing & commissioning of electrical motor driven main pump suitable for automatic operation of horizontal type multi stage split casing centrifugal type with stainless shaft with mechanical seal to ensure min. presure of 3.2 Kg/Cm2 at highest delviery point and capable to deliver 900 LPM at 35 MWC. conforming to IS 1520	Nos	1.00		
7.0	**DRENCHER PUMP**				
	Supply, erection, testing & commissioning of electrical motor driven main pump suitable for automatic operation of horizontal type multi stage split casing centrifugal type with stainless shaft with mechanical seal to ensure min. presure of 0.5 Kg/Cm2 at highest delviery point and capable to deliver 1150LPM at 30 MWC. conforming to IS 1520	Nos	1.00		
	Notes:-				

	Suitable HP squirrel cage induction motor TEFC, synchronous speed of 2900 RPM suitable for operation of 415 Volts,3 Phase 50 Hz, AC with IP 55 Protection for enclosure,horizontal foot mounted type with class-F insulation confirming to IS 325.				
	M.S.Fabricated common base plate coupling,coupling gaurds,foundation bolts etc as required.				
	Suitable cement concrete foundation duly plastered with anti-vibration pads.				
8.0	Foot Valve				
8.1	Supplying, installing, testing and commissioning of 200 mm diacast iron foot valve (for pump suction side)	Nos.	RO		
8.2	Supplying, installing, testing and commissioning of 150 mm diacast iron foot valve (for pump suction side)	Nos.	4.00		
8.3	Supplying, installing, testing and commissioning of 100 mm diacast iron foot valve (for pump suction side)	Nos.	RO		
9.0	Supplying, installing, testing and commissioning of G.I. Pipes (for suction side of pumps) confirming to IS 1239, 6mm thick, with painting, suitable type of supports, anchor fasteners, bolts nuts (Galvanised), clamps, "U" bolte, malleable specials such as Reducers,Tees, elbows, flanges. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports etc, as per drawings. The quoted rate shall also include for chasing / chipping walls, making bore holes in walls / floor and making them good with filler material and finished in cement morter etc. complete.				
a	200mm nominal dia	Rmt	6.00		
b	150 mm nominal dia	Rmt	12.00		
C	100mm nominal dia	Rmt	12.00		

10.0	Supplying, installing, testing and commissioning of G.I. Pipes confirming to IS 1239 Pt - I Heavy grade with painting, suitable type of supports, anchor fasteners, bolts nuts (Galvanised), clamps, "U" bolte, malleable specials such as Reducers,Tees, elbows, flanges. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports etc, as per drawings. The quoted rate shall also include for chasing / chipping walls, making bore holes in walls / floor and making them good with filler material and finished in cement morter etc. complete.				
a	200mm nominal dia	Rmt	5.00		
b	150mm nominal dia	Rmt	10.00		
c	100mm nominal dia	Rmt	5.00		
d	80mm nominal dia	Rmt	RO		
e	50mm nominal dia	Rmt	RO		
f	40mm nominal dia	Rmt	RO		
g	25mm nominal dia	Rmt	RO		
11.0	Supplying, installing, testing and commissioning of C.I. Non-return valves as per IS:5312(PN 20) swing check type with required flanges, nuts, bolts and gaskets etc. complete.				
a	200 mm nominal dia	Nos.	1.00		
b	150 mm nominal dia	Nos.	4.00		
c	100 mm nominal dia	Nos.	3.00		
d	80 mm nominal dia	Nos.			
12.0	Supplying, Installing, testing and commissioning CI butterfly valves as per BS 5155 (PN 20) slim seal standared lever operated type with required flanges, nuts, bolts etc. complete.The valve shall be fitted with Supervisory switch for monitoring.				
a	200mm nominal dia	Nos.	RO		
b	150mm nominal dia	Nos.	8.00		
c	100mm nominal dia	Nos.	6.00		
d	80mm nominal dia	Nos.	RO		
13.0	Supplying, installing and commissioning C.I.flanged "Y" type Strainer with SS mesh,suitable flanges, nuts, bolts, gaskets etc. complete.				
a	80mm dia	Nos.	RO		

b	100mm dia.	Nos.	4.00		
c	150mm dia.	Nos.	3.00		
d	200mm dia.	Nos.	RO		
14.0	Supply, Erection, Testing and commissioning of C.I.Gate valves as per IS:14846 (PN 20 Rating, for suction side of the pumps) and rising spindle type with flanges, bolts, nuts, washers, gaskets etc.The valve shall be fitted with Supervisory switch for monitoring.				
b	250mm nominal dia	Nos.	RO		
c	150mm nominal dia	Nos.	RO		
d	100mm nominal dia	Nos.	RO		
e	80mm dia	Nos.	RO		
f	50mm dia	Nos.	RO		
g	25mm dia	Nos.	RO		
15.0	Supplying, installing, testing and commissioning of Gun metal chrome finished Ball valves with fittings of screwed end type.				
a	15mm dia.	Nos.	RO		
b	25 mm dia	Nos.	RO		
c	50 mm dia	Nos.	RO		
16.0	Supply, Installation of Flow metre(Electronic type) on Test line to measure 150 % of pump flow and suitable to 150 mm dia.	Nos.	RO		
17.0	Supply and installation of Pressure switches of suitable range for pumpsets with Ball valves, Fittings like unions / colors / reducers etc.	Set	10.00		
18.0	Supply and installation of Pressure gauges of suitable range for pumpsets with Ball valves, siphon, Fittings like unions / colors / reducers etc.	Set	10.00		
19.0	Supply and installation of Pressure reducing disc or orifices of suitable range for pumpsets .	Set	4.00		
20.0	Providing, fixing, testing and commissioning of air-cushion tank (air vessel) 250mm dia. & 1200mm high with dished top, made of 8 mm thick M.S. sheet and 10 mm thick dished ends with 25mm dia. brass air release valve (ball type).	Nos.	2.00		

