**BID NUMBER: 0080**
**BID TITLE: UCHS FIRE ALARM**
**BID ENVELOPE/PACKAGE CONTAINING BID:**
**Proposals MUST be received in a sealed envelope/package with the bid number, company name and opening date clearly marked. Failure to comply may result in rejection of your entire bid. Late proposals, emailed proposals and faxed proposals will not be considered nor returned. Union County will not be responsible for any lost or misdirected mail.**

UNION COUNTY FINANCE OFFICE
300 MAIN STREET
MAYNARDVILLE, TN 37807
ccook@unioncountytn.org
P (865) 686-5040, F (865) 329-7428

# BID NOTICE

Union County Board of Education is currently accepting bids for a Fire Alarm System Replacement and Upgrades at the Union County High School building. Bid packet of detailed specifications and /or requirements may be obtained at UNION COUNTY FINANCE BIDS or by email to ccook@unioncountytn.org.

Sealed bids must be submitted to Union County Finance Office, 300 Main Street, Maynardville, TN 37807 ATTN: ITB **0080 – UCHS FIRE ALARM**.

**A PRE-BID MEETING AND SITE VISIT** will be conducted on 03/26/20 starting at 10:00 a.m. at the Union County High School located at 150 Main Street, Maynardville, TN 37807.

**Sealed Bids will be accepted until 3:00 p.m. 04/06/20** at the Finance Office location. Bids will be opened immediately following the close of the bids. Union County reserves the right to reject any and all proposals.

Sealed bids subject to the General Terms and Conditions of this Formal Bid Invitation to Bid, and any other data attached or incorporated by reference. Bids will be received in the Union County Finance Office until the date and time specified above and at that time publicly opened and read aloud.

Late bids will not be accepted.

**THE UNION COUNTY DIRECTOR OF FINANCE RESERVES THE RIGHT TO WAIVE ANY INFORMALITIES IN OR TO REJECT ANY OR ALL BIDS AND TO ACCEPT THE DEEMED FAVORABLE TO THE BEST INTEREST OF UNION COUNTY.**

**Bid documents must be completed in ink or typed, signed in ink, and free from alterations, erasures or mark-throughs.**

# PROJECT MANUAL

---

FIRE ALARM UPGRADES
UNION COUNTY HIGH SCHOOL
UNION COUNTY PUBLIC SCHOOLS

Date: March 11, 2020

OWNER:
UNION COUNTY

ELECTRICAL ENGINEER:
VREELAND ENGINEERS, INCORPORATED
P.O. Box 10648, 3107 Sutherland Avenue
Knoxville, TN 37939-0648
Phone: 637-4451
Contact: Chris Lay
Bidding documents may be examined at the Designer's office.

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## SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

ARTICLE 1 DEFINITIONS

1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement Between the Owner (Union County Board of Education) and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Specifications and all Addenda issued prior to execution of the Contract.

1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A107 or in other Contract Documents are applicable to the Bidding Documents.

1.3 Addenda are written or graphic instruments issued by the Engineer prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications, or corrections.

1.4 A Bid is a complete and properly executed proposal to do the Work, or designated portion thereof, for the sums stipulated therein, submitted in accordance with the Bidding Documents.

ARTICLE 2 BIDDER REPRESENTATIONS

2.1 Each Bidder by making his Bid represents that:

A. The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted.

B. The Bid is made in compliance with the Bidding Documents.

C. The Bidder has visited the Site, become familiar with the site and local conditions under which the Work is to be performed and has correlated the Bidder’s personal observations with the requirements of the proposed Contract Documents. The Bidder understands extra payment will not be given for conditions which can be determined by examining the site and Bidding Documents.

D. The Bid is based upon the materials, systems, and equipment required by the Bidding Documents without exception.

## ARTICLE 3 BIDDING DOCUMENTS

### 3.1 COPIES

A. Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days' after receipt of Bids.

B. Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner for the Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

### 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

A. Interpretations, corrections, or changes of the Bidding Documents will be made by Addendum. Interpretations, corrections, and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections, and changes.

### 3.3 ADDENDA

A. Addenda will be transmitted to all Bidders who are known by the issuing office to have received a complete set of Bidding Documents.

B. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

C. Addenda will be issued no later than three calendar days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

D. Each Bidder shall ascertain prior to submitting his Bid that he has received all Addenda issued, and he shall acknowledge their receipt in his Bid.

## ARTICLE 4 BIDDING PROCEDURES

### 4.1 PREPARATION OF BIDS

A. Bids shall be submitted on forms identical to the form included with the Bidding Documents.

B. Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have a corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

### 4.2 SUBMISSION OF BIDS

A. All copies of the Bid, and any other documents required to be submitted with the Bid shall be enclosed in a sealed envelope. The envelope must be submitted to the Union County Finance Office, with the Project name, the Bidder's name, address, license number, license classification, and license expiration date. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof. **Union County requires that all vendors submit one original and one exact copy of their bids, including brochures; unless additional copies are requested in bid specifications.**

B. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids indicated in the Invitation to Bid, or any extension thereof made by Addendum. Bids received after the time and date for receipt of Bids, will not be considered or returned.

C. The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

D. Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids are invalid and will not be considered.

### 4.3 MODIFICATION OR WITHDRAWAL OF BID

A. A Bid may not be modified, withdrawn, or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting his Bid.

B. Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and timestamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

C. Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

ARTICLE 5 CONSIDERATION OF BIDS

5.1 OPENING OF BIDS: At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly read aloud. An abstract of the Bids may be made available to Bidders by the Engineer.

5.2 REJECTION OF BIDS: The Owner shall have the right to reject any or all Bids. A Bid not accompanied by data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

5.3 ACCEPTANCE OF BID (AWARD)

A. It is the intent of the Owner to award a Contact to the lowest responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive any informality or irregularity in any Bid or Bids received and to accept the Bid or Bids which, in the Owner's judgment, is in the Owner's own best interest.

ARTICLE 6 POST-BID INFORMATION

6.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Engineer in writing:

A. A designation of the Work to be performed with the Bidder's own forces.

B. Names key personnel assignments such as the Project Manager or Superintendent.

6.2 The Bidder will be required to establish to the satisfaction of the Engineer and the Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

6.3 Prior to the award of the Contract, the Engineer/Owner will notify the Bidder in writing if either the Owner or the Engineer, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Engineer has reasonable objection to any such proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid, or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may, at the Owner's discretion, accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification under this Subparagraph, bid security will not be forfeited, notwithstanding the provisions of Paragraph 4.3.A.

6.4 Persons and entities proposed by the Bidder and to whom the Owner and the Engineer have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and the Engineer.

