यूको बैंक

(भारत सरकार का उपक्रम)

सम्मान आपके विश्वास का

UCO BANK

(A Govt. Of India Undertaking)

HONOURS YOUR TRUST

अंचल कार्यालय : यूको भवन, सन्यास आश्रम के निकट, आश्रम रोड, अहमदाबाद - ३८०००९

फोन : ०७९ - ४०१७६९२७, ४०१७६९२०

यूको बैंक, आश्रम रोड, अहमदाबाद मे एड्रेसेबल फायर अलार्म सिस्टम की आपूर्ति व लगवाने हेतु

हम प्रतिष्ठित वेंडर्स से **यूको भवन, आश्रम रोड, अहमदाबाद** मे हमारे बैंक की बिल्डिंग मे नई एड्रेसेबल फायर अलार्म सिस्टम की आपूर्ति व लगवाने हुते निविदा आमंत्रित करते है । सम्पूर्ण जानकारी के साथ आवेदन पत्र ऊपर बताए गए पते पर दिनांक **19/01/2019** तक बंद लिफाफे में ऊपर **"एड्रेसेबल फायर अलार्म सिस्टम की आपूर्ति व लगवाने हेतु आवेदन"** लिखकर पहुंचा दे । अधिक जानकारी के लिए हमारी वेबसाइट **www.ucobank.com** देखे ।

अंचल प्रबंधक

INVITATION TO TENDER

GENERAL CONDITIONS OF CONTRACT

FOR

FIRE ALARM SYSTEM & PUBLIC ADDRESS SYSTEM WORKS

OF

UCO BANK

ZONAL OFFICE, UCO BANK BHAVAN,

AT

NR. SANYAS ASHRAM, ASHRAM ROAD,
AHMEDABAD

M/s. HIREN A. GANDHI & ASSOCIATES

2, MUNICIPAL STAFF HOUSING SOCIETY

B/H. ST. XAVIER'S LOYOLA HALL, MEMNAGAR, AHMEDABAD – 380 052

Tender issued to……..

Notice of Invitation of Tender

Sealed Tenders is invited in single bid from FIRE ALARM & P. A. SYSTEM WORK CONTRACTORS on the approved of the bank are only eligible to apply for taking up FIRE ALARM & P. A. SYSTEM works for UCO BANK, ZONAL OFFICE, UCO BANK BHAVAN, AT NR. SANYAS ASHRAM, ASHRAM ROAD, AHMEDABAD. Tender Documents can be purchased from M/s. HIREN A GANDHI & ASSOCIATES, 2 MUNICIPAL STAFF HOUSING SOCIETY, B/H. ST. XAVIER'S LOYOLA HALL, MEMNAGAR, AHMEDABAD – 380 052 ON 27/12/2018 to 19/01/2019 before 3.00 PM except Sundays and Holiday.

Name of the work	:	Fire Alarm System & P. A. System work at UCO Bank Zonal Office, Uco Bank Bhavan, Nr. Sanyas Ashram, Ashram Road, Ahmedabad
Cost of application/tender document	:	Rs. 1200/-
Time and date of Submission of	:	**Before 3.00 PM on 19/01/2019 at UCO Bank, Zonal office, Ahmedabad**
Place and Address for submission of tender/contact person/telephone no./e-mail address	:	**THE ZONAL MANAGER,** **UCO BANK, ZONAL OFFICE, 7th Floor,** **UCO Bank Bhavan, Nr. Sanyas Ashram, Ashram Road, Ahmedabad**
Date, Time and place of opening of tenders	:	**21/01/2019 at 3:00 PM**
Earnest Money Deposit	:	**Rs. 30,000/-** in the form of Demand Draft, payable at Ahmedabad drawn in favour of the **UCO BANK, ZONAL OFFICE, Ahmedabad.**
Security Deposit	:	As per clause 9 of General conditions of Contract (Below)
Terms of Payment of Bills, if any	:	Running account bills each valuing more than Rs. 8.00 lakhs will be honored
(Penalty clause) Liquidated Damages for delay	:	In case of delay a penalty at the rate of 0.5% of the value of the estimate cost per week subject to a maximum of 5% of value of work done would be strictly imposed.
Stipulated time of Completion for the work/supply	:	**120 Calendar days**
Estimated value of tender	:	**Rs. 29,97,000.00**
Validity of the Tender	:	90 Calendar Days
Defects Liability Period	:	12 Months
Sales Tax. IT. Octroi. Levies	:	The rates quoted to include Sales tax, Octroi or any other statutory obligation/tax on material or on finished works like work's contract tax, turn over tax, Goods & serviced tax, etc., in respect of this contract as applicable including transportation and TA/DA of the

		workers at site and the Bank will not entertain any claim whatsoever in this respect. However I.T and WCT will be deducted at source.
Electronic payment	:	Electronic payment shall be preferred

1. GENERAL RULES AND INSTRUCTION FOR THE GUIDANCE OF TENDERER.

1. Tenders are invited on behalf of **M/s. UCO BANK, ZONAL OFFICE, UCO Bank Bhavan, Nr. Sanyas Ashram, Ashram Road, Ahmedabad** to carry out the fire Alarm & P. A. System work.

2. Tender documents consisting of the plans, complete specifications, the schedule of quantities of the various classes of wok to be done, and the set of conditions of contract to be complied with by the person whose tenders may be accepted, can be purchased from **M/s. Hiren A. Gandhi & Associates, 2, Municipal Staff Housing Society, B/h. St. Xavier's Loyola Hall, Memnagar, Ahmedabad – 380 052 of issued of tenders 27/12/2018 to 19/01/2019.**

   The site for the work is available / or the site for the work shall be made available in parts a specified below

3. Tenders which should always be placed in sealed cover with the name of project written on the envelopes will be received by **M/s. UCO BANK, ZONAL OFFICE, UCO BANK BHAVAN, NR. SANYAS ASHRAM, ASHRAM ROAD, AHMEDABAD** Up to 3.00 PM on **19/01/2019** and will opened by him/authorized officer in his office on 21/01/2019 at 3:00 PM. The tenders received after the stipulated time will not be accepted.

4. The time allowed for the carrying out of the work be 120 days from the date of written orders to commence work.

5. The contractors should quote in figures as well as in words the rate and amount tendered by them. The amount for each item should be worked out and requisite totals given.

6. Earnest Money amounting to Rs. 30,000/- (Rupees THIRTY Thousand Only) in the form of bank draft drawer in favor of **"UCO BANK" ZONAL OFFICE**, payable at AHMEDABAD. Must accompany with each tender and each tender is to be in a sealed cover super/scribed "Tender for Fire Alarm & P. A. system works at UCO Bank, zonal Office, Uco Bank Bhavan, Ahmedabad"

7. The acceptance of the tender will rest with **"UCO BANK"** which does not find itself to accept the lowest tender, and reserves to itself the authority to reject any or all of the tenders received without assigning any reason. All tenders in which any of the

prescribed conditions are not fulfilled or are incomplete in any respect are liable to be rejected.

8. **UCO BANK** reserves the right to accept the tender in full or in part and the tenderer shall have no claim for revision of rates or other conditions if his tender is accepted in parts.

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

10. All rates shall be quoted on the proper form of the tender alone.

11. An item rate tender containing percentage below/above will be summarily rejected. However, where a tenderer voluntarily offers a rebate for payment within a stipulated period, this may be considered.

12. On acceptance of the tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from the Employer/Architects shall be communicated to the Employer.

13. Special care should be taken to write the rates in figure as well as in words and the amount in figures only, in such a way that interpolation is not possible. The total amount should be written both in figures and in words. In case of figures the words 'Rs' should be written before the figures of rupees and words 'P' after the decimal figures, e.g., Rs.2.15 "P" and in case of words. The word 'Rupees' should precede and the word 'Paise' should be written at the end, unless the rate is in whole rupees and followed by the words 'only'. It should invariably be up to two decimal places. While quoting the rate in schedule of quantities the word 'only' should be written closely following the amount and it should not be written in the next time.

14. **UCO BANK** does not bind itself to accept the lowest or any tender and reserves to itself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the quoted rates.

15. Sales tax or any other tax on material or on finished works like works contract tax, turnover tax, GST etc., in respect of this contract shall be payable by the contractor and the **UCO BANK** will not entertain any claim whatsoever in this respect. This particular aspect should be mentioned in tender notice.

16. The tender for works shall remain open for acceptance for a period of Ninety (90) calendar days from the date of opening of tenders. If any tenderer withdraws his

tender before the said period, then the bank shall be at liberty to forfeit the Earnest Money paid along with the tender

17. The tender of the work shall not be witnessed by a contractor or contractors who himself/themselves has/have tendered or who may had/have tendered for the same work. Failure to observe this condition would render tenders of the contractors tendering as well as witnessing the tender liable to summary rejection.

18. It will be obligatory on the part of the tenderer to tender and sign and tender documents for all the component parts and that, after the work is awarded, he will have to enter into an agreement for each component with the competent authority **UCO BANK**.

19. The tenderer apart from being a competent contractor must associate himself with agencies of the appropriate class who are eligible to tender for other works.

20. **The quoted price shall be firm & no discounts are acceptable on the final price.**

21. If the contractor or his representatives are to be absent from the site for the more than 3 days the contract is deemed to be terminated by him.

22. Tenders are to be on the prescribed for which can be obtained from the office of **Hiren A. Gandhi & Associates, Ahmedabad**. On payment of sum of **Rs. 1200/-** by cash non refundable. The time allowed for carrying out of the work for the Fire Alarm & P. A. System works will be 120 Days, (Calendar days) from the same day after the date of written orders to commence work.

23. Issue of tender form will be stopped one day before the date fixed for the opening of tenders.

24. Power and Water will not be provided by the Employer. The contractor has to make the arrangement for the same. Sub-meter shall be provided by the contractor at his own cost.

Signature of the Competent Authority

2-GENERAL CONDITIONS OF CONTRACT

Except where provided for in the description of the individual items in the schedule of quantities in the specifications, conditions laid down here in after and in the Drawings, the work shall be carried out as per standard specifications and under the direction of Employer/Architects.

1. INTERPRETATION:

In constructing these conditions, the specifications, the schedule of quantities, tender and Agreement, the following words shall have the meaning herein assigned to them except where the subject or context otherwise requires:

a. **Employer:** The term employer shall denote **M/s. UCO BANK, ZONAL OFFICE, UCO Bank Bhavan, Nr, Sanyas Ashram, Ashram Road, Ahmedabad** and any of its employees representatives authorized on their behalf.

b. **Architects:** The term Architects shall mean **M/s HIREN A GANDHI & ASSOCIATES AHMEDABAD** or in the event of his/her ceasing to be the Architects for the purpose of this contract such other persons as the Employer shall nominate for the purpose.

c. **Contractor:** The term contractor shall mean …… (Name and address of the contractor) and his/hers legal representatives, assign and successors.

d. **Site:** The site shall mean the site where the works are to be executed. The site is in UCO BANK, Zonal Office, UCO Bank Bhavan, Nr. Sanyas Ashram, Ashram Road, Ahmedabad.

e. **Site Engineer:**The site engineer shall be appointed by the Bank. The bank may also determine the number of site Engineers and the supporting staff at site office to assist them and also whether the site engineer shall be temporary or permanent. As far as possible, the site engineer should assume change of his post before the contractor reports on site of work. Where more than one site engineer appointed, one of them shall be designated as senior engineer by the Premises Department and the other Site Engineer shall be reporting to the Senior Engineer.

f. **Drawings:** The work is to be carried out in accordance with drawings, specifications, the schedule of quantities and any further drawings which may be

supplied or any other instructions, which may be given by the employer during the execution of the work. All drawings relating to work given to the contractor together with a copy of schedule of quantities are to be kept at site and the Employer/Architects shall be given access to such drawings or schedule of quantities wherever necessary

g. "The Works" shall mean the work or works to be executed or done under this contract.

h. "Act of insolvency" shall mean any act as such as defined by the Presidency Towns insolvency Act or in Provincial Insolvency Act or any amending statuaries.

i. "The schedule of Quantities" shall mean the schedule of quantities as specified and forming part of this contractor.

2. SCOPE:

- An intelligent reporting, addressable microprocessor controlled fire detection system & voice evacuation system shall be installed in accordance to the project specifications and drawings.
- The basic system comprises of Main Addressable Intelligent fire alarm panels, Repeater panel, mimic panel, networked on a peer to peer network as the headend of the System.
- The Low side of the System shall comprise of the initiating devices such as the smoke / Heat / Combination Sensors, Manual Pull Stations etc.
- Notification Applicances shall include Hooter cum Strobes, Flashers, Alarm Bells etc.
- All the above components shall be connected by interconnecting flexible FRLS copper cables laid in 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.
- The system shall be designed such that each signalling line circuit (SLC) is limited to only 80% of its total capacity at initial installation.
- Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) 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 Signalling 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.
- The Associated Public Address system shall be integrated with Fire Alarm System and shall act as Voice Evacuation & Public Address System. This functionality

shall be achieved with the help of Digital Voice Commander Controller, amplifiers and various types of speaker.

- The Voice Evacuation & PA System shall be configured zone-wise & phase-wise for announcement related to any emergency and normal paging.

3. TENDERER SHALL VISIT THE SITE:

Intending tendered shall visit the site and make himself thoroughly acquainted with the local site condition, nature and requirements of the works, facilities of transport condition, effective labour and materials, access and storage for materials and removal of rubbish. The tenderer shall provide in their tender cost of carriage, freight and other charges as also for any special difficulties and including police restriction for transport etc., for proper execution of work as indicated in the drawing. The successful tenderer will not be entitled to any claim of compensation for difficulties faced or losses incurred an account of any site condition which existed before the commencement of the work or which in the opinion of the Employer/Architects might be deemed to have reasonably been inferred to be so existing before commencement of work.

4. TENDERS:

The entire set of tender paper issued to the tenderer should be submitted fully priced and also signed on the last page together within initials on every page. Initial/Signature will indicate the acceptance of the tender papers by the tenderer.

The schedule of quantities shall be filled in as follows:

(i) The 'Rate' column to be legibly filled in ink in both English figures and English words.
(ii) Amount column to be filled in for each item and the amount for each circle as detailed in the "Schedule of Quantities".
(iii) All corrections are to be initialed.
(iv) The 'Rate Column' for alternative items of which the quantities are not mentioned shall not be filled up.
(v) In case of any errors/omissions in the quoted rates, the rates given in the tender marked 'Original shall be taken as correct rates.

No modifications, writings or corrections can be made in the tender papers by the tenderer, but may at his option offer his comments or modifications in a separate sheet of paper attached to the original tender papers.

The Employer reserves the right to reject the lowest or any tender and also to discharge any or all of the tenders for each section or to split up and distribute any item of work to any specialist firm or firms without assigning any reason.

The tender should note that tender is strictly on the item rate basis and their attention is drawn to the fact that the rate for each and every item should be correct, workable and self-supporting. If called upon by the Employers/Architects detailed analysis of any or any or all the rates shall be submitted. The Employer/Architects shall not the bound to recognize the contractor's analysis.

The work will be paid for the "measured work" on the basis of actual work done and not as "Lump sum" contract.

All items of work described in the schedule of quantities are to be deemed and paid as complete works in all respects and details including preparatory and finishing works involved, directly, related to and reasonably detectable from the drawings, specifications and schedule of quantities and no further extra charges will be allowed in this connection. In the any case of lump-sum charges in the tender in respect of any item of works, the payment of such items of work will be made for the actual work done on the basis of lump-sum charges as will be assessed to be payable by the Employer/Architects.

The employer has power to add to, omit from any work as shown in drawings or described in specifications or included in schedule of quantities and intimate the same in writing but no addition, omission or variation shall be made by the contractor without authorization from the Employer. No variation shall vitiate the contract.

5. AGREEMENT:

The successful contractor maybe required to sign agreement as may be drawn up to suit local conditions and shall pay for all stamps and legal expenses, incidental there to.

6. TAXES AND DUTIES:

The tendered must include in their prices quoted for all duties, GST, royalties, cess, income tax and sales tax or any other taxes or local charges if applicable.

7. PROVISIONAL SUMS (PS):

All provisional sums described in the schedule of quantities as PS shall be exclusively to the purchase of materials and not for any handling and fixing to be done by the

contractor. Such costs of handling and fixing with profit (including transport charges if required) shall be separately included in the contract price as described in the schedule of quantities. The disposal of the amounts covered under this circle will be absolutely at the discretion of the Bank. Contractor is to make payments for these materials to the suppliers on certificate or order issued by the Employer/Architects and realizes them through his bills from the Employer/Architects.

8. QUANTITY OF WORK TO BE EXECUTED:

The quantities shown in the schedule of quantities are intended to cover the entire new structure indicated in the drawings but the bank reserves the right to execute only a part or the whole or any excess thereof without assigning any reason therefore.

9. OTHER PERSONS ENGAGED BY THE EMPLOYER:

The employer reserves the right to execute any part of the work included in this contract or any work which is not included in this contract by other agency or persons and contractor shall allow reasonable facilities and use of his scaffolding for the execution of such work. The main contractor shall extend all co-operations in this regard.