21.0	**PRIMING TANK**				
	Supply ,installingOne piece moulded HDP / Fibrewater tank For -ve Suction Only having capacity 1000 ltrs. Fitted with necessary accessories .	No.	1.00		
	TOTAL FOR PART - A (Carried forward to summary)				
B	**HYDRANT SYSTEM**				
1.0	Supplying, installing, testing and commissioning of G.I. Pipes confirming to IS 1239 Pt - I Heavy grade with painting, suitable type of supports (Shall be fabricated by M.S. Channel / Angle / Flat for above 50 mm dia), anchor fasteners, bolts nuts, clamps, "U" bolte, malleable specials such as Reducers,Tees, elbows, flanges. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports etc, as per drawings. The quoted rate shall also include for chasing / chipping walls, making bore holes in walls / floor and making them good with filler material and finished in cement morter etc. complete.				
a	150 mm nominal dia	Rmt	246.50		
b	100mm nominal dia	Rmt	10.00		
c	80mm nominal dia	Rmt	14.00		
d	65mm nominal dia	Rmt			
e	50mm nominal dia	Rmt			
2.0	Supplying, installing, testing and commissioning of G.I. Pipes confirming to IS 1239 Pt - I Heavy grade with suitable type of supports, malleable specials such as Reducers,Tees, elbows, flanges. Including cutting, Welding as per drawings. The rate quoted should be included with anticorrosive treatment with 4 mm thick polymer **corrosion resistant** tape as per IS 10221, overlap shall be 15mm minimum.				
a	80 mm nominal dia	Rmt	28.00		
b	100 mm nominal dia	Rmt	40.00		
c	150mm nominal dia	Rmt	284.70		
3.0	**C I BUTTERFLY VALVE**				

	Supplying, Installing, testing and commissioning CI butterfly valves as per BS 5155 (PN 20) slim seal standared lever operated type with required flanges, nuts, bolts etc. complete.The valves shall be fitted with Supervisory switch for monitoring.				
a	150mm nominal dia	Nos.	2.00		
b	100mm nominal dia	Nos.	1.00		
c	80mm nominal dia	Nos.	0.00		
d	65 mm nominal dia	Nos.			
e	50 mm nominal dia	Nos.			
	Supply, Erection, Testing and commissioning of C.I.Gate valves as per IS:14846 PN 20 Rating, and rising spindle type with flanges, bolts, nuts, washers, gaskets etc.The valve shall be fitted with Supervisory switch for monitoring.				
a	50 mm nominal dia	Nos.			
b	40 mm nominal dia	Nos.			
c	32 mm nominal dia	Nos.			
d	25mm nominal dia	Nos.			
4.0	**INTERNAL HYDRANT & HOSES**				
	Supplying, erecting and commissioning of Landing Hydrants comprising of the following in the Fire duct;				
a	Single headed hydrant valve as per IS 5290, made of gunmetal with 63 mm dia instantaneous outletof 80 mm dia fanged inelt ,Blank caps , chain and hand wheels etc complete.	Nos.	12.00		
b	2 lengths of 15 M long, 63mm dia RRL hose with instataneuos couplings and Hoses shall be stored in side the hose cabinet.	Nos.	12.00		
c	M.S. Hose cabinet stand mouted type fabricated out of M.S. sheet of 16 swg. with glass fronted (4mm thick glass with rubber beeding) door and size of the cabinet shall be 600mm x 750 mm x 250 mm Quoted rate shall be includes suitable stand for mounting, all fasteners etc, and cabinet shall be powder coated of approved colour both inside and out side.	Nos.	12.00		
d	1 no. Gun metal short branch pipe with nozzle.	Nos.	12.00		
e	Hose reel drum of swinging type with 19mm dia Rubber braided hose of 40M. length with Gate valve (upstream) and Shut off nozzle, complete	Nos.	12.00		