ARTICLE 7 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

7.1 Form To Be Used: Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A107, Abbreviated Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum.

END OF SECTION 00 21 13

**00 31 13 – BID FORM**

**TO:** Union County Schools **FROM BIDDER**: _____

**FOR**: Project Title: BID 0080 – UCHS FIRE ALARM

TFM #09158

Project #2019-11-26-03

A. The Bidder hereby acknowledges, attests, certifies, warrants, and assures that:

1. Bidder has received, read and understands the Bidding Documents and this bid is made in accordance herewith.

2. Bidder has visited the site and become familiar with the local conditions under which the Work is to be performed and has correlated all observations with the requirements of the Bidding Documents.

3. Documents identified as “Information Available to Bidders” are prepared solely for the Designer’s use in design of this Work and have not been relied upon in the preparation of this bid. The use and interpretation of such information for any purpose is entirely the responsibility of the using party.

4. Bidder shall not knowingly utilize the services of an illegal immigrant in the performance of this Contract and shall not knowingly utilize the services of any subcontractor or consultant who will utilize the services of an illegal immigrant in the performance of this Contract.

5. In compliance with the Iran Divestment Act the Bidder is not on the list created pursuant to Tennessee Code Annotated (TCA) 12-12-106 and shall not utilize any subcontractor on that list.

6. Bid Security, in the amount of 5 percent (5%) of the total amount of bid, including Alternates, is attached hereto.

7. A Drug-Free Workplace Affidavit, in the form of Section 00 41 13 is attached hereto.

8. Failure to complete this Bid Form, provide required attachments, or comply otherwise with instructions to Bidders, may be cause for rejection of bid.

9. The person who signs this bid on behalf of the Bidder is legally empowered to bind the Bidder to a Contract.

10. The following statement is (mark the one that is applicable) [ ] True [ ] False

    The Bidder and/or any of the Bidder’s employees, agents, independent contractors and/or proposed Subcontractors have been convicted of, pled guilty to, or pled nolo contendere to any contract crime involving a public contract.

11. Bidder has received the following addenda:

    Addendum No. _____ dated _____.
    Addendum No. _____ dated _____.

B. The Bidder agrees to:

1. Honor this bid for 45 days following the date of the scheduled opening of bids.
2. Enter into and execute a contract, if presented on the basis of this bid, and to furnish certificate(s) of insurance, bond(s), and other documents related to the contract as required, including, if the initial Contract Sum as awarded exceeds $100,000, the Contract Bond.
3. Accomplish the Work in accordance with the Contract Documents.
4. Achieve Substantial Completion of the Work in accordance with the number of calendar days Contract Time set forth, allotted from and including the date stipulated in the Notice to Proceed; and, accept the conditions for Liquidated Damages in the amount set forth per calendar days.

| Phase | Commencement | Contract Time | Liquidated Damages |
|---|---|---|---|
| ALL | Notice to Proceed for all Work | 90 Days | $250.00 Per Day |

C. The Bidder agrees to complete the Work of the Base Bid for this project for the lump sum of the following amount (in both words and figures. Figures prevail. Words clarify at Owner's discretion.):

_____ and _____/100ths Dollars

$_____

D. BID SUBMITTAL:

This bid is submitted by:
Authorized Signature: _____ Date: _____

Printed Name, Title: _____

On behalf of:
Bidder Name: _____
Bidder's Address: _____
_____
_____
Bidder's Phone: _____
Bidder's Fax: _____
Bidder's Email: _____

END OF SECTION

**SECTION 00 41 13 - DRUG FREE WORKPLACE AFFIDAVIT**

STATE OF _____

COUNTY OF _____

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with _____ to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____ (Hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.

2. The Company submits this Affidavit pursuant to T.C.A. 50-9-113, which requires each employer with no less than five (5) employees receiving pay to provide construction services to submit an affidavit stating that such employer has a drug free workplace program that complies with Title 50, Chapter 9, or the Tennessee Code Annotated.

3. The Company is in compliance with T.C.A. 50-9-113.

Further affidavit saith not.

Principal Officer

STATE OF _____

COUNTY OF _____

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.

Witness my hand and seal at office this _____ day of _____, 20___.

Notary Public

My commission expires: _____

END OF SECTION 00 41 13

**SECTION 00 45 59 - CRIMINAL HISTORY CHECK**

Contractor shall comply with Public Chapter 587 of Public Acts, 2007, as codified in Tennessee Code Annotated Section 49-5-413, which requires all contractors to facilitate a criminal history records check conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation for each employee prior to permitting the employee to have contact with students or enter school grounds when students are present.

AN ACT to amend Tennessee Code Annotated, Section 49-5-413, relative to contracting with certain persons who may have contact with certain children.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF TENNESSEE:

SECTION 1. Tennessee Code Annotated, Section 49-5-413, is amended by adding the following new subsection:

(d) (1) Any person, corporation or other entity who enters into or renews a contract with a local board of education or child care program as defined in Section 49-1-1102 on or after the effective date of this act shall be required to comply with the provisions of this subsection if the contract requires:

(A) The person or an employee of the person, corporation or other entity to have direct contact with school children or to children in a child care program; or

(B) The person or employee access to the grounds of a school or child care center when children are present.

(2) It is the duty of the person, corporation or other entity who employs a person described in subdivision (1) to require such applicant to supply a fingerprint sample and submit to a criminate history records check to be conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation prior to permitting the person to have contact with such children or enter school grounds.

(3) (A) No employer, or employee of such employer to whom this subsection applies shall come in direct contact with school children or to children in a child care program or enter the grounds of a school or child care center when children are present until the criminal history records check has been conducted on such person.

(B) No employer, or employee of such employer, to whom this subsection applies shall come in direct contact with school children or to children in a child care program or enter the grounds of a school or child care center when children are present if the criminal history records check indicates that the employer or employee has been convicted of an offense that, if committed on or after July 1, 2007, is classified as a sexual offense in Section 40-39-202(17) or a violent sexual offender in Section 40-39-202(25).

(C) (i) If an employee is convicted of an offense that, if committed on or after July 1, 2007, is a sexual offense as defined in Section 40-39-202(17) or a violent sexual offense as defined in Section 40-39-202(25), after the employer has conducted a criminal history records check on such employee, the employee shall notify the employer of such conviction within seven (7) days from the date of conviction.
(ii) An employee commits a Class A misdemeanor, punishable by fine only, who knowingly fails to disclose to the employer within the required seven (7) days that the employee has been convicted of an offense specified in section (C) (i).