10. a. EARNEST MONEY DEPOSIT:

The tendered will have to deposit an amount of Rs. **30000/-(Rupees Thirty Thousand Only)** as specified in tender notice in the form of Bank Draft drawn in favor of **UCO BANK, ZONAL OFFICE, AHMEDABAD** at the time of submission of tender as an Earnest Money. The employer is not liable to pay any interest on the Earnest Money of the unsuccessful tenderer will be refunded without any interest soon after the decision to award the work is taken or after the expiry of the validity period of the tender.

All taxes include Sales tax, Octroi or any other statutory obligation/tax on material or on finished works like work's contract tax, turn over tax, Goods & serviced tax, etc., in respect of this contract as applicable including transportation and TA/DA of the workers at site and the Bank will not entertain any claim whatsoever in this respect.

Income Tax will be recovered @ 2% as per Government rules.

Works Contract Tax will be recovered @ 2% as per Government rules.

Retention money shall be deducted progressive running bills @ 8% of the gross value of each running bills. The retention amount will be refunded to the contractor 15(fifteen)

days after the end of defects liability period provided he has satisfactorily carried out all the work and attended to all defects in accordance with the conditions of the contract. No interest is allowed on retention money.

11. CONTRACTOR TO PROVIDE EVERYTHING NECESSARY:

The contractor shall provide everything necessary for the proper execution of the work according to the intent and meaning of the drawings, schedule of quantities and specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from. The contractor shall provide himself for ground and fresh water carrying out of the works at his own cost. The employer shall on no account be responsible for the expenses incurred by the contractor for hired ground or fresh water obtained from elsewhere.

The rates quoted against individual items will be inclusive of everything necessary to complete the said items of work within the contemplation of the contract, and beyond the unit price no extra payment will be allowed for incidental or contingent work, labour and/or materials inclusive of all taxes and duties whatever except for specific items, if any stipulated in the tender documents.

The contractor shall at all times gives access to workers employed by the Employer or any employed on the buildings and to provide such parties with proper sufficient and if required special scaffolding, hoists and ladders and provide them with water and lighting and leave or make any holes, grooves, etc., in any work, where directed by the employer as may be required to enable such workmen to lay or fix pipes, electrical wiring, special fittings etc., The quoted rates of the tenderer shall accordingly include all these above mentioned contingent works.

12. TIME OF COMPLETION EXTENSION OF TIME AND PROGRESS CHART:

a. **Time of Completion:** The entire work is to be completed in all respects within the stipulated period of 120 days. The work shall deem to be commenced within seven days from the date of acceptance letter or date of handing over of site, whichever is earlier. Time is essence of the contract and shall be strictly observed by the contractor.

The work shall not be considered as complete until the Employer/Architects have certified in writing that this has been completed and the Defects Liability Period small commence from the date of such certificate.

b. **Extension of Time:** If in the opinion of the Employer/Architects the works be delayed

(i) By reason of any exceptionally inclement weather, or

(ii) By reason of instructions from the Bank consequence of proceedings taken or threatened by or disputed, with adjoining or neighboring owners or

(iii) By the works, or delay, of other contractors or tradesmen engaged or nominated by the Employer and not referred to in the specification or

(iv) By reason of authorized extra and additions or

(v) By reason of any combination of workmen or strikes or lock-out affecting any of the building trades or

(vi) From other causes which the Bank may consider are beyond the control of the contractor, the bank at the completion of the time allowed for the contract shall make fair and reasonable extension of time for completion in respect there for. In the event of the Bank failing to give possession of the site upon the day specified above the time of completion shall be extended suitably.

In case of such strikes or lock-outs, as are referred to above, the contractor shall, immediately give the employer, written notice thereof. Nevertheless, the contractor shall use his best endeavors to prevent delay, and shall do all that may be reasonably required, to the satisfaction of the employer to proceed with the works and on his doing so that it will be ground of consideration by the employer for an extension of time as above provided. The decision of the employer as to the period to be allowed for an extension of time for completion hereunder (which decision shall be final and binding on the contractor) shall be promulgated at the consideration of such strike or lock-out and the employer shall then, in the event of an extension being granted, determine and declare the final completion date. The provision in clause 13 with respect to payment of liquidated damages shall be construed as if the extended date fixed by the Employer was submitted for and the damages shall be deducted accordingly.

Progress of Work: During the period of construction the contractor shall maintain proportionate progress on the basis of program chart submitted by the contractor immediately before commencement of work and agreed to by the Employer/Architects. Contractor should also include planning for procurement of scare material well in advance and reflect the same in the program chart so that there is no delay in completion of the project.

13. LIQUIDATED DAMAGES:

The entry for the quantum of LD per week of delay, appropriate for the case in hand, should be selected from the following:

For contracts having time for completion 6 months and less	1.00% of the estimated amount shown in the tender per week.
For contracts having time for completion exceeding 6 months but not exceeding 24 months.	0.50% of the estimated amount shown in the tender per week
For contracts having time for completion exceeding 24 months	0.25% of the estimated amount shown in the tender per week subjected to 5% of the accepted contracted sum

The entry of the quantum of the maximum LD, the accrual of which entitles the Bank to conclude the contract should be selected from the following as may applicable.

For contracts having time for completion 6 months and less	10.00% of the accepted contracted sum.
For contracts having time for completion Exceeding 6 months but no exceeding 1 year	7.5% of the accepted contracted sum. Subject to the provision of para below.

14. NOTICE AND PATENTS OF APPROPRIATE AUTHORITY AND OWNERS:

The contractor shall confirm to the provisions of any Acts of the Legislature relating to the work, and to the regulations and bye-laws of any authorities, and/or any water, lighting and other companies, and/or authorities with whose systems the structures were proposed to have connection and shall before making any variations from the drawings or specification that may be associated to so conform, give the Employer/Architects written notices specifying the variations proposed to be made and the reasons for making them and apply for instruction thereon. The Employer/Architects on receipt of such intimation shall give a decision within a reasonable time.

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

The contractor shall indemnify the Employer against all claims in respect of patent right, royalties, damages to building, roads or members of public in course of execution of work and shall defend all actions arising from such claims and shall keep the Employer saved harmless and indemnified in all respects form such actions, costs and expenses.

15. ACCESSS:

Any authorized representative of the employer shall at the reasonable times have free access to the workshop, factories or other place where materials are being prepared or constructed for the works and also to any place where the materials are lying or from where that are being obtained, and the contractor shall give every facility to the bank or their representative everything necessary for inspection and examination and test of the materials and workmanship. Except the representative of the employer no person shall be allowed at any time without the written permission of the Employer.

16. MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS:

All the works specified and provided for in the specifications or which may be required to be done in the manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications as any from their entire satisfaction. If required by the Employer/Architects during the execution of the work, and their entire satisfaction. If required by the employer/Architects the contractor shall carry tests on materials and workmanship in approved materials testing laboratories or as prescribed by the Employer/Architects at his own cost to prove that the materials etc., under test conform to the relevant B.I.S or as specified in the specifications.

The necessary charges for preparation of mould (in case of concrete cube) transporting, testing, etc., shall have to be borne by the contractor. No extra payments in this account should in any case be entertained. All the materials (Except where otherwise described) stores equipment required for the full performance of the work under the contract must be provided through normal channels and must include charge for import duties, sales tax control and other charges and must be the best of their kind available and the contractor's must be entirely responsible for the proper and efficient carrying out of work.

The work must be done in the best workmen like manner. Samples of all materials to be used would be submitted to the Employer/Architects when so directed by the Employer/Architects and written approval from Employer/Architects must be obtained prior to placement of order. Should the work be suspended by reason of rain, strike, lock out or any other cause the contractor shall take all precaution necessary for the protection of work at his own expenses and shall make good any damage arising from, any of these causes. The contractor shall cover up and protect from damage from any cause, all new work and supply,, temporary/doors, protection to windows and any other requisite protection for execution of the work whether by himself of special trades

men or sub contractor and any damage caused must be made good by the contractor at his own expense.

17. REMOVAL OF IMPROPER WORK:

The employer shall during the progress of the work have power to order in writing from time to time the removal from the work within such reasonable time or times as may be specified in the order of any materials which in the opinion of the Employer/Architects are not in accordance with specifications or instructions, the substitution or proper re-execution of any work executed with materials or workmanship not in accordance with the drawings and specifications or instructions. In case the contractor refuses to comply with the order the employer shall have the power to employ and pay other agencies to carry out the work and all expenses consequent thereon or incidental thereto as certified by the Employer/Architects shall be borne by the contractor or may be deducted from any money due to or that may become due to the contractor. No certificate which may be given by the Architects shall relieve the contractor from his liability in respect of unsound work or bed materials.

18. CONRACTOR'S EMPLOYEES:

The contractor shall employ technically qualified and competent supervisors for the work who shall be available (by turn) throughout the working hours to receive and comply with the instructions of the Employer/Architects. The contractor shall engage at least one experienced Engineer as site-in-charge for the execution of the work. The contractor shall employ in connection with the work person having the appropriate skill or ability to perform their job efficiently.
The contractor shall employ local labourers on the work as far as possible.

No labour below the age of 18 years and who is not an Indian National shall be employed on the work.

Any labourer applied by the contractor to be engaged on the work on day-work basis either wholly or partly under the direct order or control of the Employer or his representative shall be deemed to be a person employed by the contractor.

The contractor shall comply with the provision of all labour legislation including the requirements of

a. The payment of Wages Act
b. Employer's Liability Act
c. Workman Compensation Act
d. Contract Labour (Regulation & Abolition) Act, 1970 & Central Rules 1971.

e. Apprentices Act 1961
f. Any other Act or enactment relating thereto and rules framed there under from time to time.

The contractor shall keep the Employer saved harmless and indemnified against claims if any of the workmen and all costs and expenses as may be incurred by the Employer in connection with any claim that may be made by any workmen.

The contractor shall arrange to provide first aid treatment to the labourers engaged on the works. He shall within 24 hours of occurrence of any accident at or about the site or in connection with execution of the works, report such accident to the Employer and also to the competent authority where such report is required by law.

19. DISMISSAL OF WORKMEN:

The contractor shall on the request of the Employer immediately dismiss from works any person employed thereon by him, who may in the opinion of the Employer be unsuitable or incompetent or who may misconduct himself. Such discharge shall not be basis of any claim for compensation or damages against the Employer or any of the officer or employees.

20. DAMAGE TO PERSONS AND PROPERTY INSURANCE ETC.,

The contractor shall be responsible for all injury to the work or workmen to persons, animals or things and for all damages to the structural and/or decorative part of property which may arise from the operations or neglect of himself or of any sub-contractor or of any of his or a sub-contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with carrying out of this contract. The clause shall be held to include inter-alia, any damage to building whether immediately adjacent or otherwise, and any damage to roads, streets, foot paths or ways as well as damages caused to the buildings and the works forming the subject of this contract by rain wind or other inclemency of the weather. The contractor shall indemnify the Employer and hold harmless in respect of all and any expenses arising from any such injury or damages to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts 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 the whole of the contract works complete and perfect in every respect and so

as to make good or otherwise satisfy all claims for damages to the damages to the property or third parties.

The contractor shall affect the insurance necessary and indemnify the Employer entirely from all responsibility in this respect. The insurance must be place with a company approved by the Employer and must be effected jointly in the name of the contractor and the employer and the policy lodged with the later. The scope of insurance is to include damage or loss to the contract itself till this is made over in a complete state. Insurance is compulsory and must be affected from the very initial stage. The contractor shall also be responsible for anything which may be excluded from damage to any property arising out of incidents, negligence or defective carrying out of this contract.

The employer shall be at liberty and is hereby empowered to deduct the amount of any damages, compensations, costs, charges and expenses arising or accruing from or in respect of any such claim for damages from any sums due or to become due to the contractor.

21. INSURANCE:

Unless otherwise instructed the contractor shall insure the works and keep them insure until the virtual completion of the contractor against less or damage by fire and/or earth quake, flood. The insurance must be placed with a company approved by the Employer, in the joint names of the Employer and the contractor for such amount and for any further sum if called to do so by the employer, the premium of such further sum being allowed to the contractor as an authorized extra.

The contractor shall deposit the policy and receipt for premium paid with the Employer within 7 (Seven days) days from the date of issue of work order unless otherwise instructed. In default of the contractor insuring as provided above, the employer on his behalf may so insure and may deduct the premiums paid from any money due, or which may become due to the contractor. The contractor shall as soon as the claim under the policy is settled or the work reinstated by the Insurance company should they elect to do so, proceed with due diligence with the completion of the works in the same manner as though the fire has not occurred and in all respects under the conditions of the contract. The contractor in case of rebinding or reinstatement after fire shall be entitled to extension of time for completion as the Employer may deem fit.

22. ACCOUNTS RECEIPTS AND VOUCHERS:

The contractor shall upon the request of the employer furnish them with all invoices, receipts, accounts and other vouchers that may require in connection with the work

under this contract. If the contractor shall use materials less than what he is required under the contract, the value of the work difference in the quantity of the materials he was required to use and that he actually used shall be deducted from his dues. The decision of the Employer shall be final and binding on the contractor as to the amount of materials the contractor is required to use for any work under this contract.

Before taking any measurement of any work the site Engineer or a subordinate deputed by him shall give reasonable notice to the contractor. If the contractor fails to attend at the measurements after such notice or fails to counter sign or to record the difference within a week from the date of measurement in the manner required by the site engineer then in any such event the measurements taken by the site engineer or by the subordinate deputed by him as the case maybe is final and binding on the contractor and the contractor shall have no right to dispute the same.

23. ADVANCE PAYMENTS AND SECURED ADVANCE:

Advance payment for works actually but not measured and billed for, should not be made generally payments should be made after the detailed measurements of the work are taken recorded and the contractor's bill for the same is approved by the competent authority

However, advance payment on the running bills to the extent of 75% of the Architect certified amount might be made whenever found necessary. In such cases, it shall be test checking of the measurements & scrutiny of bills are completed before payment of the next running bills.

Secured advances on the security of materials brought to site may be made to the contractors whose contract is for finished work. In such cases, the competent authority may sanction advances up to an amount not exceeding 75% of the value (invoiced/assessed value) of such materials, provided that they are of a durable / non – failure nature and that an indemnity bond is required on the materials and is a safeguard against losses due to the contractor postponing the execution of the work or to the shortage or misuse or the material and against the expense entitled, if any, for their proper watch and safe custody. Recoveries of advances so made should not be postponed until the work entrusted to the contractor is completed. They should be made from his bills for works done as the materials are used, the necessary deductions being made wherever the item of work in which they are used are billed for.

24. PAYMENTS:

All bills shall be prepared by the contractor in the form prescribed by the Employer/Architects. Normally one interim bill shall be prepared each month subject to minimum value for interim certificate as stated in these documents. The bills in proper forms must be duly accompanied by detailed measurements in support of the quantities of work done and must show deductions for all previous payments, retention money, etc.

The Employer/Architects shall issue a certificate after due scrutiny of the contractor's bill stating the amount due to the contractor from the Employer and the contractor shall be entitled to payment thereof, within the period of honoring certificates named in these documents.

The amount stated in an interim certificate shall be the total value of work properly executed and 70% of invoiced value of material brought of site for permanent incorporation into the work up to the date of the bill less the amount to be retained by the Employer as retention money vide clause 10 of these conditions, provided that such certificate shall only include the value of said material and good as and from such time as they are reasonably, properly and not prematurely brought to or places adjacent to the work and then only if adequately protected against weather or other causalities.

The employer will deduct retention money as described in clause 10 of these conditions. The refund of retention money will be made as specified in the same clause. If the Employer has supplied any materials or goods to the contractor, the cost of any such materials or goods will be progressively deducted from the amount due to the contractor in accordance with the quantities consumed in the work. All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed, and shall not preclude the requiring of bad, unsound, and imperfect or unskilled work to be removed and taken away and reconstructed, or reelected or be considered as an admission of the due performance of the contract, or any part thereof in any respect or the accruing of any claim, nor shall, it conclude determine or affect in anyway the power of the Employer under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract. The final bill shall be submitted by the contractor within one month of the date fixed for completion of the work or of the date of certificate of completion furnished by the Site Engineer and payment shall be made within three months.

25. FINAL PAYMENT:

The final bill shall be accompanied by a certificate of completion from the Employer/Architects. Payments of final bill shall be made after deduction of Retention Money as specified in clause 10 of these conditions, which sum shall be refunded after the completion of the Defects Liability Period of Twelve (12) months after receiving the Employer's/Architects certificate that the contractor has rectified all defects to the satisfaction of the Employer/Architects. The acceptance of payment of the final bill by the contractor would indicate that he will have no further claim in respect of the work executed.

26. VARIATION/DEVIATION:

The price of all such additional items/non-tendered items will be worked out on the basis of rate quoted for similar items in the contract whether existing or on engineering rate analysis based on prevalent fair price of labour, material and other components as required. The tender rates, shall hold good for any increase or decrease in the tendered quantities up to variation of 25%., For variation beyond + or - 25%, the rate for the respective item may be reviewed on mutually agreed terms.