	with 20mm Ballvalve.				
f	Fire duct Shutter fabricated out of M.S.sheet and frame, door shall be 900mm x 1200 mm min. & fixed with 4 mm thick Glass, suitable Rubber beedibg and Locking arrangement. Quoted rate shall be includes all fasteners etc, and complete shutter shall be powder coated of approved colour both inside and out side.	Nos.	12.00		
g	Providing, fixing, testing & commissioning of **deluge valve** with wet pilot trim (Hydraulic Release), electric release trim test and alarm trim complete with all accessories viz fittings, pressure gauge, valves, actuator, manifold etc. alarm gong including up stream & down stream main header valve (Water Curtain for Facade Cooling).				
	80mm dia	Nos.	2.00		
5.0	**FOUR WAY FIRE BRIGADE INLET**				
5.1	Supplying, installing and commissioning of fire brigade Siamese connection of 4 way with 4 nos. 63 mm dia. built - in Gun metal Non- return valves instantaneous coupling type arranged on 150 mm dia. Pipe manifold and connected to wet riser main as. Qouted rate shall be included with C.I. Butterfly valve, C.I. Non-return valve and M.S. cabinet of suitable size with mounting supports etc. complete.	Nos.	1.00		
5.2	Supplying and Installing fire brigade Breaching connection of dia 150 mm for supplying water in water tank	Nos.	1.00		
	Qouted rate shall be included with C.I. Butterfly valve and M.S. cabinet of suitable size with mounting supports etc. complete.				
6.0	**EXTERNAL HYDRANT & HOSES**				
	Supplying, installing, testing and commissioning of yard hydrant comprising of the following,				
a	Single headed hydrant valve as per IS 5290, made of gunmetal with 63 mm dia instantaneous out & 80 mm dia fanged inelt inlet,Blank cap , chain and hand wheel etc complete.	Nos.	7.00		

b	2 lengths of 15 M long, 63mm dia RRL hose with instataneuos couplings and Hoses shall be stored in side the hose cabinet.	Nos.	7.00		
c	1 no. Gun metal short branch pipe with nozzle.	Nos.	7.00		
d	M.S. Hose cabinet stand mouted type fabricated out of M.S. sheet of 16 swg. with glass fronted (4mm thick glass with rubber beeding) door and size of the cabinet shall be 600mm x 750 mm x 250 mm Quoted rate shall be includes suitable stand for mounting, all fasteners etc, and cabinet shall be powder coated of approved colour both inside and out side.	Nos.	7.00		
7.0	Supplying and fixing approved make 50mm dia. With automatic air release valve with unions etc. complete.	Nos.	5.00		
	TOTAL FOR PART - B (Carried forward to summary)				
C	**AUTOMATIC SPRINKLER & WATER CURTAIN SYSTEM**				
1.0	Supplying, installing, testing and commissioning of G.I. Pipes confirming to IS 1239 Pt - I Heavy grade with painting, suitable type of supports (for above 50 mm dia, shall be fabricated by M.S. Channel / Angle / Falts etc), anchor fasteners, bolts nuts , clamps, "U" bolte, malleable specials such as Reducers,Tees, elbows, flanges. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports etc, as per drawings. The quoted rate shall also include for chasing / chipping walls, making bore holes in walls / floor and making them good with filler material and finished in cement morter etc. complete.				
a	150 mm nominal dia	Rmt	191.50		
b	100 mm nominal dia	Rmt	137.50		
c	80 mm nominal dia	Rmt	206.80		
d	65 mm nominal dia	Rmt	135.30		
e	50 mm nominal dia	Rmt	104.50		
f	40 mm nominal dia	Rmt	171.60		
g	32 mm nominal dia	Rmt	453.20		
h	25 mm nominal dia	Rmt	1408.00		

2.0	Supplying, installing, testing and commissioning of G.I. Pipes confirming to IS 1239 Pt - I Heavy grade with suitable type of supports, malleable specials such as Reducers,Tees, elbows, flanges. Including cutting, Welding as per drawings. The rate quoted should e included with anticorrosive treatment with 4 mm thick polymer corrosion resistant tape as per IS 10221, overlap shall be 15mm minimum.				
a	150mm nominal dia	Rmt	94.50		
3.0	**BALL VALVE**				
	Supplying, installing, testing and commissioning of Gun metal chrome finished Ball valves with fittings of screwed end type.				
a	50 mm nominal dia	Nos	10.00		
b	40 mm nominal dia	Nos.	R0		
c	32 mm nominal dia	Nos.	R0		
e	25 mm nominal dia	Nos.	R0		
4.0	**C I GATE VALVE**				
	Supply, Erection, Testing and commissioning of C.I.Gate valves as per IS:14846 PN 20 Rating, and rising spindle type with flanges, bolts, nuts, washers, gaskets etc.The valve shall be fitted with Supervisory switch for monitoring.				
a	50 mm nominal dia	Nos.	R0		
b	40 mm nominal dia	Nos.	R0		
5.0	**C I BUTTERFLY VALVE**				
	Supplying, Installing, testing and commissioning CI butterfly valves as per BS 5155 (PN 20) slim seal standared lever operated type with required flanges, nuts, bolts etc. complete.The valves shall be fitted with Supervisory switch for monitoring.				
a	150mm dia	Nos	4.00		
b	100mm dia	Nos	12.00		
c	80mm dia	Nos	2.00		
d	65mm dia	Nos	0.00		
e	50mm dia	Nos	2.00		