(4) The provisions of this subsection shall only apply if the employer or employee of such employer comes in direct contact with school children, children in a child care program or enter the grounds of a school or child care center when children are present during the ordinary course of performing a function required or permitted by the terms of the contract. Any action involving direct contact or entry by an employee which is outside such ordinary course of performing a function required or permitted by the terms of the contract shall not in any way be deemed to be authorized or approved by the employer and such employer shall not in any way be deemed to be liable for such contact or entry, vicariously or otherwise. However, nothing in this subsection shall authorize such contact or entry by an employer or employee of such employer if contact or entry is prohibited by any other provision of law; provided that with respect to such contact or entry, the person, corporation or other entity who employs a person described in subdivision (1) shall not in any way be deemed to be liable, vicariously or otherwise, for any such actions taken by the employee unless such employer has actual knowledge that such other provision of law prohibits contact or entry by an employee.

SECTION 2. This act shall take effect September 1, 2007, the public welfare requiring it and shall apply to all applicable contracts entered into or renewed on or after the effective date of this act.

END OF SECTION 00 45 59

**SECTION 01 11 00 – SUMMARY OF THE WORK**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Documents and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Replace and upgrade the existing fire alarm system.

1.2 SUMMARY

A. Furnish and install all labor, materials and equipment, and perform all work at Union County High School as specified herein and noted in accompanying specifications, drawings, and electrical summary.

B. Verbal Summary: Without force and effect on requirements of the contract documents the description of the work of the Contract can be summarized as follows:

1. Project Name is UCHS FIRE ALARM.
2. Generally the work consists of:
    a. The building is classified by the International Building Code as "Educational Occupancy".
    b. Exterior walls are typically concrete masonry unit cavity walls with brick veneer.
    c. Interior walls are typically concrete masonry unit.
    d. Pay fees related to the work, including but not limited to permit fees, plan review fees, and other fees required by authorities having jurisdiction.

C. Contract documents indicate the work of the contract and related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the Contract Documents include but are not necessarily limited to the following:

1. Work to be performed concurrently by the Owner and/or under separate contract, if any.

D. Summary by reference: The work for the General Construction Contract can be summarized by reference to the requirements of the various contract documents, which in turn make reference to the requirements of the other applicable provisions which control or influence the work; and these references can be summarized but are not necessarily limited to the following:

1. The executed Owner-Contractor Agreement (not bound herewith).
2. The General and Supplementary Conditions, which are bound herewith.
3. The Specification Sections, which are bound herewith and are listed in the "Table of Contents" bound herewith (in this Project Manual).
4. The Addenda and Modifications to the Contract Documents, which have either been bound herewith (in this Project Manual) or distributed by transmittal subsequent to the binding hereof.
5. Governing regulations, which have a bearing on the performance of the work; copies can be obtained from or reviewed at the local, State, or Federal Agency responsible for the regulation in each case.

6. Submittals (of every kind), copies of which are retained by the Contractor at the site.
7. Miscellaneous elements of information having a bearing on the performance of the work, such as weather forecasts and reports of general trade negotiati9ons; copies must be obtained by the Contractor through normal channels of information.

1.3 CONTRACTOR'S USE OF PREMISES

A. Before construction is started the Contractor shall confer with the Owner and arrange for available trucking and storage space for the delivery of materials, storage space for materials and equipment, and parking space for his workmen.

B. Construction operations and storage of materials and equipment shall be restricted to areas of the site mutually agreed upon and in such a manner as not to block access of firefighting equipment to the building and facilities.

1.4 PROJECT UTILITIES

A. Known existing utility lines that are to remain permanently or temporarily in service shall be carefully protected from damage or dislocation and any damage to these lines shall be repaired at no additional cost to the Owner.

B. The term "utility lines" shall be understood to include, but not be limited to: "Water lines, gas lines, sanitary sewers, storm sewers, electric power lines, communication lines and appurtenances such as manholes, catch basins, fire hydrants, valves, junction boxes, switches, and conduits.

1.5 PROJECT MANUAL AND SPECIFICATIONS

A. The intent of the Project Manual and Specifications is to provide the Owner with complete, usable facilities as specified and as indicated.
1. Where conflict occurs between items specified and items listed in the Project Manual, the Contractor shall contact the Engineer for a clarification.
2. Where there is a conflict between "Contract Documents" the Contractor is responsible for the greater in quality or quantity.

1.6 VERIFICATION OF DIMENSIONS

A. Dimensions, elevations, and locations referenced to existing structures and utilities are the best available data obtainable but are not guaranteed by the Engineer or the Owner and neither the Engineer nor the Owner shall be responsible for their accuracy.

B. Before proceeding with any work dependent upon the data involved, the Contractor shall field check and verify all dimensions and other conditions of limitations at the building to avoid construction errors. If any work is performed by the Contractor or by his Subcontractors prior to adequate verification of applicable data, any resultant extra cost for adjustment of work to conform to existing limitations shall be borne by the Contractor without reimbursement or compensation by the Owner.

1.7 SUBSTANTIAL COMPLETION OF THE WORK

A. Upon substantial completion, payments for work in the substantially complete portion of the work shall be related to the Contractor, except for the retainage and an amount to cover the cost of the incomplete or deficient items included in the punch list made at the inspection to determine substantial completion. This amount shall be approximately the value of the punch list items as estimated by the Engineer.

1.8 BUILDING PRODUCTS USE

A. It is the responsibility of the Contractor to inform himself concerning the application of the products he uses and to follow the directions of the Engineer and manufacturer.

B. In the event of disagreement between the Contract Documents and the manufacturer's directions, the Contractor will obtain written instructions from the Engineer before proceeding with the installation.

C. If the Contractor has knowledge of or reason to believe the likelihood of failure, he will transmit such knowledge to the Engineer and ask for written instructions before proceeding with the work.

1.9 PROTECTION OF ROOF

A. Coordinate duct work, piping, conduit, etc., work with roofing work in regard to any items which may pierce or otherwise affect the roof. Hold consultation well in advance of the installation of the final roofing and allow sufficient time for the roofing work to be prepared for the electrical work.

B. Arrange for any cutting or repairing to roofing which might already be installed when a ductwork, piping, conduit, etc. installation is made. If necessary consultation is not held, any roof repairs necessitated by the installation shall come under the scope of the work under this section. Sealing of roof penetrations shall be performed by owner's roofing contractor. All costs associated with repairing said roof penetrations shall be included in bid price.

PART 2 - PRODUCTS
Not Applicable.

PART 3 - EXECUTION
Not Applicable.

END OF SECTION 01 11 00

## SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 01 Section “Substitutions” for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Engineer will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, “Architect’s Supplemental Instructions.”