27. SUBSTITUTION:

Should the contractor desire to substitute any materials and workmanship, he/they must obtain the approval of the Employer/Architects in writing for any such substitution well in advance. Materials designated in this specification indefinitely by such term as "Equal" or "Other approved" etc., specific approval of the Employer/Architects has been obtained in writing.

28. CLEARING SITE ON COMPLETION:

On completion of the works the contractor shall clear away and remove from the site all surplus materials, rubbish and temporary works of every kind and leave the whole of the site and the works clean and in a workman like condition to the satisfaction of the Employer/Architects.

30. PERIOD OF FINAL MEASUREMENT:

The entry for the period of final measurement after completion shall be made after taking into account complexity of the work and staff available for carrying out measurements.

All hidden works shall have already been measured as the work progressed.

It should be noted that unless a longer period is stipulated, the condition of contract generally lays down 3 months (maximum) from the date of completion of the contract as the period of final measurement.

Even though the maximum period of three month is mentioned, it shall be endeavored to complete the measurement as expeditiously as possible.

31. VALUE OF WORK INTERIM CERTIFICATE:

The maximum value of work done, entitling the contractor to receive an interim payment is generally arrived at after dividing the estimated value of the contract (as announced in the notice of tender) by the time (in months) allowed for completion of work.

The above value rounded off to the nearest thousand is entered.

32. DEFFECTS AFTER COMPLETION

The contractor shall make good at his own cost and to the satisfaction of bank all defects, Shrinkage, Settlement or other faults, which may appear within 12 months after completion of work. In default the employer may employee a person and amends and make good such damage, losses and expenses consequent thereon or incidental thereto shall be made good and borne by the contractor and such damages, loss and expenses shall be recoverable from his by the employer are may be deducted from the contractor, deduct from any money due to the contractor a sum equivalent to the cost of amending such work and in the event of the amount retained being insufficient, recover that balance from the contractor from amount returning under clause No-10 together with any expenses the employer may have incurred in connection their with.

33. ESCALATION:

The rate shall be firm throughout the tenure of the contract (including extension of time, if any, granted) and will not be subject to any fluctuation due to increase in cost of materials, labour, sales tax, octroi, etc., unless specifically provided in these documents. The price variation clause being adopted by the RBI may be followed, if such a situation arises on a case -to – case basis.

34. IDLE LABOUR:

Whatever the reasons may be no claim for idle labour, additional establishment cost of hire and labour charges of tools and plants would be entertained under any circumstances.

35. SUSPENSION:

If the contractor except on account of any legal restraint upon the Employer preventing the continuance of the work or in the opinion of the Employer shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default, the Employer shall have the power to give notice in writing to the contractor requiring the work be proceeded within a reasonable manner and with reasonable dispatch, such notice purport to be a notice under this clause.

After such notice shall have been given the contractor shall not be at liberty to remover from the site of the works of from any ground contiguous thereto any plant of materials to subsist from the date of such notice being given until the fall for 7 (seven) days after such notice has been given to proceed with the works as therein prescribed, the Employer may proceed as provided in the following.

36. TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor being a company go into liquidation whether voluntary or compulsory or being a firm shall be dissolved or being an individual shall be adjudicated insolvent or shall make and assignment or a composition for the benefit of the greater part, in number of amount of his creditors or shall enter into a Deed or arrangement with his creditors, or if the Official Assignee in insolvency, or the Receiver of the contractor in insolvency, shall repudiate the contract, or if a receiver of the contractor's firm appointed by the court, shall be unable within fourteen days after notice to him requiring him to do so, to show to the reasonable satisfaction of the employer that he is able to carry out an fulfill the contract, and if so required by the employer to give reasonable security there for, or if the contractor shall suffer execution to be issued, or shall suffer any payment under this contract to be attached by or on behalf of and of the creditors of the contractor, or shall assign, charge or encumber this contract or any payments due or which may become due to the contractor, there under, or shall neglect or fail to observe and perform all or any of the acts matters of things by this contract, to be observed and performed by the contractor within three clear days after the notice shall have been given to the contractor in manner hereinafter mentioned requiring the contractor to observe or perform the same or shall use improper materials

or workmanship in carrying on the works, or shall in the opinion of the employer not exercise such due diligence and make such due progress as would enable the work to be completed within due time agreed upon and shall fail to proceed to the satisfaction of the employer after three clear days notice requiring the contractor so to do shall have been given to the contractor as hereinafter mentioned, or shall abandon the contract, then and in any of the said cases, the bank may not withstanding previous waiver determine the contract by a notice in writing to the effect as hereinafter mentioned, but without thereby effecting the powers of the employer of the obligations and liabilities of the contractor the whole of which shall continue in force as fully as if the contract, had not been so determined and as if the works subsequently executed had been executed by or on behalf of the contractor (without thereby creating any trust in favour of the contractor) further the employer or his agent, or servants, may enter upon and take possession of the work and all plants, tools, scaffolding, sheds, machinery, steam and other power, utensils and materials lying upon premises or the adjoining lands or roads and sell the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by employing any other contractors or other persons or person to complete the works, and the contractor shall not in any way interrupt or do any act, matter or things to prevent or hinder such other contractors or other persons or person employed from completing and furnishing or using the materials and plants for the works when the works shall be completed, or as soon thereafter as conveniently may be, the employer shall give notice in writing to the contractor to remove his surplus materials and plants and should the contractor for the amount so realized. Any expenses or losses incurred by the employer in getting the works carried out by other contractors shall be adjusted against the amount payable to the contractor by way of selling his tools and plants or due on account of work carried out by the contractor prior to engaging other contractors or against the Security Deposit.

37. ARBITRATION:

All disputes or differences of any kind whatsoever whish shall at any time arise between the parties hereto touching or concerning the works or the execution or maintenance thereof of this contract of the rights touching or concerning the execution or maintenance thereof of this contract of the construction remaining operation or effect thereof or to the rights or liabilities of the parties to arising out of or in relation thereto whether during or after determination foreclosure of branch of the contract (other than those in respect of which the decision of any person is by the contract expressed to be final and binding) shall after written notice by either party to the contract to other of them and to the Employer hereinafter mentioned be referred for adjudication to a sole

Arbitrator to be appointed as hereinafter provided. For the purpose of appointing the sole Arbitrator referred to above, the Employer will send within thirty days of receipt of the notice, to the contractor a panel of three names of persons who shall be presently unconnected with the organization for which the work is executed. The contractor shall on receipt of the names as aforesaid, select any one of the person's name to be appointed as a sole Arbitrator and communicate his name to the Employer within thirty days of receipt of the names. The Employer shall thereupon without any delay appoint the said person as the Sole Arbitrator. If the contractor fails to communicate such selection as provided above within the period specified, the competent authority shall make the selection and appoint the selected person as the Sole Arbitrator. If the Arbitrator so appointed is unable or unwilling to act or resign his appoint or vacates his office due to any reason whatsoever another Sole Arbitrator shall be appointed as aforesaid.

The work under the Contract shall, however continue during the arbitration proceedings and no payment due to or payable to the contractor shall be withheld on account of such proceedings. The Arbitrator shall be deemed to have entered on the reference on the date he issued notice to both the parties fixing the date of the first hearing.

The Arbitrator shall give a separate award in respect of each dispute or difference referred to him. The Arbitrator shall decide each dispute in accordance with the terms of the contract and give a reasoned award. The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.

The fees, if any, of the Arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award including the fees, if any, of the Arbitrator who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix of settle and amount of costs to be so paid.

The award of the Arbitrator shall be final and binding on both the parties. Subject to aforesaid the provisions of the Arbitration Act 1940 or any statutory modification or reenactment thereof and the rules made there under and for the time being in for, shall apply to the arbitration proceeding under this clause.

The Employer and the contractor hereby also agree that arbitrator under clause shall be condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.

I/we hereby declare that I/we read and understood the above terms and conditions and that we shall abide them if the works is awarded to us.

38. CLEARING SITE AND SETTING OUT WORKS:

The site shown on the plan shall be cleared of all obstructions. If at any time, any error shall appear during the progress of any part of the work, the contractor shall at his own expenses rectify such error if called upon to the satisfaction of the Employer. The contractor shall further set out the works to the alternative positions at the site until on is finally approved and the rates quoted in his tender should include for this and no extra on this account will be entertained

39. PERMITS AND LICENSES:

Permits and licenses for release of materials which are under Government control will be arranged by the contractor. The employer will render necessary assistance, sign any form or applications that may be necessary. The basic price of controlled materials for the purpose of valuing the tender is to be considered as stipulated below. This will also be the basis of adjustment in settling the contractor's bills. It may be clearly understood that no compensation or additional charges can be claimed by the contractor for non receipt of any controlled materials in due time on this account or according to his own requirements.

The contractor will, however, be eligible to a proportionate extension of time on this account which in the opinion of the Employer/Architects is reasonable. The contractor shall at his own cost arrange for storage shed adequate for taking delivery and storing of the quantity of controlled materials released by the authorities or supplied by the Bank. The costs of storing, transporting etc., of all materials including those under government control are to be included by the tenderer in his quoted rates. The Employer/Architects shall be indemnified against all government or legal actions for theft and any other controlled materials in the custody of the contractor.

40. GOVERNMENT AND LOCAL RULES:

The contractor shall confirm to the provision of all local Bye-laws and Acts relating to the work and to the Regulations etc., of the government and local authorities and of any company with whose system the structure is proposed to be connected. The contractor shall give all notices required by said Act, Rules, Regulations and Bye-laws etc., and pay all fees payable to such authority/authorities for execution of the work involved. The cost, if any, shall be deemed to have been included in his quoted rates, taking into account all liabilities for licenses, fees for footpath encroachment and

restorations etc., and shall indemnify the Employer against such liabilities and shall defend all actions arising such claims or liabilities.

41. TOOLS, STORAGE OF MATERIALS, PROTECTIVE WORKS AND SITE OFFICE REQUIREMENTS:

The contractor shall provide, fix up and maintain in an approved position proper office accommodation for the contractor's representative and staff which offices shall be open at all reasonable hours to receive instruction notices or communications and clear away on completion of the works and make good all distributed work. All drawings maintained on the site are to be carefully mounted on boards of appropriate size and covered with a coat a approved varnish. They are to be protected from ravages of termites, ants and other insects.

The contractor shall provide at his own cost all artificial light required for the work and to enable other contractors and sub-contractors to complete the work within the specified time. The contractor shall provide a suitable temporary hut for the watchmen and clear away the same when no longer required and to provide all necessary attendance, lights, etc., required.

The contractor shall arrange for temporary latrines for the use of workers and field staff and keep the same in clean and sanitary condition to the satisfaction of the public Health Authorities and small cause such latrines and soil to be cleared away whenever necessary and shall make good all the works disturbed by these conveniences. Every precautions shall be taken by the contractor to prevent the breeding of mosquitoes on the works during the constructions, and all receptacles, cisterns, water tanks, etc., used for the storage of water must be suitable protected against breeding of mosquitoes. The contractor shall indemnify the employer against any breach of rules in respect of anti-malarial measures. The contractor shall not fix or place any placards or advertisement of any description or permit the same to be fixed or placed in or upon any boarding gantry, building structure other than those approved by the Employer.

Protective Measures: The contractor from the time of being placed in possession of the site must make suitable arrangements for watching, lighting and protecting the work, the site and surrounding property by day, by night, on Sundays and other holidays.

Tools: The contractor should cover in his rates for making provisions for all reasonable facilities for the use of his scaffolding, tools etc., by sub contractors for their work.

42. SITE ENGINEER:

The term 'Site Engineer' shall mean the person appointed and paid by the Employer to superintend the work. The contractor shall afford the Site Engineer every facility and

assistance for examining the works and materials and for checking and measuring work and materials. The Site Engineer shall have no power to revoke, alter, enlarge or relax any requirements of the contractor or to sanction any day work, additions, alterations, deviations or omission any extra work whatever, except in so far as such authority may be specifically conferred by a written order of the Employer.

The site engineer shall have power to give notice to the contractor or to his foreman, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the Employer is obtained. The work will from time to time be examined by the Architects, Engineer from the premises department of the Employer and the Site Engineer. But such examination shall not in any way exonerate the contractor from the obligation to remedy any defects which may be found to exist any stage of the work or after the same is complete. Subject to the limitation of this clause the contractor shall take instructions only from the Architects/Engineer.

43. ASSIGNMENT:

Whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or Undset the contract or any part, share or interest therein nor, shall take a new partner, without written consent of the Employer and no subletting shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the work during their progress.

44. CONCEALED WORK:

The contractor shall give due notice to the Employer/Architects whenever any work is to be buried in the earth, concrete or in the bodies of walls or otherwise becoming inaccessible later on, in order that the work may be inspected and correct dimensions taken before such burial, in default whereof the same shall, at the opinion of the Employer/Architect be either opened up for measurement at the contractor's expense or no payment may be made for such materials. Should any dispute to differences arise after the execution of any work as to measurements etc., or other matters which cannot be conveniently tested or checked, the notes of the Employer/Architects shall be accepted as correct and binding on the contractor.

45. SAFETY CODE:

Personal Safety Equipment's:

All necessary personal safety equipments as considered adequate by the Engineer should be kept available for the use of the person employed on the site and

maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure steps to ensure proper use of equipments by those concerned. The contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting the following precautions should be taken:

First Aid:

a. At every work place, there shall be maintained in readily accessible place first aid appliance including an adequate supply of sterilized dressings and sterilized cotton wool. The appliance shall be kept in good order and in large work place they shall be places under the charge of a responsible person who shall be readily available during working hours.

b. At large work places, where hospital facilities are not available within easy distance of the works, first aid posts shall be established and be run by a trained compounder.

In every work place, there shall be provided and maintained at suitable places easily accessible to labour sufficient of cold water fit for drinking.

Contractor's Seal and Signature.

4-ADDITIONAL CONDITIONS OF CONTRACT

1) SCOPE OF WORK:

The schedule of quantities and the tender drawings are only indicative of the scope of work. There may be variation in quantities of individual items as well as in the total quantum of work of upto + 20%. The contractor will not be liable to omission altogether of some of the items.

2) COMPLETION SCHEDULE:

The contractor will be required to work according to a programmed given to them by the consulting Architects, based on the priorities of the Employer. The contractor will be required to prepare bar charts on the basis of the programmed given to them and get these approved by Employer/Architects. While the overall completion programming of the work will be 120 days, certain items may be required to be completed shorter period, varying from 7 to 14 days.

3) WTER AND ELECTRICAL ENERGY:

Water and Electrical energy required for work be provided by the employer at one point free of charge, and the contractor will be required to make his own distribution and arrangements for them. Cost of electrical energy consumed would be payable by the contractors according to Government tariffs.

4) OTHER AND REGULATIONS:

a) All E.S.I formalities of prescriptions under workmen compensation Act will be adhered to by the contractor. He will have to observe the regulations prescribed under the contracts Labour Regulations & Abolition Act, 1970 and rules formed hereunder.

b) The contractor shall not employ labour below the age of 18 years and shall pay them not less than the wages paid for similar work on the fair wage. Fair wage men's wage whether for time of piece work as defined in the Minimum Wages Act.

Contractor's Seal and Signature

5-PREAMBLE TO SCHEDULE OF QUANTITIES

1. Tender shall be on the basis of item rates which shall include the cost of materials, labour, all taxes, duties, and all other appurtenant services for the complete installation, testing and commissioning in accordance with relevant drawings and meeting the requirements of the specification and relevant I.S specification including the fees for inspection together with the liabilities and obligations as detailed in the general conditions of contract.
2. Prices shall remain firm and free from variation due to rise and fall in the cost of materials and labour or any other price variation whatsoever whether during the stipulated period of execution or during extended period of completion if any, except direct statutory, increases by the Act of Govt. or Local bodies.
3. Item rates shall remain valid for any variation in the estimated quantities given in the schedule of quantities.
4. In order to facilitate the technical scrutiny of various quotations, the tenderer must supply with their quotations detailed technical particulars, make catalogues and erection drawings for various items under different parts specified in the schedule of quantities.
5. The drawings and specifications lay down minimum standards for equipments and workmanship. Deviations, if any, shall be clearly set down. In the absence of any deviations, it will be deemed that the tenderer is fully satisfied with the intents or the specifications and drawings and their compliance with the statuary and fire insurance provision including local codes. Where the drawings and specifications conflict the more stringent shall supply.
6. All installations shall be tested as specified and a test certificate in the prescribed from required by the authorities shall be furnished.
7. The entire installation shall be guaranteed against defective materials of workmanship for a period of 12 months from the date of installation as certified by the Architect and taken over by the owner. During the guarantee period, all the defects shall be rectified by the contractor, free of cost.
8. Water and power required for the works may be made available at site. Use of electrical power will be on chargeable basis. If the water available at site in unsuitable for construction purpose, the contractor will have to make their own arrangement for water.
9. The tenderer must acquaint themselves of the site conditions and take note of all factors while quoting the rates, so no extra will be allowed on any ground.
10. The successful tenderer shall supply completion drawings of the entire installations as executed at site drawn to a scale approved by the architects after the completion of the work but before completion certificate is given the Architect.
11. The materials of the 1st preference shall be used and the contractor may exclude himself of not doing so only if the required range as per tender specifications is not manufactured, by the particular manufacture. The evidence of such case shall be

supported by a letter from the respective manufacturer. Samples of all fittings and accessories shall be approved by the Bank Employer/Architect prior to their installation.