6.0	**C I NON-RETURN VALVE**				
	Supplying, installing, testing and commissioning of C.I. Non-return valves as per IS:5312(PN 20) swing check type with required flanges, nuts, bolts and gaskets etc. complete.				
a	100mm dia	Nos	R0		
b	80mm dia	Nos	R0		
c	65mm dia	Nos	R0		
d	50mm dia	Nos	R0		
e	40mm dia	Nos	R0		
7.0	**SPRINKLER**				
	Supplying, installing, testing and commissioning conventional Sprinkler quartzoid bulb type with 15mm screwed end connection of 68 deg. C. temperature rating,K 80 and orifice shall not be less than 6mm.Sprinklers shall be UL Listed / FM approved with Chrome finished.				
a	Pendant / Upright	Nos	477.00		
b	Side wall Sprinklers	Nos	RO		
c	Open Nozzles	Nos	16.00		
d	Concealed Sprinkler	Nos	100.00		
8.0	Supplying, installing, testing and commissioning of Electrically operated water curtain Deluge valve, with as required, pressure gauges, drain valves, ball valves, check valves, strainers etc. complete. (Signal will be given from smoke detectors)				
a	150mm dia.	Nos	2.00		
b	100mm dia.	Nos			
9.0	Supplying, installing, testing and commissioning flow switch on sprinkler distribution header on each floor nd shall be connected to fire alarm panel through cable. Cable shall be measured seperately.				
a	150mm dia	Nos	0.00		
b	100mm dia	Nos	12.00		
c	80mm dia	Nos	2.00		

d	65mm dia	Nos	0.00		
e	50 mm dia	Nos	0.00		
10.0	Stainless steel corrugated flexible pipe(hose) for dropping sprinklers below false ceiling, pipe shall be 16 bar pressure rating and 1000 mm to 1500 mm long 25 mm dia with union / reducer collar, clamps etc. as required.	Nos.	100.00		
11.0	Supply & fixing of approved type rosette plates (Recessed type, in two piece) for Sprinklers below false ceiling area.				
a	The Rosette shall be fabricated by M.S. plate of 2mm thick and the finish shall be powder coated and color shall be as approved by architects / clients.	Nos	100.00		
12.0	SITC of water spray fixed systems for fire protection applications where a high velocity water application may be required, Open nozzle for use on deluge systems	Nos	R0		
13.0	Providing, installing, testing and commissioning of 150 mm dia installation control valve UL Listed consisting of Alarm Valve, Body for Vertical Installation with ends as per ANSI Class 125 Flanged Inlet & Outlet, for Working Pressure of upto 25 bar, complete with Trim Kit for vertical installation and Water Motor Alarm complete with pressure guages, gate valves, drain etc complete as required.	Nos	1.00		
	Supply barrier type KORTEX E 120 1000°C automatic				
14.0	Automatic fire barrier for controlling fire, smoke and heat, consisting of a galvanized, steel accessible box, side guides, a fire-resistant fabric curtain, fitted with motor drive and programmable panel for connection to the fire panel.With a GRAVITY SAFETY drive enabling the barrier to be lowered with no external power.(BIS Approved, FM Approved)				
	Area				
14.1	6.35 X 5.5 m	Nos	1.00		
14.2	3.60 X 5.5 m	Nos	1.00		
14.3	6.45 X 5.5 m	Nos	1.00		

	TOTAL FOR PART - C (Carried forward to summary)				
D	**FIRE EXTINGUISHERS**				
	Supplying, installing and commissioning Portable Fire extinguishers of following type & capacity.				
a.	Dry chemical powder type fire extinguisher of 5 Kgs. Capacity, with initial filling in brand new cylinder with powder coated finish, fitted with Gun metal union, high pressure CO2 gas cartridge, discharge hose, wall mounting bracket etc. complete, confirming to IS:2171.	Nos.			
b.	ISI marked water (CO2 gas Expelled) type extinguishers 9 litres capacity with discharge tube, metal cap, 60 grams carbon dioxide cartridge complete in all respects.	Nos.			
c.	Carbon dioxide type extinguisher with cylinder fully charged with 4.5 Kgs. capacity.	Nos.			
d.	ABC Type fire extinguishers of 5 kgs. capacity.	Nos.	36.00		
e.	ABC Type fire extinguishers of 10 kgs. capacity.	Nos.	4.00		
f.	ISI marked 10 Kg. capacity dry powder fire extinguishers with high pressure discharge hose, squeeze grip nozzle , 120 grams carbon dioxide cartridge, gunmetal cap with initial charge of dry powder. Both extinguisher and dry powder to be ISI marked.				
g.	9 Liters water CO2 extinguishers (Soda acid tamper).	Nos.	18.00		
h.	9 litre mechanical foam	Nos.	RO		
i	Sand bucket filled withdry clean sand	Nos.	2.00		
	TOTAL FOR PART - D (Carried forward to summary)				