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Engineer are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor’s Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Engineer.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change, indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Engineer will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Engineer may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS
Not Applicable.

PART 3 - EXECUTION
Not Applicable.

END OF SECTION 01 26 00

**SECTION 01 29 00 – PAYMENT PROCEDURES**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Application and Certification for Payment.

B. Section specifies administrative and procedural requirements governing each prime Contractor's Application and Certification for Payment.

1. Coordinate the Schedule of Values and Application and Certification for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

B. Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with preparation of the Contractors' Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative Schedules and forms, including:
    a. Contractor's construction schedule.
    b. Application and Certification for Payment form.
    c. List of subcontractors.
    d. Schedules of allowances.
    e. Schedule of alternates.
    f. List of products.
    g. List of principal suppliers and fabricators.
    h. Schedule of submittals.
2. Submit the Schedule of Values to the Engineer at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application and Certification for Payment.
3. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

C. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.

1. Identification: Include the following Project identification on the Schedule of Values:
    a. Project name and location.
    b. Name of the Engineer.
    c. Project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
    a. Generic name.
    b. Related Specification Section.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that have affected value.
    g. Dollar value.
    h. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications and Certification for Payment and progress reports. Break principal subcontract amounts down into several line items.
4. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
5. For each part of the Work where an Application and Certification for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Unit Cost Allowances: Show line item value of unit cost allowances as a product of unit cost times measured quantity as estimated from the best indication in the Contract Documents.
7. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications and Certification for Payment. Each item in the Schedule of Values and Applications and Certification for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
8. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS AND CERTIFICATION FOR PAYMENT:

A. Each Application and Certification for Payment shall be consistent with previous applications and payments as certified by the Engineer and paid for by the Owner.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application and Certification for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Applications and Certification for Payment.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if schedules have been revised.
2. Include amounts of Change Orders and Construction Change Directives Issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit three (3) executed copies of each Application for Payment to the Engineer by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required and one (1) copy of "Retainage Release" letter.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

F. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanic's lien for the period of construction covered by the application.
    a. Submit final Application for Payment with or proceeded by final waivers from every entity involved with performance of Work covered by the application that could lawfully be entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final)
5. Schedule of principal products
6. Schedule of unit prices.
7. Copies of building permits.
8. Copies of authorizations and licenses from governing authorities for performance of the Work.
9. Initial progress report.
10. Certificates of insurance and insurance policies.
11. Performance and payment bonds (if required).
12. Data needed to acquire Owner's insurance.
13. Initial settlement survey and damage report, if required.

I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Administrative actions and submittals that shall precede or coincide with this application
include:

1. Occupancy permits and final inspection approvals.
2. Warranties (guarantees) and maintenance agreements.
3. Final cleaning.
4. Application for reduction of retainage, and consent of surety.
5. List of Incomplete Work, recognized as exceptions to Engineer's Certificate of Substantial Completion.

K. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
4. Assurance that Work not complete and accepted with be completed without undue delay.
5. Transmittal of required Project construction records to Owner.
6. Proof that taxes, fees and similar obligations have been paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish and similar elements.

PART 2 - PRODUCTS
Not Applicable
.
PART 3 - EXECUTION
Not Applicable.

**SECTION 01 77 00 – PROJECT CLOSEOUT**

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Final Inspection.
2. Contract Closeout Submittal.
3. Operation and Maintenance Data.
4. Warranty Data.
5. Demonstration and Training.
6. Final Application for Payment.

1.3 FINAL INSPECTION

A. When the Contractor determines the work is complete he shall submit written certification that:
1. Contract Documents have been reviewed.
2. The work has been inspected for compliance with Contract Documents by a qualified person authorized by the Contractor.
3. The work is complete in accordance with the Contract Documents.
4. Equipment and systems have been tested and demonstrated in the presence of the Owner's representative and are operational.
5. The work is ready for final inspection.

B. Within a reasonable time after receipt of the certification the Engineer will schedule an inspection to verify completion.

C. Should the Engineer consider the work incomplete or defective, he will promptly notify the Contractor in writing listing incomplete or defective work. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification when the work is complete. The Engineer will reinspect the work.

1.4 CONTRACT CLOSEOUT SUBMITTAL:

A. Submit to the Engineer as a single package including:
1. Project Data; i.e., as-built drawings.
2. Operation and Maintenance Data.
3. Warranty Data.
4. Certificate of Occupancy and other approvals or permits required by Authorities Having Jurisdiction.
5. Contractor's Affidavit of Payment of Debts and Claims, AIA G706.
6. Contractor's Affidavit of Release of Lien, AIA G706A.
7. Subcontractor's and Suppliers' Affidavit of Release of Lien.
8. Consent of Surety to Final Payment, AIA G707, with Power of Attorney.

9. Consent of Surety to Reduction in or Partial Release of Retainage, AIA G707A, with Power of Attorney.
10. As-Built drawings.

1.5 OPERATION AND MAINTENANCE DATA

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.
4. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

B. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2” x 11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folder oversize sheets.

C. Submit two copies of the complete manual prior to inspection for Substantial Completion. Include a complete operation and maintenance directory.

1.6 WARRANTY DATA

A. Warranties: Submit required warranties in a heavy-duty, two inch, 3-ring, vinyl covered, loose-leaf binder organized into the appropriate divisions with marked divider tabs. Include a Table of Contents in the front of the binder listing warranties.

B. Submit one copy of the complete warranty data prior to inspection for Substantial Completion.

1.7 FINAL APPLICATION FOR PAYMENT

A. The Contractor shall submit the Final Application for Payment accompanied by a settlement of accounting, reflecting all adjustments to the Contract Sum.

1. The Original Contract Sum.
2. Additions and Deductions resulting from:
    a. Change Orders.
    b. Allowances.
    c. Unit Prices.
    d. Deductions for non-conforming work.
    e. Other adjustments.
3. Total Contract Sum as adjusted.
4. Previous Payments.
5. Sum Remaining Due.

B. Signed Final Change Order by the Contractor (if required) with a cover letter certifying that, to the best of his knowledge, the project is in compliance with the Contract Documents and the balance shown is due and payable.

PART 2 - PRODUCTS
Not Applicable.

PART 3 - EXECUTION
Not Applicable.

END OF SECTION 01 77 00

**SECTION 26 00 00 – ELECTRICAL**

PART 1 – GENERAL

1.1 SUMMARY

A. Scope of Work: The contractor shall furnish all plant, labor, materials, equipment, and services necessary for and reasonably incidental to the complete installation of all electrical and fire alarm work as listed in “Electrical Summary”, listed in Project Manual, and indicated on drawings. **References to the brand names, trade names, model numbers, or other descriptions peculiar to specific brand products are made to establish a required level of quality and functional capabilities, and are not intended to exclude other products of that level.**

1.2 REFERENCES

A. General Provisions of the Contract, General and Supplementary Conditions, and Division 1 Specification Sections, General Requirements, apply to this section.