6-ARTICLES OF AGREEMENT

Articles of Agreement made at **AHMEDABAD** between this day of _____ between **UCO BANK , ZONAL OFFICE, UCO BANK BHAVAN, NR. SANYAS ASHRAM, ASHRAM ROAD, AHMEDABAD**. (Hereinafter referred to as "The Employer" which expression shall unless excluded or repugnant to the context be deemed to include its successors and assigns) of the one part, and M/s _____ carrying on business at _____ (hereinafter referred to as the "Contractor" which expression shall unless excluded or repugnant to the context be deemed to include their heirs, executors, administrators, representatives and assigns) of the other part.

WHEREAS

1. The Employer is desirous of carrying out the fire Alarm & P. A. System works for **UCO BANK, Zonal Office, Uco Bank Bhavan, Nr. Sanyas Ashram, Ashram Road, Ahmedabad**, and has drawings and specifications, schedule of quantities describing the work to be done, have been prepared by the Consultant **M/s. HIREN A. GANDHI & ASSOCIATES, AHMEDABAD,** under the direction of the Employer. The Employer is desirous of completing the said work strictly and according to the said drawings and specifications.

2. The said drawings and the specifications and the priced schedule of quantities have been signed by or on behalf of the parties hereto and

3. The contractor has agreed to execute upon and subject to the conditions, set forth herein (hereinafter referred to as "the conditions") the work shown upon "the said Drawings" and described in "the said Specification" and "the said Priced Schedule of Quantities" at the representative rates mentioned in the Priced Schedule of Quantities

NOW IT IS HEREBY MUTUAL AGREED AND DECLARED BETWEEN THE PARTIES HERETO AS FOLLOWS:

1. The contractor hereby agrees and undertakes to execute and complete the said works shown in the said drawings and such further detailed drawings as may be furnished to it by the Employer and described in the said specification and the said schedule of quantities upon and subject to the said conditions.
2. The term "Consulting Architects" in the conditions shall mean the said **M/s. HIREN A GANDHI & ASSOCIATES, AHMEDABAD,** or in the event of their death or ceasing to be the Consulting Architects for that purpose of this contract, such other persons as shall be nominated for that purpose by the employer, not being a person to whom the contractor shall object for reasons considered to be in sufficient by the employer,

provided always that no persons subsequently appointed to be Consulting Architects under this contract shall be entitled to disregard or over-rule any decision or approval or direction or expressed in writing by the consulting Architect for the time being.

3. The plan, agreement and documents above mentioned shall form the basis of this contract and the decision of the said Consulting Engineers/Architects for the time being as mentioned in the Conditions of Contract in reference to all.

4. Mater of dispute as to the materials, workmanship or account and so as to the intended interpretation of the clauses of the Agreement of any other document attached hereto shall be final and binding on both parties and may be made a Rule of Court.

5. The said contract comprises the work above mentioned and all subsidiary works connected therewith within the same site as may be ordered to be done from time to time by the said employer through the consulting Architects or other the Consulting Architects for the time being, even though such works may not be shown on the drawings or described in the said specifications or the Priced Schedule of Quantities.

6. The employer reserved to himself the right after the drawings and nature of the work and of adding or omitting any item of work or of having portions of the same carried out departmentally or otherwise and such alterations and such alterations or variations shall be carried out without prejudice to this contract.

7. The said conditions shall be read and constructed as forming part of this agreement and parties hereto will respectively abide by and submit themselves to the conditions and stipulations and perform the agreements on their parts respectively as such conditions contained.

8. Further, letter exchange between the Employer and the Contractor after the receipt of this contract as listed, shall from an integral part of this contract.

9. The several parts of this contract have been read and fully understood by us.

As witness our hands this date of 2018

Signed by the said Employer

In the persons of

Signed by the said Contractor

In the persons of

SPECIAL CONDITIONS OF CONTRACT

1.0 SCOPE :

The scope of all items in LV sub-system is SITC – Supply, Installation, Testing and Commissioning.

The agency that is bidding for the total project shall be called as “LV Contractor” or “Integrator”.

The Integrator or LV Integrator shall be a well qualified and well established entity having local offices at the location of installation.

The entire responsibility towards the successful execution of the Fire Detection and Alarm System of the project shall remain with the LV Contractor.

The LV integrator shall be certified and authorized to supply, commission and provide services at site as may be required, including warranty and post-warranty support, as being the Original Equipment Manufacturer’s authorized partner for the project. The LV integrator shall have to formally submit the Manufacturer’s Authorization as per the prescribed format annexed to this specification before commencement of the work.

The qualification of LV integrator shall be as below:

- Should have service centers for service and support centre in Ahmedabad /Gujarat.

- The bidder should have successfully completed the similar nature of one work not less than the Amount Rs. 24 Lacs. **OR** two works not less than the Amount Rs. 18 Lacs. **OR** three works not less than the Amount Rs. 12 Lacs. The copy of Work order & Completion certificate should be attached.

- Notarized copies of Employee Provident Fund Registration, ESIC Registration, Class ‘A’ registration and above in R&B/CPWD/STATE GOVT.,to be submitted.

- Notarized Copy of Electrical License to be submitted.

- Notarized copy of Average Annual Turnover for last 3 years should not be less than of Rs. 0.5 Crore.

- Notarized copy of Bank Solvency from any nationalized bank not less than 20 lacs and it has to be of ongoing financial Year.

- Tenderer has to provide OEM Authorisation letter with name of work mentioned to bid the tender as per make as per enclosed annexure.

The successful tenderer will have to supply the items from the make-list provided in this specification. No Deviation shall be acceptable in this matter.

The LV Contractor is advised to provide technical datasheets and specification sheets for approval for all items prior to initiating any supply. Any items having deviations, in absence of specific approval from Client / Architect / Consultant shall be returned whether installed or uninstalled at the risk, liability and expense of the Contractor.

The LV Contractor is advised to inform the Client / Architect / Consultant of any specific requirements for equipments such as heat dissipation, earthing, ventilation etc. before supply so as to incorporate the same at site by other agencies.

The contractor is advised to specifically use items only from the make list and provide information on compliance of performance specifications. Moreover, the contractor shall submit the OEM test certificates for all items used for the project.

The contractor shall not use any unknown or local items as a substitute for listed brands and makes that may degrade system performance.

Make of components required to be used by contractor to complete the installation, if not mentioned anywhere, shall be required to GET APPROVED from Client / Architect / Consultant in writing before installation.

Within 1 weeks of work order, the contractor shall submit the technical submital which shall contains offer items make, model no., technical data sheets, details of OEM (Contact Address, Contact Person with contact no.) for all products/systems going to supply for the project for the approval of the Client / Architect / Consultant.

TECHNICAL SPECIFICATIONS

FIRE DETECTION AND ALARM SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

A. 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.

B. 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.

C. The system shall 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.

D. 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.

1.2 SCOPE

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Class A Signaling Line Circuits (SLC).
2. Device Circuits (IDC) shall be wired NFPA Class A as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired NFPA Class A as part of an addressable device connected by the SLC Circuit.
4. On 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.

5. 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.
6. Speaker circuits may be controlled by NAC outputs built into the amplifiers, which shall function as addressable points on the Digital Audio Loop.
7. 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.
8. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.
9. 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.

   Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions.

   Speaker circuits shall be arranged such that there is a minimum of one speaker circuit per smoke zone.

   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.
10. 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, or two Class A circuits.
11. 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 **thirty five (35)** remote Fire Fighter's Telephone locations simultaneously on a conference.
    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 up to 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.

12. **The proposed product shall not restrict the buyer to one single organization, not shall it require any proprietary dongle or other programming tools for after sales & maintenance activity.**

13. The MTBF for the product offered shall be less than 40

1.3 DESIGN INTENT

a) Main fire alarm panel with digital voice command system, Fire fighters telephone, amplifier, zone selector keypad and announcement console – Ground floor – Near passenger lift lobby.
b) Secondary fire alarm panels- At each level – near lift lobby
c) Active repeater panels at security cabin
d) All fire alarm panels connected as pier to pier.
e) Fire survival cables (750 deg. 2 hours)
f) Class - A cabling to loop all detectors, devices & MCP"s to control panel.
g) Coverage per detector as per NFPA -2015, considering > 60 ACH
h) System integration (Soft integration) with all standalone panels such as agent release panels for deluge valves, Pre-action panels, lift switchboard, DG fresh air switchboard, etc
k) VESDA (Very Early Smoke Detection Apparatus) to cover the false flooring and room void areas of Data Hall, UPS,Battery rooms and MMR.
m) Emergency communication system, integral with the Main FACP, including voice alarm system components, microphones, amplifiers, zone selector keypads and tone generators
n) Audible Alarm Notifications
o) Fire fighters telephone system as part of main fire alarm system which is two-way, supervised voice communication proposed to link between the MFACP and remote fire fighters' telephone stations throughout the building (at all staircases at all levels)

1.4 GENERAL INSTRUCTIONS

a) Protect from moisture by using appropriate coverings. Store at dry interior locations.

b) Sequence work to avoid interferences with building finishes and installation of other products.

c) Supply as maintenance stock, consumable devices, components as recommended by Supplier, but shall not be less than two units of each type/ rating of installed consumable material/ component/ device.

d) For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

1.5 WARRANTY

A. The fire alarm control panel, voice panels and any head-end equipment shall have a manufacturer’s warranty of a minimum of 12months.

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1.6 APPLICABLE STANDARDS AND PRODUCT APPROVALS

A. 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.

B. National Fire Protection Association (NFPA) - USA:

NFPA 12	Extinguishing Systems (low and high)
NFPA 12A	Halon 1301 Extinguishing Systems
NFPA 13	Sprinkler Systems
NFPA 15	Water Spray Systems
NFPA 16	Foam / Water Deluge and Spray Systems
NFPA 17	Dry Chemical Extinguishing Systems
NFPA 17A	Wet Chemical Extinguishing Systems
NFPA 2001	Clean Agent Extinguishing Systems
NFPA 70	National Electric Code
NFPA 90A	Air Conditioning Systems
NFPA 92A	Smoke Control Systems
NFPA 92B	Smoke Management Systems in Malls, Atria, Large Areas
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code

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

UL 268	Smoke Detectors for Fire Protective Signaling Systems
UL 864	Control Units for Fire Protective Signaling Systems
UL 2572	Mass Notification Systems
UL 217	Smoke Detectors, Single and Multiple Station
UL 228	Door Closers - Holders for Fire Protective Signaling Systems
UL 268A	Smoke Detectors for Duct Applications
UL 521	Heat Detectors for Fire Protective Signaling Systems
UL 464	Audible Signaling Appliances
UL 38	Manually Actuated Signaling Boxes
UL 1481	Power Supplies for Fire Protective Signaling Systems
UL 346	Waterflow Indicators for Fire Protective Signaling Systems
UL 1076	Control Units for Burglar Alarm Proprietary Protective Signaling Systems
UL 1971	Visual Notification Appliances
UL 2017	Standard for General-Purpose Signaling Devices and Systems
UL60950	Safety of Information Technology Equipment

D. Factory Mutual – USA

E. Local and State Building Codes.

F. All requirements of the Authority Having Jurisdiction (AHJ).

G. The system shall be certified for seismic applications in accordance with the

International Building Code (IBC). The basis for qualification of seismic approval shall be via shake table testing.

H. The System shall be FM 6320 (Factory Mutual) approved as a Gas Detection system when employed with the 4-20 monitor module and industry standard 4-20 mA gas detectors.

PART 2.0 PRODUCTS

2.1 MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE:

A. Main FACP or network node shall contain a microprocessor based Central Processing Unit (CPU) and power supply. 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, printer, annunciators, and other system controlled devices.

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

1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.
2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed.

System Capacity and General Operation

A. The FACP shall can communicate on a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mbps and support up to 200 panels / nodes per network.

B. The control panel shall be capable of expansion via up to 10 SLC loops. Each module shall support up to 250 analog/addressable devices for a maximum system capacity of 2500 points.The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a LCD display/Touch Panel individual, color coded system status LEDs, and a LCD display/Touch Panel keypad for the control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either company.

C. All programming or editing of the existing program in the system shall be achieved without interrupting the alarm monitoring functions of the fire alarm control panel.

D. The FACP shall be able to provide the following software and hardware features:

1. 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.

2. 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.
3. 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.
4. 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.
5. The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.
6. Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.
7. NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the sensitivity testing requirements of NFPA 72.
8. 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.
9. 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. A single change to one CPU database shall not require a database download to other CPUs.
10. History Events: The panel shall maintain a history file of atleast last 5000 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 5000 event history file.
11. Smoke Control Modes: The system shall provide means to perform Fire Smoke Control Station mode. This mode controls all dampers, smoke extraction fan, fresh air supply fans, etc during Fire condition. Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.
12. **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.
13. 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.
14. Block Acknowledge: The system shall support a block Acknowledge for Trouble

Conditions

15. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.
16. 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.
17. 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.
18. 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 fire alarm type code shall activate an output with a fire alarm type code.
19. 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.
20. Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen.
21. **Multi-Cooperating Detectors: The system shall provide means to link one detector with up to two detectors at other addresses in cooperative multi-detector sensing. The detector shall take feedback from the other two adjacent detectors to take fast and genuine alarm decision mitigating the risk of false alarm. There shall be no requirement for mandatory sequential address setting in the detectors to achieve this function. Multi-cooperative detection shall be a built-in intelligence in the system to take fast & reliable decision on genuine alarm triggering. The alarm event shall be aresult ofall cooperating detector chamber readings considered as a consolidated alarm signal.**
22. 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.
23. 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.
24. Mass Notification Override:The system shall be UL 2572 listed for Mass Notification and shall be capable, based on the Risk Analysis, of being programmed so that Mass Notification/Emergency Communications events take

precedence over fire alarm events.

25. Security Monitor Points: The system shall provide means to monitor any point as a type security.
26. 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 Control By Event 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.
27. 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.
28. 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.
29. 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.
30. **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.
31. 100 trouble equations per device: The system shall provide support for up to 100 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.
32. 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.
33. 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-zone and four abort options to satisfy any local jurisdiction requirements.
34. 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. 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.

E. Central Processing Unit

1. 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.
2. 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.
3. 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.
4. The CPU shall provide an RS-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.
5. The CPU shall provide two RS-485 ports for the serial connection to annunciation and control subsystem components.
6. The RS-232 serial output circuit shall be optically isolated to assure protection from earth ground.
7. In the event of CPU failure, all SLC loop modules shall fallback to **degrade mode**. **Systems not offering degrade mode shall offer Redundant CPU**. 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.

F. Display

1. The system display shall provide a **LCD display/Touch Panel** It shall also provide eleven 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, CONTROLS ACTIVE, and CPU FAILURE.
2. **These characters shall be only for fire alarm / trouble information and not for Logo or other purpose. It shall be UL Listed. Repeater panel displays in FACP is not allowed unless until approved by UL**
3. The system display shall provide a QWERTY keypad for ease of operation.
4. The keypad shall have control capability to command all system functions, entry of any alphabetic or numeric information, and **field programming without the use of any external equipment or laptop**. 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.

G. Loop (Signaling Line Circuit) Control Module:

1. The control panel shall be capable of expansion via up to **10 SLC loops**. Each module shall support up to **250 analog/addressable devices** for a maximum system capacity of **2500 points.**

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. Each loop shall maintain 20% spare capacity for future expansion.
4. Each Loop shall be capable of operating as a NFPA Class B circuit in case of single open circuit fault in existing SLC Circuit
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.

H. Network Communication

The FACP shall communicate over a peer-to-peer communication network, inherently over a regenerative communication format and protocol. The network shall support communication speed up to 100 Mbps and support up to **200 Control Panels/ Network Nodes**, over a **single medium** (copper conductor / fiber optic), redundant ring, communication channel for fire alarm, voice evacuation and telephone talk-back system. The system shall support up to **200 such networks** in a single system.

The network card shall have inbuilt Fiber port for terminating Fiber Optic Cable without any third party converters.