E	**ELECTRICAL SYSTEM**				
1.0	**Control Panel for Fire pumps.**				
	Fabrication,supplying,installation,testing & commissioning of electrical control panel of cubicle construction, floor mounted type,fabricated out of 2 mm,thick CRCA sheet, compartalised with hinged lokable doors,dust and vermin proof,powder coated of approved shades after 7 tank treatment process,cable alley,inter connection,having switchgear and accessories mounting and internal wiring,earth terminals,numbering etc.Complete in all respect,suitable for operation on 415 V,3phase, 50 Hz AC supply with enclosure protection class IP65 as required.	No.	1.00		
	FIRE FIGHTING PANEL as shown in the schematic EMPH-151.				
	INCOMER				
	1Nos 250A, TPN, 50 KA, MCCB with microprocessor release with Ics=100%Icu digital Voltmeter (0-500 Volts) with selector switch. digital Ameter (0-250Amps) with in built selector switch and CT's etc. Set of 3 Phase LED indicating lamps,Set of Al. bus bar for 250 Amps.				
	OUTGOING.				
	a) Main Fire Hydrant & Sprinkler Pump.				
	2 Nos. 160 Amps. 4P MCCB,35/36 KA Ics=100%Icu with suitable HP fully automatic star/delta starter with over load protection, without no volt and under voltage trip, current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation, selector switch for local /remote, auto/manual/OFF operation.3 Phase LED indicating lamps - 5sets				
	b) Drencher pump.				
	1No. MPCB Suitable for 15W Motor ,20 KA Ics=100%Icu with suitable HP fully automatic star/delta starter with over load protection, without no volt and under voltage trip, current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation, selector switch for local /remote, auto/manual/OFF operation.3 Phase LED indicating lamps				
	c) Jockey pump.				

	3Nos. MPCB Suitable for 7.5W Motor ,20 KA Ics=100%Icu with suitable HP fully automatic star/delta starter with over load protection, without no volt and under voltage trip, current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation, selector switch for local /remote, auto/manual/OFF operation.3 Phase LED indicating lamps				
	d) Booster pump.				
	2Nos. MPCB Suitable for 7.5W Motor ,20 KA Ics=100%Icu with suitable HP fully automatic star/delta starter with over load protection, without no volt and under voltage trip, current sensing type single phase preventor complete with all accessories and internal wiring required for automatic operation, selector switch for local /remote, auto/manual/OFF operation.3 Phase LED indicating lamps				
2.0	**1100 V GRADE POWER / CONTROL CABLES**				
2.1	SITC of heavy duty 1100V grade XLPE insulated sheathed & armoured Fire Retarded Low Smoke (FRLS) cables indoor or outdoor with Al./Cu conductors as specified and shown on drgs.complete with:				
	a) Cable clamps on walls, columns, beams, built-up trenches, cable markersetc for indoor cables.				
	b) Covering bricks or tiles,cable markers etc for outdoor cables.				
	c) Earthing the glands armouring etc.				
A	3C x 50 sq.mm (Al.)	Rmt	30.00		
B	3C x 35 sq.mm (Al.)	Rmt	30.00		
C	3.5C x 35 sq.mm (Al.)	Rmt	200.00		
D	3C x 10 sq.mm (Cu.)	Rmt	90.00		
2.2	Supply and laying of control wiring with multicore copper stranded conductor of following sizes PVC insulated.PVC sheathed armoured under ground cable between various sensors and system controller/starter/etc in pump house & outside on surfaces/existing cable tray complete with connections at both end with glands etc as required.				
b	6 x 2.5 sq.mm	Rmt	100.00		

c	2 x 2.5 sq.mm	Rmt	75.00		
2.3	Making cable end terminations including brass double compression glands and crimping type copper lugs for cable sizes mentioned below of aluminium or copper.				
a	3C x 50 sq.mm (Al.)	Nos	4.00		
a	3C x 35 sq.mm (Al.)	Nos	4.00		
b	3.5C x 35 sq.mm (Al.)	Nos	2.00		
c	3C x 10 sq.mm (Cu.)	Nos	12.00		
3.0	**CABLE TRAY**				
	Supply & installation of Perforated type G.I cable trays of 50 mm in Height with necessary supporting frame etc.for L.V.as specified & shown on drawings.				
a	150 mm wide single	rmt	10.00		
	horizontal/vertical tier.				
b	200 mm wide single	rmt	10.00		
	horizontal/vertical tier.				
c	300 mm wide single	rmt	15.00		
	horizontal/vertical tier.				
	TOTAL FOR PART - E (Carried forward to summary)				
F	**CIVIL WORKS**				
1.0	Exacavation of trenches up to 1.5 mts. in depth, for laying pipes upto 150mm dia. Including forming bottom surface to required level, refilling the trenches with selected excavated earth around th pipe in layers of 150mm thick,watering, consolidating. Quoted price inclusive of disposing off / Carting away the surplus earth out side the site to a dump yard acceptable local bodies or as directed by the site engineer with a lead of 300 mts. etc. complete.				
a	Excavation in all kinds of soil	Cum.	5.00		
b	Cutting of Rock with chiselling	Cum.	2.00		