1.3 GENERAL

A. The “Electrical Summary” indicates the extent and general arrangement of the fire alarm system upgrades and work required. Details of proposed departures due to unforeseen conditions or other causes shall be submitted to the Engineer for approval before proceeding.

B. Equipment and materials to be furnished under this specification shall be the standard products of manufacturer's latest standard, shall be new and unused, and bear the Underwriter's Seal of Approval.

C. All work of the installation to be done by skilled workmen in a workmanlike manner, following the best modern practices. The work shall present a neat and workmanlike appearance when completed.

D. Manufacturers, catalog numbers, etc., used in these specifications or shown on the drawings are to denote design, workmanship and quality desired.

1.4 APPLICABLE STANDARDS AND CODES

A. Be governed by these specifications and by the current rules and regulations and applicable codes.

1.5 PRINCIPAL FEATURES

A. A complete system of conduit and conductors to supply electrical energy to fire alarm system.

B. Demolition of existing items as they relate to existing fire alarm system equipment.

1.6 SHOP DRAWINGS

A. Shop drawings shall be furnished for approval of the following.
1. Fire alarm.
2. Wiring devices: Switches, plug receptacles, cover plates, etc.

1.7 MATERIAL AND EQUIPMENT SUBMITTAL

A. Furnish four sets of catalog data including cuts, properly assembled in a binder and labeled for the following items including all of the items for which catalog data exists from the manufacturer.
1. Fire alarm.
2. Wiring devices (switches, plug receptacles, outlets, etc.)

1.8 MAINTENANCE MANUALS

A. Provide a separate white plastic 3-ring binder with stiff back with suitable identifying name lettered across the side and the end, in three copies of the following, which shall include catalog pages of each item of the fire alarm equipment, wiring diagrams showing the internal and the external elements and their connection, manufacturer's maintenance manual separated into loose leaf form with fabric reinforcements on the ring holes, bill of material showing necessary data of ordering parts with bill of material to include parts lists, and other incidental material as suggested by the manufacturer, Owner, or Engineer.

1.9 INITIAL OPERATION OF EQUIPMENT

A. Give all equipment furnished in the contract an operational test prior to final acceptance. Assist the owner in the initial operation when the owner operates the building and equipment. Instruct the owner's personnel in the proper operation and maintenance of all the equipment furnished under this section of the specifications.

1.10 GUARANTEE

A. Guarantee all work to be free from defects of material and workmanship. Repair and/or replace all defective material or equipment and any work damaged thereby and make any other adjustments necessary without additional cost to the Owner.

1.11 PROTECTION OF ROOF

A. Coordinate electrical work with roofing work in regard to any electrical items which may pierce or otherwise affect the roof. Hold consultation well in advance of the installation of the final roofing and allow sufficient time for the roofing work to be prepared for the electrical work.

B. Arrange for any cutting or repairing to roofing which might already be installed when an electrical installation is made. If necessary consultation is not held, any roof repairs necessitated by the electrical installation shall come under the scope of the work under this section. Sealing of roof penetrations shall be performed by owner's roofing contractor. All cost associated with repairing said roof penetrations shall be included in bid price.

1.12 CONNECTIONS TO EQUIPMENT

A. Wiring to and connection to all equipment (except controls) shall be included in the electrical contract work. Equipment shall be properly prepared to receive a single connection with all wiring internal to the equipment installed by the equipment supplier. Verify all connections and rough-in location with the equipment supplier prior to start of work.

1.13 RECORD DRAWINGS

A. Furnish record drawings showing the changes and modifications that occurred during the construction period. These drawings shall be on tracing paper to allow reproducing.

B. The job supervisor shall maintain a set of prints of the job office to be used to illustrate and note the job changes as they occur. This set of prints shall then be used as a reference to prepare the reproducible drawings record drawings. At the contractor's option, a "sepia" or translucent print may be made from the contract drawings at the contractor's expense and the modifications made thereon. Secure approval of the type of translucent print used prior to having them made.

1.14 WORK IN CONNECTION WITH OTHER TRADES

A. Coordinate and review all ceiling systems, grid systems by other sections so that lighting fixtures and other ceiling mounted equipment and their trims are compatible with the ceiling system used prior to submittal of shop drawings and brochures. Coordinate with mechanical trades.

1.15 TYPICAL MOUNTING HEIGHTS

A. For all exposed elements of electrical work such as lighting fixtures, panel boards, wiring devices, switches, fire alarm, sound equipment, etc., mounted in walls and finished spaces will have the mounting heights may be supplied in detail by the architect. When provided, these heights are to be used in all cases except where mounting heights are noted for a specific device, fixture or panel on the electrical drawings. Schedule will be prepared when shop drawings and brochures have been submitted so that the dimensions of particular pieces of equipment can be evaluated in relation to ceiling height and other clearances.

1.16 METHODS OF ATTACHMENT TO BUILDING

A. Attachment to the building structure, or walls, floors, or other elements, shall be made by suitable clamps, expansion bolts, and similar elements.

1.17 WORK IN CONNECTION WITH THE MECHANICAL EQUIPMENT

A. Furnish and install all conduit and wiring necessary for the line voltage power supply for the plumbing, heating, ventilating, air condition facilities. Control wiring including conduit for same shall be a part of Division 26 work. Refer to mechanical specifications for additional information.

B. Motor starters, variable frequency speed controllers, will be furnished and physically installed in Division 23 work with the equipment with which it will be used. Electrical connection for power shall be a part of the Electrical work.

C. All smoke detectors shall be furnished, installed, and connected as a part of the project including those mounted in air ducts and air handling walk-in units.

1.18 SERVICE TO EQUIPMENT

A. Check service required by equipment prior to making final connection. Call differences to attention of Architect. Check equipment for proper protective devices and safety devices to allow proper operation of equipment and prevent burnout. Assist Owners in initial operation of equipment and make necessary adjustment for proper operation.

1.19 FIRE-RATED WALL PENETRATIONS

A. Where conduit penetrates fire-rated walls and floors, the space between the penetration item and the fire barrier wall shall be properly protected. The space adjoining the conduit penetration shall be filled with a material capable of maintaining the fire rating of the fire barrier, or it shall be protected by an approved device designed for this specific purpose. Where penetrating sleeves are used, the sleeves between the conduit and the sleeve shall be filled with a material capable of maintaining the fire resistance of the fire rated wall. Contractor shall be responsible for determination of fire rated partitions from existing conditions. All floors shall be considered to be fire rated. Contractor to submit U.L. detail of means for sealing penetrations.