I. 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.
    Operate as a two-way emergency telephone system control center.
    b. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.
    c. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
    d. Provide all-call Emergency Paging activities through activation of a single control switch.
    e. As required, provide vectored paging control to specific audio zones via dedicated control switches.
    f. 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.

g. Provide a software utility capable of off-line programming for the DVC 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 DVC shall not inhibit the emergency operation of other nodes on the fire alarm network.

h. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 fire-listed analog audio amplifiers and SLC controlled switching.

i. 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.

j. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.

j. **Fire, Voice & Telephone data shall flow through single network cable.**

k. **The Voice Evacuation System shall be capable of establishing communication between the master voice controller and amplifier over fiber optic cable network without using any third party media converter.**

l. **Failure of Fire Panel CPU shall not affect the operation of DVC. Incase DVC / Amplifiers are controlled by Fire Panel CPU, a separate panel with dedicated CPU shall be considered for each DVC & Amplifier.**

J. Power Supply

1. The Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.
2. The 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 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 7-**200 amp-hours** within a 48-hour period.
4. The Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
5. The Main Power Supply shall be power-limited per UL864 requirements.
6. The Main Power Supply shall communicate power supply, line voltage, battery status and charger status to the local LCD display. Any abnormal condition shall be annunicated and logged to the system alarm history log.
7. 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.

13. 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.

14. 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 zero, two, eight or sixteen hours shall be programmable.
15. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be programmable.
16. The addressable power supply mounts in either the FACP backbox or it's own dedicated surface mounted backbox with cover.
17. Each of the power supply's four output circuits shall be programmed- 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.
18. 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 24 VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
19. When selected for Notification Appliance Circuits, the output circuits shall be individually programmable for Steady, March Time, Dual Stage or Temporal.
20. 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.
21. 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.
22. 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.

K. Audio Amplifiers

1. The Audio Amplifiers shall provide Audio Power 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:

    a. Earth Fault Detection & Annunciation forCommunication bus
    b. Audio Amplifier Failure Trouble Annunciation
    c. External trigger input indication in case of Amplifier failure
    d. Audio Detected on Firefighter's Telephone Riser
    e. Receiving Audio from digital audio riser
    i. Short circuit on detection &annunciation on each speaker circuit
    j. Communication Status
    n. Board failure
    r. Active fiber optic media connection
    t. Power supply monitoring of below conditions –Earth fault, Low Battery, Charger Trouble

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.**
8. One designated backup amplifier shall be capable of backing up multiple primary amplifiers mounted in the same or adjacent cabinets.
9. Multi-channel operation from a single amplifier shall be supported by the addition of an optional plug-in amplifier card.
10. **System shall support distributed architecture of voice evacuation system to enable remote installation of amplifiers.** Remote Amplifer's shall communicate with the centrally located Digital Voice Command.

L. 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.

M. Field Programming

1. **The system shall be programmable, configurable and expandable in the field without the need for special tools**. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.
2. All field defined programs shall be stored in non-volatile memory.

N. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. **Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.**
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 delay shall be programmable from 0 to 60 seconds and each detector shall be able to be selected for verification. 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.

O. System Point Operations

1. Any addressable device in the system shall have the capability to be enabled or

disabled through the system keypad or Graphics User Interface.

2. System output points shall be capable of being turned on or off from the system keypad or the video terminal.
3. 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:

    a. Device Status.
    b. Device Type.
    c. Custom Device Label.
    d. Software Zone Label.
    e. Device Zone Assignments.
    f. Analog Detector Sensitivity.
    g. All Program Parameters.

4. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 5000 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.
5. The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.
6. 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.
7. 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.
8. 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.

2.2 SYSTEM COMPONENTS

A. Network Control Annunciator

A network control annunciator shall be provided to display all system intelligent points. The NCA shall be capable of displaying all information for **200,000 points on the network**. Network display devices, which are only capable of displaying a subset of network points, shall not be suitable substitutes.

The NCA shall include a LCD display/Touch Panel It shall also include a full QWERTY style keypad with tactile feel. Additionally, the network display shall include ten soft-keys for screen navigation and the ability to scroll events by type. i.e. Fire Alarm, Supervisory Alarm, Trouble, etc.

The network control annunciator shall have the ability to display up to eight events in order of priority and time of occurrence. Counters shall be provided to indicate the total number of events by type.

The NCA shall mount in any of the network node fire alarm control panels. Optionally, the network display may mount in a backbox designed for this useand shall connect to the network over either a wire or fiber interface.

The network control annunciator shall have an event history buffer capable of storing a minimum of 1000 events in non-volatile memory. Additionally, the NCA shall have a fire alarm history buffer capable of storing a minimum of 200 events in non-volatile memory. Systems that do not protect fire alarm events from being overwritten by other events are not suitable substitutes.

The NCA shall include two optically isolated, 9600 baud, industry standard RS-232 ports for UL864 listed printers and CRT's. These peripheral devices shall print or display network activity.

The network control annunciator shall include control switches for system wide control of Acknowledge, Signal Silence, System Reset, Drill, and local Lamp Test. A mechanical means by which the controls switches are "locked out", such as a key, shall be available.

The NCA shall include long life LEDs to display Power, Fire Alarm, Pre-Alarm, Security Alarm, System Trouble, Supervisory, Signals Silenced, Disabled Points, Other (non-fire) Events, and CPU Failure.

The network control annunciator shall include a Master password and up to nine User passwords. Each password shall be up to eight alpha-numeric characters in length. The Master password shall be authorized to access the programming and alter status menus. Each User password may have different levels of authorization assigned by the Master password.

The NCA shall allow editing of labels for all points within the network; control on/off of outputs; enable/disable of all network points; alter detector sensitivity; clear detector verification counters for any analog addressable detector within the network; clear any history log within the network; change the Time/Date settings; initiate a Walk Test.

The network control annunciator shall support an optional WindowsTM based program utility. This utility shall allow the user create an NCA database, upload/download an NCA database, and download an upgrade to the NCA executive. To ensure program validity, this utility shall check stored databases for errors. A compare function shall be included to identify differences between databases.

For time keeping purposes the NCA shall include a time of day clock.

B. Network Control Station / Graphics User Interface

The NCS shall utilize a Microsoft(tm) operating system. Each Network Control Station shall be capable of graphically annunciating and controlling all network activity and at least **2,50,000 network points**. Network display devices that are only capable of displaying a subset of network points shall not be suitable substitutes.

The NCS shall be an IBM (or compatible) personal computer with the following minimum requirements: Intel Pentium II(tm)-processor, operating at a minimum of 400 Mhz, 128Mbytes of RAM, 8 Mbytes Video RAM, 1.44 Mbyte floppy drive, 3.2 Gbyte hard disk, mouse, 32X CD-ROM, 3PCI / 1 ISA expansion slots, internal 3.2 Gbyte tape drive, sound card, 200 watt power supply, and SVGA graphics with a screen resolution of 1024 x 768. The network control station shall include a 19-inch monitor.

The NCS shall be capable of storing over **100,000 network events** in a history file. Events shall be stored on hard disk and shall be capable of back-up storage to a tape drive. The history buffer allows the operator to view events in a chronological order. A filter shall be available for displaying chronological events by operator, date, time, fire alarms, troubles (including security, supervisory and system/device), disabled points/zones, system programming, operator response and operator log in/log out. The ability to print NCS history files shall also be available.

The NCS shall use a Windows(tm) dialog box technology to address, interrogate, control, and/or modify intelligent points on each fire alarm node. This shall include, and not be limited to: Activating outputs, enabling or disabling points, adding or removing intelligent points, viewing intelligent detector sensitivity levels and modifying point information (custom messages, detector type, verification, day/night selection etc.)

The NCS shall include the ability to display system information in a graphical (floor plan) form. Each view, created using standard Windows bitmap files, shall include icons created for intelligent devices. These icons shall blink and change to the appropriate programmed icon when an event occurs. When the device has been acknowledged, the icon shall become steady. Once the point has returned to normal, the normal icon is displayed. In addition to the graphical representation of the device, the user shall be able to link pictures, documents and sound files to the device. The NCS shall also provide the ability to auto-vector to the floor plan (screen) of the device that is active. By selecting a device in the graphic presentation, the operator of the NCS shall have the ability to log onto the corresponding node and interrogate the associated intelligent point.

The NCS shall have the ability to provide the following information through a Windows(tm) pull down menu: An Event Counter that contains the number of new and total events on the network. The information that is displayed shall consist of Fire Alarms, Pre-Alarms, Security Alarms, Supervisory Alarms, and Troubles. A Detailed Event window that contains all Off-Normal events, both unacknowledged and acknowledged that are present in the system. It shall contain two views, Fire events and Non-fire events that shall be user selectable. A Current Event window that shall contain all network and local events as well as system messages with a maximum of 1,000 events displayed. A Disabled Device window that shall contain all disabled devices in the system.

The NCS shall have the option, from a Windows pull down menu, to connect to a third party paging service that allows the NCS to automatically send text-based messages regarding system status to a typical text pager.

The NCS shall include help screens, available to aid the user without leaving the selected application screen.

The NCS shall be UL-Listed for fire protection (UL864) and burglary (UL1076).

The NCS shall interface with other panels as a node in the pear to pear network.

The operator shall be able to monitor the FFT system from GUI software and shall be able to monitor and control Integrated Voice Evacuation System.

The NCS shall have a flexible way of assigning operator passwords. There shall be an unlimited number of possible operators, each with specific levels of control. Each operator shall have his/her own password. Operator password and control selection shall be available to a high level "administrator" who shall have complete control over levels of control. If no action has taken place on the NCS after 10 minutes, the current operator shall be logged out and require a new log-in.

The NCS shall include an industry-standard RS-232 port for a UL864 listed printer.

The NCS shall be a table top hardware configuration.

C. Interactive Firefighters' Touchscreen Display

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

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

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. It shall be capable of mapping at least **2,50,000 network points**

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.

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.

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

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

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.

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

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

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

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

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

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

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

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

2.3 GATEWAY AND WEB SERVERS

A. BACnet Interface Gateway: The system shall be capable of being interfaced with BACNet compliant clients. A BACnet interface supporting BACnet/IP communication shall be available from the fire alarm control panel manufacturer.**BACnet shall support 14000 data points. BACnet gateway shall communicate with all the panels in a peer to peer network.**

B. MODbus Interface Gateway: The system shall be capable of being interfaced with MODbus compliant clients. A MODbus interface supporting MODbus/TCP communication shall be available from the fire alarm control panel manufacturer.**MODbus shall support 22500 data points.MODbus gateway shall communicate with all the panels in a peer to peer network.**

C. **Webserver**: The system shall support a webserver allowing remote connection via the Internet or Intranet. Authorized users will have the ability to view panel/network history, event status and device properties. The webserver shall also support sending event information via email or text to up to 50 registered users, the webserver shall be available from the fire alarm control panel manufacturer.

D. **Web Portal Interface**: The system shall be capable of being interfaced with a web portal to integrate with Inspection and Service Manager utilities. The web portal and inspection and service manager utilities shall be available from the fire alarm control panel manufacturer.

2.3 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General

1. Addressable devices shall provide an address-setting means using **rotary decimal switches**. Addressable devices that require the address be programmed using a programming utility are not an allowable substitute.
2. Addressable devices shall use simple to install and maintain decade, decimal address switches.
3. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.
4. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
6. **Addressable smoke and thermal detectors shall provide dual alarm and power/polling bi-colour LEDs.** Both LEDs shall flash green 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 red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
7. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.
8. 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.
9. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.The system shall also support an intelligent programmable sounder base, the programmable sounder base shall be capable of providing multiple tones based on programming and at a minimum be capable of providing a Temp-4 tone for CO (Carbon Monoxide) activation and a Temp-3 tone for fire activations and be capable of being synchronized with other programmable sounder bases and common area notification appliances; 85 DBA minimum.
10. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).
11. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
12. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
13. A magnetic test switch shall be provided to test detectors and modules. Detectors

shall report an indication of an analog value reaching 100% of the alarm threshold.

14. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

B. Addressable Manual Call Point (Break Glass / Pull Down Type)

1. Addressable manual call point shallsend 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 fire alarm boxes shall be constructed of Lexan / ABS Plastic with clearly visible operating instructions provided on the cover. The word FIRE / Fire Sign shall appear on the front of the stations.

C. Intelligent Photoelectric Smoke Detector:

The intelligent photoelectric smoke detector shall 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.

D. Intelligent High Sensitivity Photo Smoke Detector

The intelligent high sensitivity photo smoke detector shall be a spot type detector that incorporates an extremely bright high sensitivity diode and an integral lens that focuses the light beam to a very small volume near a receiving photo sensor. The scattering of smoke particles shall activate the photo sensor.

1. The high sensitivity detector shall have conductive plastic so that dust accumulation is reduced significantly.
2. **The intelligent high sensitivity photo detector shall have nine sensitivity levels and be sensitive to a minimum obscuration of 0.02 percent per foot.**
3. The high sensitivity detector shall not require expensive conduit, special fittings or PVC pipe.
4. The intelligent high sensitivity photo detector shall support standard, relay, isolator and sounder detector bases.
5. The high sensitivity photo detector shall not require other cleaning requirements than those listed in NFPA 72. Replacement, refurbishment or specialized cleaning of the detector head shall not be required.
6. The high sensitivity photo detector shall include two bicolor LEDs that flash green in normal operation and turn on steady red in alarm.

E. Intelligent Multi Criteria Detector

The intelligent multi-criteria 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 its**

environment and choose the appropriate sensing settingsfor early detection and reduction in false alarm. The detector design shall allow a wide sensitivity window, 0.5 to 2.5% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.

1. 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).
2. 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**.**

F. Intelligent Thermal Detectors

The intelligent thermal detectors shall be 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. **A high heat thermal detector rated at 190 degrees Fahrenheit (87.8 degrees Celsius) shall also be available.** The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

G. Intelligent Duct Smoke Detector

The smoke detector housing shall accommodate an intelligent photoelectric detector that provides continuous analog monitoring and alarm verification from the panel. 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. The Intelligent Duct Smoke Detector shall support the installation of addressable Photoelectric detector capable or being tested remotely.

H. Advanced Multi-Criteria Intelligent Fire/CO Detector

1. Advanced Multi-Criteria Fire/CO detector be an addressable advanced multi-criteria smoke detector with a separate signal for carbon monoxide (CO) detection per UL 2075 standards.
2. **The detector shall be comprised of four sensing elements, including a photoelectric (light-scattering) particulate sensor, an electrochemical CO sensor, a daylight-filtered infrared (IR) sensor and solid state thermal sensor(s) rated at 135°F (57.2°C).** The device shall be able to indicate distinct smoke and heat alarms.
3. The advanced multi-criteria detection device shall include the ability to combine the signal of the photoelectric signal with other sensing elements in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition. The detector shall be capable of selecting the appropriate sensitivity levels based on the environment type (office, manufacturing, kitchen, etc.) in which it is installed, and

then have the ability to automatically change the setting as the environment changes.

4. The CO detector component shall be capable of a functional gas test using a canned test agent to test the functionality of the CO sensing cell.
5. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The device shall provide unique signals to indicate when 20 percent of the drift range is remaining, when 100 percent of drift range is used, and when there is a chamber fault to show the unit requires maintenance.
6. The detector shall indicate CO trouble conditions, including six months of sensor life remaining and sensor life has expired. The detector shall indicate a combined signal for any of the following: low chamber trouble, thermistor trouble, CO self test failure, IR self test failure, and freeze warning.
7. The detector shall provide address-setting means on the detector head using rotary switches. Because of the possibility of installation error, systems that use binary jumpers or DIP switches to set the detector address are not acceptable. The detector shall also store an internal identifying code that the control panel shall use to identify the type of detector. Systems that require a special programmer to set the detector address (including temporary connection at the panel) are labor intensive and not acceptable. Each detector occupies any one of at least 125 possible addresses on the signaling line circuit (SLC) loop. It responds to regular polls from the system and reports its type and status.
8. The detector shall provide a test means whereby it 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 switch) or initiated remotely on command from the control panel. There shall be four test methods: functional magnet, smoke entry aerosol, carbon monoxide aerosol or direct heat method.
9. The detector shall provide two LEDs to provide 360° visibility. The LEDs shall be placed into steady red illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED. The detector must be capable of connecting to a sounder base that provides both temporal 3 and temporal 4 patterns for fire and CO alarm.
10. Two LEDs on the sensor shall be controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, shall cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.
11. The detector shall be plug-in mounted into a twist-lock base. The detector shall be constructed of off-white, UV-resistant polymer and shall be detachable from the mounting base to simplify installation, service and maintenance. Mounting base wiring connections shall be made by means of SEMS screws. The detector shall allow pre-wiring of the base and the head shall be a plug-in type. The mounting base shall be mounted on a junction box that is at least 1.5 inches (3.81 cm) deep. The mounting base shall be available to mount to standard junction boxes. Suitable boxes include:

    a. 4.0" (10.16 cm) square box with and without plaster ring.
    b. 4.0" (10.16 cm) octagonal box.
    c. 3.5" (8.89 cm) octagonal box.
    d. Single-gang box.
    e. Double-gang box

12. Meets Agency Standards

    a. ANSI/UL 268 -Smoke Detectors for Fire Alarm Signaling Systems
    b. CAN/ULC-S529- Smoke Detectors for Fire Alarm Systems
    c. FM 3230-3250- Smoke Actuated Detectors for Automatic Fire Alarm Signaling
    d. UL 2075 – Gas and Vapor Detector and Sensors – Systems Connected

I. Intelligent Addressable Aspiration Detector

The intelligent aspiration detector shall be an addressable aspiration detector that communicates directly with the fire alarm control panel via the SLC communication protocol, no modules or high level interfaces shall be required. The fire alarm control panel shall support up to thirty one intelligent aspiration detectors per SLC loop. The aspiration detector shall have dual source (blue LED and infra-red laser) optical smoke detection for a wide range of fire detection with enhanced immunity to nuisance particulates. The FACP shall be capable of monitoring and annunciating up to five smoke event thresholds and eleven trouble conditions. Each event threshold shall be capable of being assigned a discrete type ID at the FACP.