2.0	Supply and installation of RCC hume pipes of 200 mm dia & NP 2 Class with collars for road / below floor crossing of Fire water pipes. The rate shall includes excavation, PCC (1:4:8 100 mm thick)bed and ends shall be closed with Brick masonry work as directed by site engineer.	Rmt.	15.00		
3.0	Supply & Construction of valve chamber with 230 mm Brick masonry wall with best quality TM bricks & CM 1:4,on a PCC 1:4;8 bed of 100 mm thcik.The wall shall be plastered internally smooth in CM 1:3, water proofing as required and externally rough plastered with sponge finish, including curing. The chamber shall be provided with M.S. 6 / 8 mm thick plate fabricated top cover in leaves with neccessory hinges and locking arrangement. The size of the chamber shall be 900mm x 900mm x1000mm in depth.	Nos.	2.00		
4.0	Supply and construction of PCC (1:2:4) pedastals / supports for Under ground / above ground pipes. Quoted rate shall inclusive of excavation (if required), chipping / chasing, shuttering, plastering (if required) etc. complete.	cum	5.00		
5.0	Providing and doing core cutting in RCC slab / beam at given location as per architectural / consultants instructions inluding necessary tools and machinaries, scaffolding, watering, rate also included carting away the debris from site time to time or disposing the material as directed and specified by the client				
5.1	50 Dia Core Cuts in 600mm width beam.	Nos	64.00		
5.2	80 Dia Core Cuts in 600mm width beam.	Nos	58.00		
5.3	100 Dia Core Cuts in 600mm width beam.	Nos	45.00		
5.4	150 Dia Core Cuts in 600mm width beam.	Nos	25.00		
5.5	200 Dia Core Cuts in 600mm width beam.	Nos	15.00		
5.6	100 Dia Core Cuts in slabs.	Nos	32.00		
5.7	150 Dia Core Cuts in slabs.	Nos	32.00		
	TOTAL FOR PART - F (Carried forward to summary)				
	TOTAL				

Semi Addressable Fire Alarm System					
Sr No.	**DESCRIPTION**	**Unit**	**QTY**	**Unit Rate**	**Amount**
1	Supply, installation and testing of Addressable fire alarm control panel with necessary hardwares generally conforming to the intents of specifications complete with				
	i) Each loop with 99 Devices + 99 Detectors modules connection capability of Addressable FACP) Pannel.				
	ii) FACP with all in-built modules & displays.				
	iii) 240 volts AC power supply, automatic battery charger, 24 volts sealed lead acid batteries sufficient for 24 hours normal working.				
	iv) Programming & setting up				
	v) system to be capable of operating the system for 2 hours during an emergency condition including all necessary software for remote programming of fire alarm system through central control station.				
a	4 Loop Fire Alarm Panel	Nos	1		
2	Addressable Type Optical smoke detector with inbuilt fault isolator, pulsing IR LED & photodiode to detect IR scatter caused by smoke entering the chamber.	Nos	258		
3	Addressable Type Rate of Rise heat detector with inbuilt fault isolator, thermistor arrangement to sense a quick rise in temperature and also a final threshold temperature of 57°C. The Fyreye fixed heat detector has a single thermistor arrangement that gives an alarm at a temperature of 90°C.	Nos	40		
	Supply & commissioning of Analog Addressable type Self Acclimatising Multi Sensing (Photo + Heat) detector with standard mounting base, LED, address switch, complete with MS Powder coated Junction Box for mounting on Surface / on False Ceiling / Below False Floor, Cable lugs at end, cable compression glands, cable tags and ferruling and as per attached specification etc. as required.	Nos	50		

4	The manual call point has a modern design and has been approved by BSI to EN54 part 11. It is a resettable call point that signals an alarm entering the window area and a red alarm LED.with a yellow flag entering the window area and a red alarm LED.				
4.1	Addressable MCP with inbuilt control module / monitor module.	Nos	10		
5	The sounder (hooter) is a small, high output sounder which designed to meet the requirements of EN54 part 3 and is CE marked.80 dB Min sound Level. (Addressable with control module)	Nos	10		
6	Conventional Type Optical smoke detector uses a pulsing IR LED & photodiode to detect IR scatter caused by smoke entering the chamber.				
6.1	Below False Ceiling.	Nos	RO		
6.2	Above False Ceiling.	Nos	RO		
7	Conventional Type Rate of Rise heat detector uses a thermistor arrangement to sense a quick rise in temperature and also a final threshold temperature of 57°C.The Fyreye fixed heat detector has a single thermistor arrangement that gives an alarm at a temperature of 90°C.	Nos	R.O.		
8	Addressable Relay / control Module	Nos	4		
9	Addressable Monitor Module	Nos	10		
10	Fault Isolator Module	Nos	RO		
11	Response Indicator	Nos	30		
12	Addressable Zone Module.	Nos	RO		
13	Wiring for signal initiating devices, consisting of 2C x 1.5 Sq.mm FRLS CU armoured CABLES shielded & (Signal,supervised power, voice, strobes, telephonic & spare) from fire panel to the detectors / devices..	Rmt	3936		
	Total				