END OF SECTION 26 00 00

## SECTION 26 05 19 – LOW VOLTAGE, 600 VOLT CONDUCTORS

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and install conductors throughout the raceway system and distribution of electrical energy for the electrical items noted.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All conductors are to be stranded copper. Minimum size shall be No.12 AWG. Insulate conductors with Type "THHN/THWN" insulation unless specifically indicated otherwise on the drawings. Rating shall be 600-volts, AC.

B. Connectors for conductors size No. 10 and 12 shall be approved type insulated twist on wire nuts. Use hydraulic compression type connectors for conductors No. 8 and larger.

C. A dedicated neutral shall be installed for each phase conductor. A common neutral shall not be shared between phase conductors.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Conform to manufacturer's recommendations and latest standard practice of industry. Color code all conductor for phase, neutral, and ground reference, as follows:

| PHASE | 208/120v. | 480/277v. |
|---|---|---|
| A | Black | Brown |
| B | Red | Orange |
| C | Blue | Yellow |
| *Neutral | White | Natural Gray |
| Ground | Green | Green |

*Neutral conductor to include a “stripe” of color corresponding to “phase” conductor.

END OF SECTION 26 05 19

**SECTION 26 05 26 – GROUNDING AND BONDING OF ELECTRICAL SYSTEMS**

PART 1 – GENERAL

1.1 SUMMARY

A. Electrical service shall be taken from existing facilities as noted.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Products for the Power Service shall be covered under other sections of the Specification.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Furnish and install a Code-sized grounding conductor in all feeder and branch circuit conduit runs. Ground equipment in accordance with the National Electrical Code.

END OF SECTION 26 05 26

**SECTION 26 05 33 – RACEWAYS AND BOXES**

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and install a system of raceways and boxes for installation of conductors for distribution of power. All wiring shall be in metallic conduit. Conduit shall be concealed in all locations where an acoustical ceiling is installed.

B. Furnish outlet boxes for lighting fixtures, wall receptacles, switches, and other boxes as required. Also, pull boxes and junction boxes shall be furnished as required.

1.2 REFERENCES

A. General Provisions of the Contract, General and Supplementary Conditions, and Division 1 Specification Sections, General Requirements, apply to this section.

PART 2 – PRODUCTS

2.1 RACEWAYS

A. All conduits shall be metal unless noted otherwise. Electric-metallic tubing shall be used for all panel feeders and branch circuit wiring.

B. Minimum size conduit on project shall be 1/2".

2.2 BUSHINGS

A. Bushings for conduit 2" in size and smaller shall be plastic. Conduit size 2-1/2" and larger shall be OZ Company type "B" Appleton Co. Efcor Series NO. 55 or approved equal with metal ring and insulator as an integral part of bushing.

2.3 CONDUIT COUPLINGS

A. Conduit couplings (EMT) shall be compression or galvanized set screw type.

2.4 FLEXIBLE CONDUIT

A. Flexible metal conduit shall be used for final connections from load side of safety switch to HVAC equipment. Maximum length of flexible conduit shall be 24". The flexible conduit shall be constructed of hot-dipped galvanized, interlocked spirally wound steel strip. All connectors shall be galvanized and shall be listed for connection to the conduit and boxes. “Seal-tite” shall be used outdoors. Provide a ground conductor in each length of flexible conduit. Flexible conduit used in mechanical rooms, kitchen areas, and damp or wet locations shall be liquid tight. Other than the uses listed above, the use of flexible conduit will not be permitted. The use of "MC" will not be considered.

2.5 MANUFACTURER

A. Conduit shall be as manufactured by Pittsburgh, National, Republic Steel Companies, General Electric Company, or approved equal.

2.6 CEILING BOXES

A. Ceiling outlet boxes shall be 4-inch octagon and 2-1/8 inch deep. Provide extension rings where additional volume is required. All ceiling outlet boxes shall have fixture stud of no-bolt, self-locking type installed if required to hang fixture specified at that outlet.

B. Where ceiling outlets occur in reinforced concrete, provide rings with removable back plate and fixture stud specifically designed for this purpose.

2.7 WALL BOXES

A. Toggle wall switch boxes shall be a minimum size of 4" high by 2-1/8" wide by 2-1/8" deep. Where more than one gang occurs, 4" square boxes or additional larger boxes shall be used with device ring attached. Boxes in masonry shall be 4" high and 2-1/2" deep with the number of gangs necessary. An example of the masonry box shall be Raco Co. No. 692 for 3-gang, No. 693 for 4-gang, etc.

B. Plug receptacle boxes shall be 4" square by 2-1/8" deep with a 4" square device cover, either one or two-gang as required. Covers shall be square cut, with a depth to accommodate the wall finish material with a minimum raised cut of 1/2".

2.8 MANUFACTURER

A. Boxes and fittings shall be Appleton, Steel City, Raco, Efcor, Crouse-Hinds, or equal.

2.9 FABRICATION

A. Pull and junction boxes shall be galvanized or sherardized sheet metal or code thickness with lapped and welded joints and with 3/4" flange. They shall be rigidly supported on ceiling or wall. Conduit runs entering a box shall not be considered as adequate support.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Conduits shall be continuous from outlet to outlet and from outlet to panel or pull box. Connect conduit in building construction except as indicated. Secure conduit to all boxes and bushings with double locknuts so that system will be electrically continuous.

B. Install all conduit in a workmanlike manner with bends made using tools specifically designed for purpose to prevent kinks and flattened areas. Where electric metallic tubing is connected to an outlet box or panel, terminate tubing in an approved type connector and couple together with approved type connectors in order to insure adequate bonding.

C. Where conduit is installed above ceilings, secure it in place by attachment to building structural framing system with appropriate clamps manufactured for purpose of making conduit attachment.

D. Where conduit pierces a rated wall, provide a suitable seal to close openings. Refer to drawings for details.

E. Provide junction or pull boxes in conduit lines which have greater than 360-degrees in total bends.

F. Install pull and/or junction boxes in conduit lines wherever necessary to avoid excessive length of runs or number of bends in run. No run shall exceed 100 feet without a pull box.

G. Pull and junction boxes shall be accessible and sized in accordance with provisions of Article No. 370-18 of latest edition of National Electrical Code.