J. Intelligent Addressable Reflected Beam Detector

1. The intelligent single-ended reflected beam smoke detector shall connect with two wires to the fire alarm control panel signaling line circuit (SLC). The detectors shall consist of a transmitter/receiver unit and a reflector and shall send data to the panel representing the analog level of smoke density. The detector shall be capable of being tested remotely via a keyswitch; It shall be equipped with an integral sensitivity test feature.
2. The Beam Detectors shall be long range, projected beam type smoke detectors which consist of a Transmitter and receiver in a single unit and reflector on the other side.
3. The Beam Detector shall have a range upto 100 mtrs. There shall be multiple sensitivity levels. Starting from 25 %, 30 %, 40 %, 50 % and acclimate levels also 30 % to 50 % and 40 % to 50 %. There shall be trouble alarm if obscuration block is more than 96 %.

K. 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 IDC zone shall be suitable for Class A or Class 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.

L. Two Wire Detector Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device)

2. The IDC zone may be wired for Class A or 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.

M. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances
2. The control module NAC may be wired for Class A/B with a current rating of 2 Amps
3. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

N. Addressable Releasing Control Module

1. An addressable releasing module shall be available to supervise and control compatible releasing agent solenoids
2. The module shall operate on a redundant protocol for added protection.
3. The module shall be configurable for Class A/B and support one 24 volt or two 12 volt solenoids.

O. Addressable 4-20 mA Module

Addressable 4-20 mA module shall be available to monitor industry-standard, linear-scale, 4-20 mA protocol sensors. The module converts the sensor output to communication protocol that can be interpreted by the FACP for monitoring and display

1. The module shall support programming of up to five programmable event thresholds.
2. The System shall be FM 6320 (Factory Mutual) approved as a Gas Detection system when employed with the FMM-4-20 monitor module and industry standard 4-20 mA gas detectors.

P. Addressable Relay Module

1. Addressable Relay Modules shall be available for HVAC control and other network building functions
2. The module shall provide two form C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.
3. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary devices energize at the same time on the same pair of wires;
4. For multiple relay control a module shall be available that provides 6 programmable Form-C relays.

Q. Addressable Two-In / Two-Out Monitor/Relay Module

1. An addressable Two-In / Two-Out module shall be available.
2. The two-in/two-out module shall provide two Class B/Style B dry-contact input circuits and two independent Form-C relaysrated at up to 3 Amps resistive and up

to 2.0 Amps inductive.

R. 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.

1. 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.
2. The isolator module shall not require 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.
3. The isolator module 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.

S. Serially Connected Annunciator

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. RS-485 wire runs. Up to 32 annunciators, each configured up to 96 points, may be connected to the connection, for a system capacity of 3,000 points of annunciation.
2. An RS-485 repeater shall be available to extend the RS-485 wire distance in 3,000 ft. increments. 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 RS-485 driven relays. This shall extend the system point capacity by 3,000 remote contacts.
7. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

T. Speakers

1. The Speaker appliance shall be listed to UL 1480 for Fire Protective Signaling Systems. It shall be a dual-voltage transformer speaker capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to

4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.

2. A universal mounting plate shall be used for mounting ceiling and wall speaker products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate.
3. Speakers shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker design shall isolate speaker components to reduce ground fault incidents.
4. The speaker shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction.
5. All notification appliances shall be backward compatible.

U. Advance Speaker Strobes

1. The Speaker Strobe appliance shall be listed to UL 1971 and UL 1480 and be approved for fire protective signaling systems. It shall be a dual-voltage transformer speaker strobe capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.
2. A universal mounting plate shall be used for mounting ceiling and wall speaker strobe products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate. Also, Advance speaker strobes shall be powered from a non-coded notification appliance circuit output and shall operate on a nominal 12 or 24 volts (includes fire alarm panels with built in sync). 12-volt rated notification appliance circuit outputs shall operate between 8.5 and 17.5 volts; 24-volt rated notification appliance circuit outputs shall operate between 16.5 to 33 volts.
3. Speaker strobes shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker strobe design shall isolate speaker components to reduce ground fault incidents.
4. The speaker strobe shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction. The strobe shall consist of a xenon flash tube with associated lens/reflector system and operate on either 12V or 24V. The strobe shall also feature selectable candela output, providing options for 15 or 15/75 candela when operating on 12V and 15, 15/75, 30, 75, 110, or 115 when operating on 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.
5. All notification appliances shall be backward compatible.
6. Strobe lights shall meet the requirements of the ADA, UL Standard 1971and be fully synchronized.

V. Programmable Directional Sounders

1. Shall follow NFPA 72 2016 edition Clause A.18.4.7.1 recommendation.

2. Electronic sounders shall operate on 24 VDC nominal.
3. 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.
4. Shall be capable to broadcast pre programmed Voice Message.
5. Shall be flush or surface mounted as shown on plans.
6. Shall produce broad band directional sound with **20 Hz to 20 Khz frequency band** to guide occupants to safe exists even in complete darkness.

W. Addressable Portable Emergency Telephone Handset Jack

1. Portable emergency telephone handset jacks shall be flush mounted on stainless steel plates as indicated on plans. Handset jacks shall be approved for emergency telephone system application.
2. Insertion of a remote handset plug into a jack shall send a signal to the fire command center which shall audibly and visually indicate the on-line condition, and shall sound a ring indication in the handset.
3. The two-way emergency telephone system shall support thirty five (35) handsets on line without degradation of the signal.
4. **Remote Telephone Handset shall be capable of making paging announcement across all the zones in the system.**

X. Addressable Fixed Emergency Telephone Handset

1. The telephone cabinet shall be painted red and clearly labeled emergency telephone. The cabinets shall be located where shown on drawings.
2. The handset cradle shall have a switch connection such 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. The two-way emergency telephone system shall support thirty five (35) handsets on line (off hook) without degradation of the signal.
4. **Remote Telephone Handset shall be capable of making paging announcement across all the zones in the system.**

Y. Batteries

The battery shall have sufficient capacity to power the fire alarm system for not less than 48 hours in standby plus 2hours of alarm upon a normal AC power failure.

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

If necessary to meet standby requirements, external battery and charger systems may be used.

PART 3.0 - EXECUTION

3.1 INSTALLATION

A. 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.

B. All conduit, junction boxes, conduit 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.

C. 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.

D. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2 CAUSE & EFFECT LOGIC

System shall be programmed as per the attached cause & effect logic.

3.3 TESTING

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
B. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
C. Verify activation of all waterflow switches.
D. Open initiating device circuits and verify that the trouble signal actuates.
E. Open and short signaling line circuits and verify that the trouble signal actuates.
F. Open and short notification appliance circuits and verify that trouble signal actuates.
G. Ground all circuits and verify response of trouble signals.
H. Check presence and audibility of tone at all alarm notification devices.
I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
J. Each of the alarm conditions that the system is required to detect shall 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.
K. When the system is equipped with optional features, the manufacturer's manual shall 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.

3.4 FINAL INSPECTION

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.5 INSTRUCTION& TRAINING

A. Instruction shall be provided 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.

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

3.6 SUBMITTALS

a) Power calculations.

- Battery capacity calculations.
- Supervisory power requirements for all equipment.
- Alarm power requirements for all equipment.
- Justification showing power requirements of the system power supplies.
- Voltage drop calculations for wiring runs in worst case condition.

b) Complete manufacturer's catalogue data including supervisory power usage, alarm power usage, physical dimensions, finish and mounting requirements.

c) Submit panel configuration and interconnection of modules and all other data as required to make an informed judgment regarding product suitability. As a minimum, data shall be submitted on the following:

- Main system including all fire detection with main and secondary control panels.
- Circuit interface panels including all modules.
- Power supplies, batteries and battery chargers.
- Equipment enclosures.
- Intelligent addressable manual pull stations, multi-criterion detectors, heat detectors, analogue smoke detectors, alarm monitoring modules, and supervised control modules.
- Audible and visual evacuation signals and devices.
- Software and firmware as required providing a complete functioning system.
- Wiring.
- System driven remote annunciators.

- Interface module and wiring configuration from local system to Fire Command System.

d) Submit copies of UL listing or FM approval data showing compatibility of the proposed devices or appliances and the panels being provided.

e) Submit the following shop drawings.

- Floor plans showing all initiating, end of line, supervisory, indicating appliances, and output control devices; including circuit interface panels, enunciators, printers, Control panel location.
- Raceways, marked for size, conductor count with type and size
- Calculations and mathematical justification for speakers meet the code required 15 dBA above ambient for audible warning signals.
- Wiring diagrams showing points of connection and terminals used for all electrical connections to the system devices and panels.
- Complete single-line riser diagram showing all equipment and the size type and number of all conductors.

f) Submit Method Statement for systems component wiring, installation, testing, commissioning and operating.

g) Typical installation drawings

h) Complete operation and maintenance manual with two sets of proposed installation drawings shall be submitted.

i) Warranty all system components, devices, peripherals, wiring, for Three years from date of practical completion Certificate.

j) Guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for One years from date of practical completion Certificate.

Part I Design Requirements

1 Project Overview

[This chapter mainly describes the basic information and requirements for this bid.]

2 System Design

The design for the Digital Public Address/Voice Alarm System should meet the user and system requirements below. Its key features and design basis are as described in the next chapters.

2.1 User Requirements

The broadcasting system uses the same device to play the background music, business announcement and emergency broadcast. It has an emergency call microphone in the fire control center for evacuating the crowds in specific zones when accidence happens and a paging microphone in the broadcasting center to broadcast announcements and search notices.
The background music, business announcement and emergency broadcast share the same loudspeakers. In ordinary situation, the loudspeakers are for playing background music and business announcement, but for emergency broadcast instead during the fires.
The broadcasting devices located in the broadcasting center or the specified location according to the user's requirement. The placement of the devices should meet the operating environment requirement and save up floor space. The amplifier capacity should comply with national standards and be with redundancy. Meanwhile, the emergency broadcast can achieve the linkage of the adjacent layers. Users can select the layers to be linked.

2.2 System Design Requirements

2.2.1 Maturity

As the development of modern science and technology, all kinds of the advanced technologies have been applied in the intelligent buildings to save the labor costs, to improve the efficiency and to ensure the intelligence for the modern buildings.
The modern technologies support the public address applications in the intelligent buildings. The global mature and advanced technologies are critical for designing the public address system, and only the broadcasting system incorporating mature and industry-leading technology and high-technology products can ensure the intelligence for buildings.
In the system design, advanced concepts, technologies and methods need to be adopted; system structure, product designs and wiring easiness also need to be considered.

2.2.2 Functionality and Reliability

Besides the technical advancement mentioned above, functional design, system structure, system performance, manufacturing process and after-sales support are also important as to ensure the reliability and stability of the system operation, maximizing the mean error-free time.

A mature technical platform and the rigorous manufacturing process are the bases of functions' realization. During the runtime, system should be able to discover and eliminate all the functional faults in time. The core components can achieve auto backup. System administrators can easily access the failures and work logs.

2.2.3 Manageability

Intelligent buildings need to realize intelligence distribution and resource sharing.

The central control units of the broadcasting systems connected with standard Ethernet distribute in different zones of the building for usage convenience. The system administrators can collect the system resources in the network and centralize the monitoring management. The resulting efficiency and equipment cabling cost reduction can not be achieved by the traditional decentralized management. Therefore, a digital address system that can be extended via Ethernet and can achieve central monitoring management is ideal.

2.3 Key Design Bases and Indices

2.3.1 Key Design Bases

- XXX Bid Document
- Architectural Plan
- Civil Architectural Electrical Design Code (JGJ/T16-92)
- Code for Engineering Design of Generic Cabling System for Building and Campus (GB/T50311-2000)
- Standard for Design of Intelligent Building (GB/T50314-2000)
- Code for Design of Automatic Fire Alarm System (GBJ116-92)
- Automatic control system for fire protection (GB16806-2006)
- Technical Code for Public Address System Engineering (GB50526-2010)

2.3.2 Key Design Indices

Sound Field Intensity

The intensity of the sound field is close related to the background noise. In terms of the noise criterion for different environments, the noise criterion in general buildings is 25 ~45db except the parking lot with noise criterion around 55 ~56db. The uniformity of the sound field is the uniformity on the sound pressure level, and its range of variation should better be around 8db.Sound intelligibility is the subjective assessment standard of the sound articulation. The performance indices for the loudspeaker: the frequency response is the key factor that affects the intelligibility. The frequency response of the ceiling loudspeaker within 100Hz ~ 14 KHz is appropriate. The specific indices for the various loudspeakers should accord to the frequency response of the amplifier, which should be better than the loudspeaker's. The selection and location for the loudspeakers are mainly determined by factors like maximum sound pressure

level, sound field uniformity, transmission frequency characteristic and space size. In terms of the technical standards, Indices of Acoustic Characteristics for Sound Reinforcement System & Civil Architectural Electrical Design Code, the system is designed by third level of the sound reinforcement for the voice and music. The indices are as follows:

- Vacant auditoria stable overall sound pressure level ≥85dB (Within 250 ~ 4000Hz average sound pressure level)
- transmission frequency characteristic: 250 ~ 4000Hz, tolerance +4 ~ 10dB
- Sound Field Non-uniformity ≤ 8dB
- The sound pressure of the listening point on the vertical axis along the single loudspeaker's projecting direction can be calculated by:

  LP=L0+10lgPS-20lgr
- LP: auditory point sound pressure level(dB), L0: loud speaker sound pressure level (dB SPL), PS: sound pressure power of sound source, also the loudspeaker rated power (W), r: vertical distance of the speakers and the listening point
- Background Music: The sound source location of the background system should not be aware by the listeners. The goal for the design is that the tone quality of the music is tender and clear. The design indices: the sound pressure inside is uniform. The average sound pressure = noise level + (3~5) db. The frequency band is 100 ~ 12000Hz, and the playback is straight.
- Emergency broadcast: The emergency system is designed to make the listener hear clear and correct sound. The design indices: The sound pressure inside is uniform. The average sound pressure = 88 ~94 db. The frequency band is 100 ~ 6000Hz and the playback is straight.
- As described above, the noise level can determine the average sound pressure for this design: Background music sound pressure = 60 ~ 70 dB, and Emergency broadcast sound pressure = 88 ~94dB.

Power Amplifier

- P=K1·K2·ΣP0
- P —Total electric power amplifier device output (W); P0— max. electric power of Ki·Pi when every branch broadcasts at the same time
- Pi— the speakers rated capacity of the i-th branch; Ki— sync coefficient of the i-th branch
- Service broadcasting programs, Ki=0.2~0.4; Background music system, Ki= 0.5~0.6
- The business of broadcasting, Ki= 0.7~0.8; Fire accident broadcasting, Ki= 1.0 (the maximum electric power broadcast should be in line with the national standards)
- K1—Line attenuation compensation coefficient: When line attenuation is 1db, K1 is 1.26; line attenuation is 2db, K1 is 1.58
- K2— the aging factor, 1.2~1.

3 System Function

3.1 System Design Composition and Principle

The system has placed broadcasting devices in every plant room. The distributed control device (DCS) is integrated with many functions and supports the connection via Ethernet. It has 8 loudspeaker output circuits to connect the loudspeaker in zones and 4 network connection interfaces to connect to 4 network paging control panel or Ethernet. Each DCS can connect up to 4 amplifier channels. The device has integrated amplifier switching matrix to support the redundancy switching and the general dry contact input/output interface to connect the external audio sources and dry contact interface of the linkage fire system. It has a built-in 1G memory to store the audios such as digital voice messages and the alarm tone of the emergency broadcast. This device can operate independently without the PC. It encompasses the functions like the audio playing, zone control, fault monitoring, log recording, volume control and amplifier switchover.

The control device for the system customized NPM. It has the LCD touch screen for operations, like zone selecting, calling, audio sourcing selecting, emergency broadcast, monitoring and internal communication. The functions of the Programmable network paging console NPM can be configured using the configuration software.

The system management software installed in the central control room has a user-friendly operation interface, enabling the Electronic Map, Devices and Zones statuses' graphic monitoring. Users can set shortcuts and broadcasting programs via the software, as well as proceed background music playing, audio announcement, equipment status view, log view and time-based broadcast configurations..

3.2 Key Features

3.2.1 Distributed Control

This distributed design for the system is based on the building structure to facilitate the connection of the loudspeakers in several nearby zones, which will make the control of the loudspeakers easier. The selected system devices should use the TCP/IP technologies and build on the standard network platform to ensure the extensibility, compatibility for multiple technology platforms and advancement of the system.