ESTIMATE - PUBLIC ADDRESSABLE SYSTEM

ITEM NO.	DESCRIPTION OF ITEM	QTY.	UOM	UNIT Rate	TOTAL AMOUNT
1	**Public Address System**				
1.01	Supply & installation of Ceiling Mounted Type 6W Speakers Make Bosch in office area	98	Nos		
1.02	Supply & installation of 6W Wall Mounted Speakers of Make Bosch in classrooms	71	Nos		
1.03	Supply & installation of 20W wall mounting box speakers. Make Bosch in Multipurpose hall	RO	Nos		
1.04	Providing, fixing, testing & commissioning 240Watts Amplifiers of Make Bosch.	RO	Nos		
1.05	Providing, fixing, testing & commissioning 480Watts Amplifiers of Make Bosch. (Spare Amplifier)	RO	Nos		
1.06	Supply & installation of Main control panel Bosch (Plena Amplifier) with 6 zone & 480 W inbuilt amplifier with BGM Provision.	1	Nos		
1.07	Providing, fixing, testing & commissioning Microphone & zone selection Keypad for 6 zones, connection from Main controller to Announcement consol maximum 100 metre Cat-6 Cable Bosch (in Administration Area)	1	Nos		
1.08	Providing, fixing, testing & commissioning Call Station Key Pad with connections & all accessories.	1	Nos		
1.09	Providing & laying of armoured 2C x 0.75 sqmm Cu. Cable with required fixing arrangements etc.	2123	Mtrs.		
1.10	Providing, fixing, testing & commisioning Router for expanding 6 Zones Controller with additional port for amplifier of suitable wattage.	R.O.	Nos		
	Total for PA system				**-**

Annexure-3

(On Letter Head)

DECLARATION OF THE CONTRACTOR

I hereby declare that I have made myself thoroughly conversant with the local conditions regarding all FF , FA & PA material and labour on which I have based my rates for this work, which are inclusive of all leads and lifts involved. The specifications and understood by me before submitting this tender. I undertake to use only the best materials approved by the Consultants or his duly authorized assistant before starting the work and abide by his decision.

I hereby undertake to pay the Laborers engaged on the work as per Minimum Wages Act, 1948 as amended from time to time and applicable to the zone concerned.

Authorised Signature with Seal

Annexure-4

ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made this _____day of _____ 2018 BETWEEN SASMIRA, MUMBAI (Hereinafter called "The Employer") of the ONE PART.

AND

_____ (or whose Registered Office is situated at _____ (Hereinafter called "The Contractor") of the OTHER PART. WHEREAS the Employer is desirous of construction of _____ and has caused Drawings and specifications describing the works to be done to be prepared by **M/s. Master & Associates & M/s. Global Engineering Services** and WHEREAS the said drawing Numbered to inclusive, the specifications and/or the schedule of quantities 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 set forth herein (HEREIN AFTER referred to as "The said conditions" the work shown upon the said Drawings and/or described in the said specifications and include in the said schedule of quantities at the rates therein set forth amounting to the sum of therein arrived at or such sum as shall become payable there under (hereinafter referred to as "The said Contract Amount").

NOW IT IS HERE BY AGREED AS FOLLOWS

(1) In consideration of the said 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 condition execute and complete the work shown upon the said Drawings and described in the said specification and/or the 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 term "The Architect" in the said conditions shall mean the said Shri., UDAY MASTER MUMBAI Architects or , in the event of his death or ceasing to be the Architects for the purpose of this contract, such other person as shall be nominated for the purpose of contract, such other person as shall be nominated for that purpose by the Employer, not being a person to whom the Contractor shall object or reasons considered to be sufficient by the arbitrator mentioned in the said conditions provided always that no person subsequently appointed to be Architect under the contract shall be entitled to disregard or over rule any previous decision or approval or direction given or expressed by the Architect for the time being.

(4) The said conditions, special conditions, appendix, standard specifications and all the papers attached hereto shall be respectively read and construed as forming part of this agreement, and the parties hereto shall respectively abide by, submit themselves to the conditions and perform the agreements on their part respectively in such conditions contained.

(5) The R.C.C. specialist refers to the name of M/s Rajeev Shah & Associates as mentioned above or person or persons as may be appointed by the Architect for the purpose.

(6) The plans, agreement and documents mentioned herein form the basis of this contract.

(7) The contract is neither a fixed lump-sum contract nor a piece work contract, but is a contract to carry out the work in respect of the entire buildings to be paid for according to actual measured quantities at the rates contained in the schedule of rates and probable quantities or as provided in the said conditions.

(8) The Employer through the Architect reserves to himself the right of altering drawings and nature of the work of adding to or omitting any items of work or having portions of the same carried out without prejudice to this contract.