H. Pull and junction boxes shall be installed so that cover shall be accessible at all times.

END OF SECTION 26 05 33

**SECTION 26 27 26 - WIRING DEVICES**

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and install wall switches, plug receptacles, etc. as specified hereafter and shown on the drawings. Devices offered as a substitute to those specified will be carefully checked to see that quality such as grounding continuity, retention force for insertion devices, are equal to those specified.

1.2 REFERENCES

A. General provisions of the Contract, General and Supplementary Conditions, and Division 1 Specification Sections, General Requirements, apply to this section.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The plug receptacles shall have a minimum rating of 20 amperes for the voltage service applied. All receptacles shall be "specification grade".

B. Wall switches shall be 20-ampere, minimum capacity and single pole, 3-way or 4-way as required. Other variations of the devices shall be as called for on the drawings. Where pilot lights are required, they shall be separately ganged. All switches to be “specification grade”.

C. Special colors may be required by the Owner and request for color variation must be made well in advance of product procurement. For the basis of the specification, it shall be assumed that the switch device handles and plug receptacle bodies of normal power devices are to be ivory.

D. Cover plates: Stainless steel cover plates shall be used except where specifically requested by the owner to be nylon.

E. The manufacturer shall be Hubbell, General Electric, Bryant, P & S, Leviton, or approved equal.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation of devices shall be in accord with the manufacturer's recommendations. Grounding devices such as jumper straps between the device grounding pole and the junction box, or the connection of a grounding conductor will be required at each plug receptacle. Where metal conduit serves the outlet box, a device using a "UL" approved grounding arrangement making use of the contact between the yoke and the device box is approved for use.

END OF SECTION 26 27 26

## SECTION 28 05 29 - LOW VOLTAGE CABLING SUPPORT SYSTEM

PART 1 – GENERAL

1.1 DESCRIPTION

A. Furnish and install a system of cabling supports above acoustical tile lay-in ceilings for fire alarm cabling.

B. Exposed plenum rated cabling for fire alarm system wiring shall only be permitted above acoustical tile lay-in ceilings. Otherwise, all fire alarm cabling shall be installed in raceway system as described elsewhere in project manual.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Low-voltage cable support system shall be similar and equal to Caddy Fasteners Company No. CAT425. Supports shall be capable of supporting up to 425 cables of 4-pair UTP or fiber optic 4” or 6” diameter top.

B. Provide all necessary supports and attachments to allow connection to structure for these supports.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Entire installation shall be in accordance with manufacturer’s recommendations.

B. Cabling supports shall be located minimum 5’ on center throughout entire length of fire alarm cabling runs above ceiling. Locate supports well clear of acoustical lay-in ceiling tiles. Supports shall be located such that tiles can be removed without interfering with support system.

END OF SECTION 28 05 29

## SECTION 28 31 00 - FIRE ALARM SYSTEM

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Furnish and install a complete and addressable fire detection and evacuation system for the existing high school as described herein and shown on the electrical plans. New system is to be wired, connected, tested, and left in a first class operating condition.

B. Fire alarm equipment supplier shall:

1. Be an alarm systems contractor licensed by the State of Tennessee Department of Commerce and Insurance and shall include a copy of the license in the equipment submissions.
2. Have NICET certified employees for the sale, supervision, and final testing of the equipment and shall include a copy of the certification of at least one employee in the equipment submission.
3. Provide equipment submissions including the following:
    a. Complete descriptive data including U.L. listing for all system components.
    b. Complete CAD drawings of the proposed system showing conduit layout, wire count, device locations.
    c. Coordinate and install required ancillary alarm functions where shown on electrical plans. Examples are monitoring of hood extinguishing systems, sprinkler systems, HVAC control, elevator recall control, elevator sprinkler system control.
    d. Electrical drawings illustrate existing devices to be replaced. Device locations and quantities were taken from existing contract documents and site observations. In addition to items noted on drawings, contractor to furnish and install additional fire alarm components/equipment as required to replace all fire alarm system components (whether illustrated on drawings or not).
    e. The requirements and conditions of the contract, supplementary conditions, and general requirements, applied to the work specified in this section.
    f. Contractor shall coordinate with owner for sequence of replacing existing fire alarm system. Existing fire alarm system shall remain active and be operational until the time in which it is replaced.

### 1.2 REFERENCES

A. Underwriters Laboratories (UL):

1. UL 268 - Standard for Smoke Detectors for Fire Alarm Signaling Systems.
2. UL 864 - Standard for Control Units and Accessories for Fire Alarm Systems.
3. UL 1971 - Standard for Signaling Devices for the Hearing Impaired.
4. UL 2572 - Standard for Control and Communication Units For Mass Notification Systems.

## 1.3 SYSTEM DESCRIPTION

A. A new intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor controlled fire detection and emergency voice alarm communication system shall be installed in accordance with the specifications and as indicated on the Drawings.

B. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC): Limited to only 80 percent of its total capacity during initial installation.

C. Basic Performance:

1. Network Communications Circuit (Net SOLO) Serving Network Nodes: Wired using single twisted non-shielded 2-conductor cable or connected using approved fiber optic cable between nodes in Class A configuration.
2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class A.
3. Initiation Device Circuits (IDC) Serving Non-Addressable Devices Connected to Addressable Monitor Modules: Wired Class A.
4. Notification Appliance Circuits (NAC) Serving Strobes, Horns and Speakers: Wired Class A.
5. On Class A Configurations: Single ground fault or open circuit on Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm.
6. Alarm Signals Arriving at INCC COMMAND CENTER: Not be lost following primary power failure until alarm signal is processed and recorded.
7. Transponders:
    a. Operate in peer-to-peer fashion with other panels and transponders in system.
    b. Each transponder shall store copy of audio evacuation messages and tones.
    c. Systems that use centralized message storage and control at main fire alarm control panel shall not be acceptable.
8. Network Node Communications, Audio Evacuation Channels and Fire Phone Communications:
    a. Communicated between panels and transponders on single twisted pair of copper wires or fiber optic cables.
    b. To enhance system survivability, ability to operate on loss of INCC Command Center, short or open of entire riser at INCC Command Center shall be demonstrated at time of system acceptance testing.
    c. Systems that are not capable of providing true Class A performance for fire fighter's phone communications shall not be acceptable.
9. Signaling Line Circuits (SLC):
    a. Reside in remote transponders with associated audio zones.
    b. SLC modules shall operate in peer-to-peer fashion with all other panels and transponders in system.
    c. On loss of INCC Command Center, each transponder shall continue to communicate with remainder of system, including all SLC functions and audio messages located in all transponders.
    d. Systems that provide a "Degraded" mode of operation upon loss of INCC Command Center or short in riser shall not be acceptable.
10. Audio Amplifiers and Tone-Generating Equipment: Electrically supervised for normal and abnormal conditions.