3.2.2 Faults detection and Isolation

The Faults detection function for the broadcasting system can automatically examine the host system, power amplifier, power source, communication, and detect the open circuit, short circuit and grounding fault to generate the fault alarm and log.

When the grounding fault or short circuit occurs, the amplifier or the main controller of the system should isolate the circuit to ensure the operation of the main devices and normal circuits.

3.2.3 Background Music Audio Source

The broadcasting system can use audio sources from devices such as the CD, radio and MP3 to provide the zones with different audio sources, which can meet the various requirements for different zones. In the tolerant power range, different zones using the same audio source can

share an amplifier, reducing the system cost. The background music inputs methods are multiple: both network and local inputs are allowed.

3.2.4 Service Broadcasting

The paging microphone allows users to make paging and broadcast search notices by zone. The paging microphone has a color LCD touch screen. Users can configure the functions directly on the screen. Users can select the zone and audio source, adjust the volume, and enable the emergency broadcast by pressing the button on it. Paging microphones can intercommunicate. 255 broadcast priorities levels available. When the connected distributed control unit is out of order, a paging microphone can continue the intercommunication with other microphones in the network and proceed the remote broadcasting configuration on other control units.

3.2.5 Time Synchronization

Within the system, the controller can specify any main device as the main time source, or choose a third party system to be the time source. Other devices synchronize their time with the main time source to make sure the time is consistent in the system.

3.2.6 Timed Broadcast

The timed broadcast function of the broadcasting system allows users to set the periods for playing different music or service broadcasts in different zones.

3.2.7 Emergency broadcast

The broadcasting system can be linkage of the fire system to achieve the alarm function in the adjacent layers. The layers for linkage can be configured with the software as the requirements. Users can record the voice message for the emergency broadcast and save it in the host system. The emergency broadcast can start automatically (when linkage of the fire system) and manually. The broadcasting system has its own 1 PPT emergency microphone, which could be used to play emergency broadcasts and evacuate the crowds in specific zones.
When the fire alarm rings, the system can display the fires in planar graph and show the fire zones. According to the fire status, users can call the emergency microphone to make the fire zones enter alarm and evacuation two modes.

3.2.8 Priority

The broadcasting system allows users to set the priorities. Generally, the priority for the broadcast is in the order: Emergency Broadcast > Service Broadcast >Background Music, and for the microphone is Emergency Microphone > Service Broadcast Microphone.

3.2.9 Automatic Amplifier Shift

The system has standby amplifiers. When a main amplifier fails to function, the standby amplifier replaces it automatically. After the main amplifier recovers, the system will use it instead of the standby amplifier in an automatic way.

3.2.10 Broadcast Record

The DCS can record sufficient voice message (up to 1GB), and its contents can be customized. The voice message contains the emergency broadcasts for fires, such as evacuation and all-clear information, which are played by the digital speech synthesis system automatically (linkage of

the fire alarm system) or manually. Four languages for the voice message are available. Users can select one of the languages to record the information.

3.2.11 Internal Communication

The call stations can communicate with each other using the simple communication functions.
The paging microphone in the broadcasting center has a color LCD touch screen. Users can configure the functions according to the actual requirements.
The call station's calling zone can be authorized. Each call station can call the local authorized zones. Several call stations can call the same zone, and one call station can call the zones of other call stations.

3.2.12 System Electronic Map

The system interface has several optional views. The electronic map can display statuses of all broadcast zones within the building structure. Users can operate on the broadcasting zones using the electronic map. Maps can be layered into three levels.

3.2.13 Background Music Broadcast

The background music broadcasting functions and local audio sources can be specified in different zones. The administrator can configure the background music according to the time and occasion. The system will automatically switch to the emergency broadcast under emergency.

3.2.14 Program Source

The broadcasting control center has various audio sources, including the professional digital players for background music, CD, FM/AM tuner, remote control microphone for zone calling and high-capacity digital record and playback devices.

3.2.15 Log

The system can record the device fault log and operation log. Users can search information in the logs using time, devices, operators and log types as search criteria.

3.2.16 Power Source Forced Switchover

The key devices, like DCS and amplifiers, have main power source and 24V standby power source. When the main power source fails to function, the standby power source is responsible for the power supply.

3.2.17 Distributed Call Station

The distributed call station can call the specified zones. The call station has remote control function, which can control emergency broadcast, zone audio sources and external devices.

3.2.18 Automatic Volume Control

The volume of the system can adjust automatically responding to different levels of environment noise in the crowded areas.

3.2.19 Local & Remote Monitoring

Users can monitor audio sources status via local distributed control units and remote call stations.

3.2.20 Emergency broadcast

- Emergency broadcast Requirement
  - Forced Switchover (Auto/Manual): Once the emergency broadcast is triggered by a remote control microphone or other external devices (fire alarm system), the other functions (like background music and general broadcast) will be paused, but the system will play the recorded voice message (alarm and evacuation information) for fire emergency or the information from the emergency microphone until the all-clear.
  - The system will switch to emergency broadcast in 3 seconds.
  - The signal tones and voice messages (alarm and evacuation information) of the Emergency broadcast system are stored on the voice storage flash or SD card, which will not be ageing or lost. Users can play them in all zones.
  - Emergency broadcast system should have system testing function as a standard configuration. The testing for the system can enable the operator to ensure the normal operation for the system all the time. The testing of emergency broadcast should be enabled via the software instead of playing the actual emergency broadcasts and causing public's panic.
  - Emergency broadcast system should achieve the automatic amplifier shift. Once an amplifier fails to function, the standby amplifier replaces the breakdown amplifier automatically without changing the input and output circuits of the amplifier manually.
  - Emergency broadcast system should have two pre-recorded emergency broadcast messages. The system should be able to edit and record the alarm and evacuation message. The priorities of the emergency broadcast can be programmed. DCS should be with a PTT emergency microphone, with which operators can announce real-time evacuation notices when emergency happens.
  - Users can listen to stored or audios about to play to avoid playback error message which may lead to crowd panic.
  - Language kinds should meet the user's requirements. There should be spaces left for the tags to facilitate users to stick related prompts for management.
  - System can automatically record voice messages sent by emergency microphone. Users can listen to and broadcast the voice message.
  - The linkage signals of the emergency broadcast uses the volt-free contact. All signals are from the fire control center. The number of the cables is the same as the fire control centers number.
  - Can achieve the linkage of the adjacent layers. Users can select the layers to be linked via software configuration.
  - When system switches to fire alarm mode, fire floor plan will pop up in the operating interface, directly showing where the fire happens. Operators can select specific zones and activate the warning and evacuation broadcast on the operating panel.
  - The loudspeakers allow the 3-wire forced volume control switchover.
- Circuit Detection

It is able to detect every zone’s status to ensure the working order of the circuits and report faults in time. When a short-circuit error takes place, the device isolates the zone where error happens to protect the amplifiers and to cut off its impact on other zones.

Part II Solution

4 Device Selection

The system should be based on the TCP/IP network technologies with high level of integration and flexible configuration to meet various requirements. It is designed for the emergency broadcast and background music application enabling fire emergency broadcast functions like automatic fire warning, voice message presetting, emergency calling, emergency call recording and circuit monitoring, and service broadcasting functions like zone background music broadcasting, zone call broadcasting, timed music broadcasting and monitoring. The device is accordance with the Automatic Control System for Fire Protection (GB16806) and Standard EN 54-16.

With public address and voice alarm system integrated into one, the system should solve the duplication of investment and security risks and other problems caused by two individual systems. The distributed intelligent systems of the should be capable of accessing the 10/100M Ethernet network and multiple audio sources from the network. It supports connections in the Ethernet and the networking for several other control systems to perform centralized and distributed management via software. This product should be suitable for medium-scale and large-scale buildings.

5 Technical Characteristics

5.1 High Integration

The controller should be able to integrate audio source storage, network audio reception, voice broadcasting, audio matrix, volume control, monitoring, troubleshooting and main/standby amplifier switch functions together.

5.2 Safety

The system should be GB16806/EN54-16 compliant and can work in severe environment. It can be used to broadcast in case of emergency to disperse and evacuate people. It is a great guarantee for people’s life security

5.3 Ethernet Based Extension

The central controller should be able to connect over the Ethernet without any external device. The configurable Network Paging Microphone could be placed anywhere in the Ethernet, which will enable the following :

- The method of distributed installation can save the cost of wiring.
- If the band width is sufficient, it can use current internal network.
- Provide plentiful network audio sources.
- Centralized management of the system via system software.

- Control the local or global broadcasting by the manner of permissions.
- Easy to upgrade.

5.4 Multitask Processing Mechanism

To simplify the operations, the system adopts multitask processing mechanism, thus it can process multiple tasks and make it possible to broadcast multiple audio source and broadcast in multiple zones.

5.5 Multiple Audio Sources Support

The system supports the audio sources from emergency microphone, network audio, ancillary line input, build-in audio/music files and web microphones.

5.6 SONIC Network Digital Audio Transmission Technology

With SONIC, multiple digital audio signals, including PC-connected microphones, external audio files, DCS local audio files, etc., can be transmitted through the network, realizing the audio input diversity and output parallelism. 10M/100M Standard Ethernet is adopted as the transmission media. If the band width is sufficient, the devices can use and share the existing network with other systems, reducing costs on network laying.

5.7 Prioritized Control

The system supports 255 priorities. Users can configure it in any way they want and realize all kinds of prioritized broadcasting controlling.

5.8 Automatic Volume Control Function

In places of crowded people and loud noises, users can install a noise detector, which can help control the broadcasting volume automatically to ensure sound's intelligibility..

5.9 Local and Network Monitoring Function

With the built-in loudspeaker of controller or Configurable Network Paging Console, users can monitor each zone's broadcasting. The monitoring volume can be adjusted.

5.10 Touch screen

Programmable network paging console (NPM) is equipped with a touch screen. Users can operate on the touch screen to configure multi-zones settings without the need to extend hardware key modules, saving floor space on the desktop.

5.11 Troubleshooting Feature

The ASD troubleshooting technology can support the system to automatically detect the failure of the main power, standby power, amplifier circuit, amplifier protection/power, software, communications and loudspeakers etc. It can also locate the failure for maintainers to repair or replace the fault units.

5.12 Loudspeaker Circuit Detection

The SIM loudspeaker circuit detecting technology helps monitor loudspeaker circuits' statuses. When short-circuit or open-circuit faults are found, the device will send a warning automatically. The software can display all the circuit faults for maintenance's convenience. Usually a loudspeaker's short-circuit fault will activate the amplifier protection, affecting the working order in other zones. SIM solves this problem by automatically isolate the short-circuited zone where fault is found.

5.13 Matrix Allocation Function

This system includes the audio source matrix and power matrix to provide two kinds of work mode: low-cost power zones, and amplifiers & zones, which can meet the requirement for low-cost applications or high power zones.

5.14 Auto-backup

RiskFree auto-backup technology focuses on realizing the main units', including servers' and amplifiers', backup and switchover functions. A server machine is paired up with a standby one, while a standby amplifier can serve as the backup machine of one, two or three main amplifiers. When faults are detected on the main machines, the system will switch over to the standby one.

5.15 Input/output Triggering

This system has input/output interfaces which can be triggered by dry contacts. Engineer staffs can configure the contact input to achieve the broadcasting control by the external device (linkage of the fire system). The contact output can be used to control the external devices for the volume, forced switchover and so on. The contact output interface can be linked of the broadcasting operations.

5.16 Voice Recording

Besides in the system server, the controller should havea 1GB solid-state storage to store the alarm voice, service voice and other audio files. Users need to upload the audio files to the device using the specified configuration software.

5.17 Voice Alarm

This system is designed in accordance with the EN54-16 Standard and national standard GB16806. It is full-featured for the fire alarm. When the fire occurs, the system will play the preset voice information. Then it can play the evacuation information for the zones with fires and the fire alarms for the nearby zones. The system can set several kinds of language for voice information, which can be played using the operation panel.

5.18 Automatic Recording

When users make broadcasting using the emergency microphone, the system can automatically record the broadcast for 30 minutes or more. The recorded broadcast can be played as the audio source.

5.19 Broadcast Delay

Users can configure the time delay function in the broadcasting system. After making broadcasts, users need to wait for the time delay set previously, then the pre-recorded program will be played. This function can be utilized as in the following situation: When fire occurs, the system will pause for the administrator to confirm the fire alarm signal, and then play the emergency broadcasts. It can avoid crowd panic results from mis-operations.

5.20 OneClick Technology

To increase operation's convenience, OneClick technology is developed with which broadcasting can be started by clicking only one key. The operation shortcut can be configured with system management software and network paging console.

5.21 Internal Communication

The Programmable network paging console should have built-in loudspeakers and microphones for internal communication. Users need to configure this function before using it.

5.22 Multichannel Digital Power Amplifier

Multi-channel digital power amplifiers with CLASS-D technology design should be used in the system. Its output efficiency is more than 80%, which can reduce the power costs. Besides low power consumption, it is small in size. In this case, several amplifiers can be put in the same chassis to save the space. This kind of power amplifier has the features as below:

- CLASS-D Amplifier saves the energy with high efficiency.
- Channel number can be 1, 2 or 4
- 100V or 70V output is used for each channel.
- Support balanced input or unbalanced audio input mode.
- Cooling mode is forced air-cooling mode.
- Able to limit output voltage automatically.

5.23 Flexible Configuration

This system allows users to customize the configurations flexibly using the specific software. The engineering technicians and maintainers can configure the built-in audio sources, keys' functions, troubleshooting, audio source play modes, broadcasting priorities and contact input/output and other customized operations the OneClick functions. With careful configurations, the system can meet the needs of both background music broadcasting and emergency alarms. The configuration software for this system is used to configure the hardware. The default configuration for the device contains only the basic functions. Users need to work on each settings, including basic parameters, troubleshooting, broadcast preset and key events and so forth.

Configuration Software features:

- Project File Management

  It includes:

  - Create project, save project, open project, and check the latest project file;

- Manage the subsystem and configuration files

- Property Setting

  The property setting is to set the basic property and broadcasting functions. The basic property settings include the zone settings, DCS settings and NPM settings.

- Broadcasting Setting

  The broadcasting function allows users to set the event- triggered, time-triggered and fire alarm broadcasting.

- Output Configuration

  After the error checking and building, system can generate the configuration files according to the configured project files.

- Audio Source Conversion

  It allows users to convert the audio files according to the sampling rate, digitalizing bit and channel number into the audio files in specified formats for the system.

- Network Communication

  It allows users to upload the configuration files, audio files and playlists to the devices like DCS and NPM via the network. The devices will reboot to make the configuration take effect after they receive the configuration files.

5.24 System Management Software

The system management software can run on the Windows XP/Windows Vista/ Windows 7 operation system. It can communicate with the system via the Ethernet. The operation is as simple as below:

- System Configuration
  - Configure the components and functions of the system management software.
  - Configure the devices for the server.
  - Configure the electronic map or operation interface.
  - Configure audio sources and preset broadcasting operations.
  - Drag the maps, icons and buttons to modify the layout on the server operation interface.
  - Configure the managing scope and authorities for software on the client end.

- User Management

  It can add, edit and delete users and manage access control of the users.

- Broadcasting Control

  The broadcasting control function allows users to manage all the broadcasting businesses and to manage the broadcasting management client ends.

- System State Management

  The software can obtain broadcasting states of each device in the system. The buttons and icons representing devices or zones will be green when all functions are normal, and will turn red when fire occurs.

- System Warning

System Warning Function allows for centralized management of device failure states in the system, and recording the fault log automatically in the log module. When the system detects failure, the interface of the system management software will give out audible & visual alarm. Failed device unit is yellow. Users can accurately locate the failure unit using the interface of the system management software.

- Log Management

  System can record and store all system operations histories and failure events for future analysis. Work log and failure log will be stored in separate memories and cannot be deleted manually. Only the logs of the latest one year will be stored. Users can query the logs according to time, workgroup, device, etc. and export the result logs.

- Voice Synthesis

  The system management software provides the interfaces for the third party voice synthesis software. It can convert the text words into voice for playing.

- Audio Management

  It allows users to perform centralized management of the audio files on the server, and to play them on the network. The audio management function can convert the audio source files in different format into the specified formats of the system. It can put the audio files to the specified broadcasting zones by configuring the preset broadcasting operation.

6 Device Description

6.1 Digital Integrated System Manager / controller

The Digital Integrated System Manager is hereinafter referred to as the DCS.
The DCS is control equipment in the system designed for extending the number of loudspeaker zones, and can support multiple sound source files for broadcasting. The system integrates with functions such as the sound source file storage system, the network audio broadcasting system, the loudspeaker zone control system, and the system for monitoring and diagnosing faults.
The DCS offers various features, which are listed below:

- Supports the manual selection of sound source files, zone buttons, and can be directly operated.
- Supports emergency microphone input for emergency broadcast in the event of, for example, a fire evacuation.
- Includes different indicator lights that identify system running states.
- Performs remote paging and broadcasting operation through the Configurable Network Paging Console.
- Includes 8 zone outputs. The number of zones can be configured through the software.
- 4 auxiliary inputs that can connect to external sound source equipment such as a CD player or tuner
- 4 auto volume control input ports that can set the phantom power supply and gain of each input.
- Auto loudspeaker circuits' short-circuit and open-circuit detection.
- A fuse protects the main power supply. In the case of a power supply short circuit within the DCS, the system automatically disconnects the main power supply.