(9) The time shall be considered as of the essence of the agreement and contractor hereby agrees to commence the work soon after the site is handed over to him as provided for in the said conditions and to complete the entire work within 6 consecutive calendar months (incl. monsoon) subject nevertheless to the provisions for extension of time.

(10) The said conditions shall be read and construed as forming part of this agreement and the parties hereto will respectively abide by and submit themselves to conditions and stipulations and perform the agreements on their parts, respectively in such conditions contained.

(11) All disputes arising out or in any way connected with this agreement shall be deemed to have arisen in MUMBAI and only the court at MUMBAI shall have jurisdiction to determine the same.

(12) The several parts of this contract have been read to us and fully understood by

us. AT WITNESS our hands this _____ day of_____ 2018

signed by the contractor : _____

(The Contractor with Address)

in the presence of (1)_____

(2) _____

Signed by the Employer _____

(The Employer with Address)

in the presence of (1) _____

(2) _____

-0O0-

Annxure-5

APPENDIX HEREINBEFORE REFERRED TO

1.	Defects Liability Period	: 12 Months
2.	Date of Commencement	: **21/08/2018**
3.	Date of Completion	: **21/11/2018**
4.	Insurance	: 1). Contractor All Risk Policy (CAR) 2). Third party liability. 3). Workman Compensation Insurance.

5. Agreed Liquidated Damages per week: @ 0.5% of the accepted tendered amount per week subject to ceiling of 10%

6.	Period of Final Measurement	: 1 Month.
7.	Value of Work for Interim Certificate	: 10 Lakhs.
8.	Retention Percentage	: 4 % Security Deposit + EMD
9.	Installment After Virtual Completion	: 50% Retention + Full EMD Amount. Balance After Defect Liability Period.
10.	Period for Honoring Payment of Bills	: 15 Days.
11.	Rate for Interest for Delayed Payment Percent Per Annum.	: Not Applicable.

Annexure-6

MINIMUM STAFF TO BE MAINTAINED BY CONTRACTOR AT ALL TIMES TILL THE HANDING OVER OF SITE

Sr.No.	Job Description / Qualification	Eligibility	Minimum Exp. in similar jobs
1	Project Engineer	B.E. / B.Tech in Mechanical	5 yrs.
		Diploma in Mechanical	10 yrs.
2	Senior Engineer	B.E. / B.Tech in Mechanical	5 yrs.
		Diploma in Mechanical	6-7 yrs.
3	Junior Engineer	B.E. / B.Tech in Mechanical	2-3 yrs.
		Diploma in Mechanical	4-5 yrs.

Annexure-7

COMPANY PROFILE

Sr.	Particular	Detail
1	Name of Organisation	
2	Nature of the Organisation	
a	In case of Public/Pvt. Ltd company (Certified copy of Certificate of incorporation for companies & Memorandum and Articles of Associations)	
b	In case of Partnership Firm (Partnership deed)	
c	In case of Proprietorship (Registration certificate, Factory registration, DIC –industrial registration)	
d	In case of society (Certified copy of registration deed with objects of constitution of society)	
e	In case of Corporation (Authenticated copy of the parent statute)	
3	Address with Phone No. and Fax No. E-mail, Website:	
4	Name and Contact details of the Authorised Person	
5	Any other details in support of your office	
6	PAN (attach attested copy)	
7	CST/ TAN No.:	

Annexure – 8

ELIGIBILITY CRITERIA

Sr.	Criteria	Documents/Detail required	Documentary Proof attached (Y/N)
1.	Minimum 03 (three) years of experience in the field of Fire Fighting, Fire Alarm & Public Address installation and maintenance.	Certificate of incorporation, Business commencement certificate, Works to be demonstrated by Contract/Agreement/ Work Order from clients showing clearly 3 years of experience	

Annexure – 9

Technical Evaluation Criteria

The Criteria for evaluating the Technical Bids would be as follows:

Sr. No.	Heading	Description	Criteria for point allotment
1	Firm□s Experience	i) Proven and demonstrable experience in FF , FA & PA working for installation, commissioning.	• projects experience • projects experience • projects experience
		ii) Proven and demonstrable experience in working for long term projects for all FF , FA & PA Work	18 months experience months experience Less than 12 months
2	Key Personnel	Educational Qualification	**Team Leader:** To have at least 10 years of working experience. Should have deep expertise in monitoring and advising installation, commissioning, demonstration/ training of FF , FA & PA Work. The candidate should essentially have strong working experience and prior experience in all types FF , FA & PA work. **Other Team members:** To have at least 5 years of working experience in FF , FA & PA project related work.
3	Project Methodology, approach and work plan	Technical Approach & Methodology for the project	Bidder to provide approach, methodology, and detailed work/ activity plan, etc for installation, commissioning, and training within given timelines. The bidder is to provide detailed plan for entire FF , FA & PA work.

Annexure-10

DETAILS OF WORK SIMILAR TYPE AND MAGNITUDE CARRIED OUT

Annexure-11

DETAILS OF TECHNICAL PERSON WITH TENDERER

Annexure-12

DETAILS OF OTHER WORKS TENDERED FOR AND IN HAND