- Built-in loudspeaker that can monitor the zones and sound sources, as well as monitor the network audio through the NPM.
- Contains 1GB of built-in flash memory that can store recorded voice files so as to fulfill functions such as voice information broadcasting and voice synthesis
- Can simultaneously broadcast four types of sound sources, such as voice audio sources and external input or network audio sources.
- Can automatically record operation and fault logs, and can store up to 10,000 logs of each log type (operation and fault log types).
- Supports switching between the main and backup power amplifiers, and is capable of configuring the standby mode.
- Contains a self-test function.
- Supports automatic fault diagnosis.
- Supports broadcasting volume adjustment.
- Can define the zone and sound source functions. Button function description labels are also easy to install.
- An audio matrix enables broadcasting any audio source in any zone.
- Supports fire emergency broadcast mode so as to improve personnel evacuation efficiency in case of an emergency.
- Supports broadcasting designated recorded voice audio at a designated time so as to allow for unattended broadcasting.
- Capable of system extension through an Ethernet network.

Parameter	Value
Power Supply	
Main power supply	~100-240V，50/60Hz
Backup power supply	DC 21.5V-28.5V
Main power fuse	T2AL 250V
Max. input power	120 W
Rated power	50 W
Audio Input	
Auxiliary input	0dB
Input impedance	20 kΩ
Frequency response	60Hz-16KHz
PTT microphone input	-51dB
SNR	>85dB
Audio Output	
Audio output channels	4个
Output signal	0dB

Parameter	Value
Record output	0dB
AVC Input	
Channels	4个
Input signal	-50dB/0dB, configured by switch
Input impedance	20KΩ
Phantom power	DC 24V, configured by switch
Frequency response	60Hz-16KHz
SNR	>65dB
Loudspeaker Circuit	
Output channels	8, with circuit fault detection function
Max. output load power	250W
Trigger Input / Output	
Trigger input ports	8
Trigger output ports	8 (NO, NC and COM)
Max. working voltage	AC 250V/DC 30V
Max. working current	2.5A
Others	
Monitoring loudspeaker	10W/8W
Ethernet speed	10M/100M
Ethernet interface number	4
Storage space	1GB
Work Condition	
Humidity	< 95%, without condensing
Working temperature	-10°C~+55°C
Storage temperature	-40°C~+70°C
Specification	
Dimension (W×H×D)	482 mm×88 mm ×420mm
Mount dimension (W×H×D)	580mm×235mm ×552mm
Net weight	9.3Kg
Gross weight	12.5Kg

6.2 2X250W High Efficiency Power Amplifier

2X250W

Parameters	Values
Rated output power	2X250W
Main power supply voltage	AC 220V -15% - +10% 50-60Hz
Backup power supply voltage	AC 220V -15% - +10% 50-60Hz
Main power supply fuse	T10AL 250V
Loudspeaker output	100V / 70V
Frequency response	70-15KHz (+1dB to -3dB)
Input sensitivity and impedance	1.414V_{RMS} & 20K ohm
Output voltage/impedance	100V/40ohms, 70V/19.6ohms
Signal-to-noise ratio (SNR)	$>$ 90dB
Nonlinear distortion	$<$ 0.1% (1KHz, 1/3 rated output power)
Number of channels	2
Environment humidity	$<$ 95%, without condensing
Working temperature	0 to +40°C
Storage temperature	-10°C to +55°C
Product dimensions (width × height × depth)	88mm × 440mm × 440mm

6.3 Configurable Network Paging Console

The Configurable Network Paging Console is hereinafter referred to as the "NPM"
The network paging microphone (NPM) connects to the system and related devices to transmit audio and control information through the Ethernet network. The NPM is used for paging, controlling broadcasts, monitoring zones, and for using the bidirectional intercom function.
The NPM has the following characteristics:

- Lightweight and innovative patent outward design. Support embedded desktop installation
- 4.3-inch color LCD touch screen. Can display system status and be operated for zones and groups' division or global paging and broadcast control
- Simple and intuitive user interface
- Can connect with up to 20 units. Button numbers can be added via software configuration
- Built-in monitor loudspeakers. Can utilize functions like zone monitoring and two-way intercom between stations.
- Digital audio processing to avoid acoustic fidelity distortion
- Can intercommunicate with other paging microphones and DCS in the network even when the connected DCS is not running
- 3 shortcut buttons: microphone talk mode switch, select all function and emergency broadcast
- Has one audio input and output port for playing BGM from a CD source or for recording an output.

Parameters	Values
Power supply voltage	DC 12V
AUX input	0 dB
AUX input impedance	10 KΩ
Frequency response	60 Hz – 16 KHz (local input signal)
Microphone input	-51 dB
Audio output	0 dB
Monitoring loudspeaker	2 W/8 Ω
Monitoring sound pressure level	Higher than 65 dB and lower than 115 dB (1 m in front of where the audio is being output)
Operating temperature	-10 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Humidity	< 95%, without condensation

6.4 Integrated Audio source

The Integrated CD player supports the MP3 music files on removable disks, SD cards, DAB digital broadcastings and FM tuners.

- Two single CD\USB\SD and DAB\FM line outputs can play music applications in two areas.
- The volumes of the two line outputs can be adjusted separately.
- CD\USB\SD has three play modes: single play, all play and repeated play.
- DAB\FM can preset 10 channels of programs.
- RS485 remote control interface.

Parameters	Values
Power supply	~ 220V 50Hz
Power consumption	< 13W
Input	DAB/FM DAB 50 Ohm unbalanced antenna terminals USB port, SD port
Output	RCA audio output for DAB/ FM synthesizer tuner (910mV) RCA audio output for CD/USB/SD L and R channels (910mV)
Channel	2
Product dimensions	482(W) × 44(H) × 252(D) mm

Parameters	Values
Packing dimensions	520(W) × 142(H) × 351(D) mm
CD-DA Audio	
Output level(mV)	850mV
Frequency response(dB)	±1dB
THD (Total harmonic distortion)	0.08%
SNR(Signal-to-noise ratio) (dB)	80dB
Channel Separation(dB)	70dB
MP3/WMA Audio	
Channel Separation(dB)	70dB
Frequency response(dB)	17Hz~127Hz(-1dB, +2dB) 127Hz~10KHz(±1dB) 20KHz(±2dB)
THD (Total harmonic distortion)	0.15%
SNR(Signal-to-noise ratio) (dB)	80dB
DAB	
Band frequency range (MHz)	174MHz~240MHz
SNR(Signal-to-noise ratio) (dB)	60dB
THD (Total harmonic distortion)	0.2%
Channel Separation(dB)	55dB
Input Impedance(Ohm)	50Ohm
FM	
Band frequency range (MHz)	87.5MHz~108MHz
SNR(Signal-to-noise ratio) (dB)	48dB
THD (Total harmonic distortion)	1%
Channel Separation(dB)	25dB

6.5 Loudspeakers

6.5.1 Ceiling Loudspeaker

- 6W Metal Ceiling Speaker with 6/3/1.5W taps

Parameters	Values
Max power	9 W
Rated power	6 W
Power taps @ 100V	6W / 3W / 1.5W
Sound pressure level at 6W/1W (4kHz,1m)	96dB / 88 dB
Frequency range (-10dB)	80 Hz -20 kHz
Dispersion angle (1kHz/-6dB)	160°
Rated input voltage	100 V / 70 V
Rated impedance	1.7 kΩ / 3.3 kΩ
Connection	Plastic terminal blocks
Dimensions(Φ x H)	Φ180 mm x 55 mm
Hole cut-out size	150 mm
Size of speaker	5”
Weight	0.71 kg
Color	White (RAL 9010)
Weight of Magnet	117 g

- 6W Ceiling speaker with metal grille and 6/3W taps

Parameters	Values
Max power	9W
Rated power	6W
Power taps @ 100V	6W / 3W
Sound pressure level at 6W/1W (4kHz,1m)	98 dB / 90 dB
Frequency range (-10dB)	80 Hz -20 kHz
Dispersion angle (1kHz/-6dB)	160°
Rated input voltage	100 V / 70 V
Rated impedance	1.7 kΩ / 3.3 kΩ
Connection	Push terminal

Parameters	Values
Dimensions(Φ x H)	Φ180mm x 55 mm
Hole cut-out size	150 mm
Size of speaker	5”
Weight	0.6 kg
Color	White (RAL 9010)
Weight of Magnet	93 g

6.5.2 Wall Loudspeaker

- 6W Wall mount speaker with 6/3W taps

Parameters	Values
Rated power	6 W
Power taps @ 100V	6 W / 3 W
Sound pressure level at 6W/1W (1kHz,1m)	96 dB / 88 dB
Frequency range (-10dB)	110 Hz -13 kHz
Rated impedance	1.7 kΩ / 3.3 kΩ
Connection	Cable
Dimensions (W x H x D)	260 x180 x 120 mm
Weight	1.08 kg
Color	White (RAL 9010)
Weight of Magnet	115 g

7 Training

- Train the clients to know the system structure and principles.
- Train the clients to know and master the installation methods of the digital broadcasting systems.
- Train the clients to master the configuration methods of the digital broadcasting systems.
- Train the clients to use digital broadcasting system software.
- Train the clients to know basic troubleshooting and maintenance methods of the digital broadcasting systems.

LIST OF APPROVED MAKES

FIRE DETECTION & ALARM SYSTEM

1. FIRE ALARM PANEL	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
2. REPEATER PANEL	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
3. GRAPHICAL USER INTERFACE	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
4. MULTISENSOR DETECTOR	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
5. HEAT DETECTOR	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
6. MANUAL CALL POINT	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
7. HOOTER CUM STROBE	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
8. INPUT / OUTPUT DEVICES	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
9. FAULT ISOLATOR	-	NOTIFIER / JOHNSON CONTROL IFC SERIES / ESSAR
10. RESPONSE INDICATOR	-	HONEYWELL / AGNI / GST
11. 2CX1.5 SQ.MM CABLE	-	POLYCAB, CALIPLAST, RR KABEL
12. 4CX1.5 SQ.MM CABLE	-	POLYCAB, CALIPLAST, RR KABEL

PA SYSTEM

13. Voice Alarm Controller	-	Honeywell, Bosch Presideo, Ateis
14. Voice Call Station	-	Honeywell, Bosch Presideo, Ateis
15. Power Amplifier	-	Honeywell, Bosch Presideo, Ateis
16. Ceiling Mount Speaker	-	Honeywell, Bosch Presideo, Ateis
17. Wall Mount Speaker	-	Honeywell, Bosch Presideo, Ateis
18. Music Source – CD / DVD / FM Player	-	Philips, Samsung, LG
19. 2CX1.5 Sq.mm cable	-	POLYCAB, CALIPLAST, RR KABEL
20. Equipment Rack	-	Valrack, Rittal, APW,

BILLS OF QUANTITIES

BILLS OF QUANTITES FOR FIRE ALARM & P. A. SYSTEM

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Sr. No.	Description	Qty	Unit	Rate (INR)	Amount (INR)
1	**FIRE ALARM SYSTEM**				
1.1	Supply, installation, testing & commissioning of microprocessor based min 2 loop (Expendable upto 10 loops) Networkable Analogue addressable type fire alarm control panel with LCD display/Touch Panel capable of catering to the detectors and devices as listed under Sl. No. B of this BOQ. The panel should be equipped with sufficient numbers of loop with 20% spare capacity in each loop. Each loop shall have a minimum capacity of 125 addressable detectors & 125 addressable devices, QWERTY style alphanumeric keypad for the field programming and control of the fire alarm system, panel shall maintain a history file of the last 2000 events, along with inbuilt printer, 240 volts AC power supply, automatic battery charger, 24 volts sealed lead acid maintainence free batteries sufficient for 24 hours normal working and then be capable of operating the system for 2 hours during an emergency conditions as required. (UL Listed / FM Approved)	**1**	Nos.		
1.2	Supply, Installation, Testing and commissioning of UL Repeater panel with backlit LCD display/ LCD Touch screen functional keys like acknowledge, signal silence, system reset, lamp test etc. (UL Listed / FM Approved)	**1**	Nos.		

1.3	Supply, Installation, Testing And Commissioning of UL Listed Network Control Station complete with PC as per configuration described in technical specifications and GUI based main network software. The 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. The GUI software shall be located in control room in one of the blocks and shall monitor all the blocks panel connected with each other. The software shall be capable of monitoring 100 Nodes with 100 MB baud Transmission rate on Fibre Optics Network and 12 MB baud Transmission on cable or more. The software shall provide the facility to Monitor, Control all the Digital PAVA as well as 2 way communication from main control room using voice signals over Fire Network along with the Fire detection signal.	**1**	Nos.		
1.4	Supply, installation, testing & commissioning of Analog addressable multisensing detectors with mounting based LED, Address Switch , MS Box, complete as required and as per specification (UL Listed / FM Approved)	**140**	Nos.		
1.5	Supply, installation, testing & commissioning of intelligent addressable Heat detectors with indicating lamp mounting base, address switch complete as required as per specification (UL Listed / FM Approved)	**26**	Nos.		
1.6	Supply, installation, testing & commissioning of addressable Manual Call Station for initiation of fire alarm complete as required and as per specification (UL Listed / FM Approved)	**24**	Nos.		
1.7	Supply, installation, testing & commissioning of Hooter cum Strobe with addressable control module minimum 75DB output and minimum 110 cd. The strobes shall be synchronized for better evacuation, complete as required and as per specification.	**24**	Nos.		

1.8	Supply, installation, testing & commissioning of fault isolator module for isolating shorted, dewired and loose circuits between two successive fault isolators with automatic resetting arrangement complete as required and as per specification (UL Listed / FM Approved)	**11**	Nos.		
1.9	Supply, installation, testing & commissioning of addressable control modules for driving outputs like Hooters, magnetic door hold open mechanism, fire fighter jacks etc. complete as required and as per specification (UL Listed / FM Approved)	**10**	Nos.		
1.10	Supply, installation, testing & commissioning of addressable monitor modules to give input to FAS like Sprinkler Flow switch complete as required and as per specification (UL Listed / FM Approved)	**10**	Nos.		
1.11	Supply, installation, testing & commissioning of response indicator complete as required and as per specification.	**50**	Nos.		
1.12	Supply & laying of 2 Core X 1.5 sq.mm. FRLS Armoured PVC Insulated copper cable	**3500**	Mtrs.		
1.13	Supply & laying of 4 Core X 1.5 sq.mm. FRLS Armoured PVC Insulated copper cable	**200**	Mtrs.		
	SUB TOTAL FIRE ALARM SYSTEM RS.				
2	**PUBLIC ADDRESS SYSTEM**				
2.1	Supply, Installation, Testing And Commissioning of 8 zone IP based, digital Voice Alarm controller expandable upto 128 zones. The voice alarm controller should be able to connect directly over Ethernet without use of intermediary modules. It should have functions like the audio playing, zone control, fault monitoring, log recording, volume control and amplifier switchover. The Voice alarm controller should also have the following functions: . 255 Priorities . Time schedule broadcasts . Capable of amplifier redundancy . 8 trigger inputs/outputs	**1**	Nos.		

2.2	Supply, Installation, Testing And Commissioning of IP based Networkable touch screen paging station for selection of zones, supervision of system status, setting of scheduled broadcasts with the following functions: . Built-in monitoring loudspeaker . Detachable goose-neck microphone . LCD touchscreen display . Audio input	**1**	Nos.		
2.3	Supply, Installation, Testing and Commissioning of Music Source – CD / DVD / FM Player	**1**	Nos.		
2.4	Supply, Installation, Testing And Commissioning of 500 W digital power amplifier, High Efficiency Class D Power Amplifier, 2x250W, 100V/70 Output, with 220 VAC UPS input.	**2**	Nos.		
2.5	Supply, Installation, Testing And Commissioning of 6W Ceiling Speaker with max SPL1M/1W 96dB . Frequency response of 80Hz-20KHz with a dispersion angle of 160 deg. The speaker should have tappings at 6W/3W/1.5W.	**132**	Nos.		
2.5	Supply, Installation, Testing And Commissioning of 6W Wall mount Speaker with max SPL1M/1W 96dB . Frequency response of 80Hz-20KHz with a dispersion angle of 160 deg. The speaker should have tappings at 6W/3W/1.5W.	**14**	Nos.		
2.6	Supply, Installation, Testing and Commissioning of 30U Rack with all required accessories for mounting the equipements.	**1**	Nos.		
2.7	Supply & laying of 2 Core X 1.5 sq.mm. FRLS Armoured PVC Insulated copper cable	**1500**	Mtrs.		
	SUB TOTAL FIRE ALARM SYSTEM RS.				
	Grand Total Amount In Rs.				