11. Amplifiers: Located in transponder cabinets serving no more than 3 floors per transponder to enhance system survivability, reduce required riser wiring, simplify installation, and reduce power losses in length of speaker circuits.
12. Speaker NAC Circuits: Arranged such that there is a minimum of 1 speaker circuit per fire alarm zone.
13. Notification Appliance Circuits (NAC), Speaker Circuits, and Control Equipment: Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
14. Speaker Circuits:
    a. Electrically supervised for open and short circuit conditions.
    b. If short circuit exists on speaker circuit, it shall not be possible to activate that circuit.
    c. Arranged for 25 or 70 VRMS and shall be power limited in accordance with NEC
    d. 20 percent spare capacity for future expansion or increased power output requirements.
15. Speaker Circuits and Control Equipment:
    a. Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.
    b. Systems utilizing "bulk" audio configurations shall not be acceptable.
16. 2-Way Telephone Communication Circuits:
    a. Shall communicate digitally over the network between transponders.
    b. Supervised for open and short circuit conditions.
    c. Short circuit condition on 2-way telephone communications circuit shall result in trouble condition and not result in call-in condition.
17. Voice Communication:
    a. Connect telephone circuits to speaker circuits to allow voice communication over speaker circuit from telephone handset.
    b. Capable of remote phone-to-phone conversations and party-line communications as required.

D. Basic System Functional Operation: When fire alarm condition is detected and reported by 1 of the system alarm initiating devices, the following functions shall immediately occur:

1. System Alarm LEDs: Flash.
2. Local Piezo-Electric Signal in Control Panel: Sound at a pulse rate.
3. 80-Character LCD Display: Indicate all information associated with fire alarm condition, including type of alarm point and its location within protected premises.
4. Historical Log: Record information associated with fire alarm control panel condition, along with time and date of occurrence. History Log shall have capacity for recording up to 4,100 events.
5. System output programs assigned via control-by-event equations to be activated by particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
    a. Close Fire Doors
    b. Shot down air handlers as required by code
    c. Notify the Central Station or Municipal Tie.
    d. Any elevator control functions shall activate as required.
6. Strobes flash synchronized continuously.

7. Audio Portion of System: Sound alert tone followed by pre-recorded message determined by event and this scenario repeating or other message as approved by local authority until system is reset.

E. Fire Alarm System Functionality:

1. Provide complete, electrically supervised distributed, Class A networked analog/addressable fire alarm and control system, with analog initiating devices, integral multiple-channel voice evacuation, and fire fighter's phone system.
2. Fire Alarm System:
   a. Consist of multiple-voice channels with no additional hardware required for total of 4 channels.
   b. Incorporate multiprocessor-based control panels, including model E3 Series modules include Intelligent Network INCC Command Center(s) (INCC), Intelligent Loop Interface (ILI-MB-E3 or ILI95-MB-E3), Intelligent Network Transponders (INX), communicating over peer-to-peer token ring network with standard capacity of up to 64 nodes expandable to 122.
3. Each ILI-MB-E3 or ILI95-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support in Velociti ® mode up to 159 analog addressable detectors and 159 addressable modules per ILI-MB-E3 SLC or support in Apollo mode up to 126 detectors and modules per ILI95-MB-E3 SLC.
4. Voice, Data, and Fire Fighter's Phone Riser: Transmit over single pair of wires or fiber optic cable.
5. Each Intelligent Network Transponder: Capable of providing 16 distributed voice messages, fire fighter phones connections, SLC loop for audio control devices, and integral network interface.
6. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
7. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
8. Network:
   a. Based on peer-to-peer token ring technology operating at 625 K baud, using Class A configuration.
   b. Capability of using twisted-pair wiring, pair of fiber optic Multi-mode cable strands up to 200 microns or Single-mode optimized for 9/125 microns, or any combination, to maximize flexibility in system configuration.
9. Each Network Node:
   a. Capability of being programmed off-line using Windows-based software supplied by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
   b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-topeer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
   c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD or touchscreen display without additional equipment.
10. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.

11. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
12. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.
13. Have the capacity for multiple pre-recorded messages (at least sixteen (16), but more if required by local AHJ) and address a list of subjects.
    a. Fire evacuation and relocation
    b. Intruder or hostile person sighted within or around the building grounds
    c. Directions to occupants to take cover within building
    d. Emergency weather conditions appropriate for local area
    e. All Clear

**1.4 SUBMITTALS**

A. Comply with Section 260000 – 1.6.

B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings.

C. Equipment Submittals:
1. Cover Page: Indicate the following:
    a. Project name and address.
    b. Engineered systems distributor's name and other contact information.
    c. Installing contractor's name and other contact information.
    d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
2. Table of Contents: Lists each section of equipment submittal.
3. Scope of Work Narrative: Detail indented scope of work.
4. Sequence of Operations: Use matrix or written text format, detailing activation of each type of device and associated resulting activation of the following:
    a. Control panel.
    b. Annunciator panels.
    c. Notification appliances.
    d. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown, etc.
5. Bill of Material: Indicate for each component of system the following:
    a. Quantity.
    b. Model number.
    c. Description.
6. SLC Circuit Schedule: Detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.

D. Shop Drawings:
1. Cover Page: Indicate the following:
a. Project name and address.
b. Engineered systems distributor's name and other contact information.
c. Installing contractor's name and other contact information.
d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
2. Floor Plans:
a. Provide separate floor plan for each floor.
b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
c. Prepare using AutoCAD.
d. Prepare to scale 1/8 inch = 1'-0", unless otherwise required by the Engineer.
e. Show equipment and device locations.
f. Show wiring information in point-to-point format.
g. Show conduit routing, if required by the AHJ.
3. Title Block: Provide on each sheet and include, at a minimum, the following:
a. Project name.
b. Project address.
c. Sheet name.
d. Sheet number.
e. Scale of drawing.
f. Date of drawing.
g. Revision dates, if applicable.
4. Control Panel: Provide sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.

E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized representative of major equipment manufacturer.

F. Project Record Drawings:
1. Submit complete project record drawings within 14 calendar days after acceptance test.
2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.

G. Operation and Maintenance Manuals:
1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
2. Operation and maintenance manuals shall be similar to equipment submittals, but revised to reflect changes made during construction.
3. Include factory's standard installation and operating instructions.

## 1.5 QUALITY ASSURANCE

A. Codes and Standards:
1. ADA: System shall conform to American with Disabilities Act (ADA).

B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear "UL" label.

C. Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition and UL 2572.

D. Equipment, Programming, and Installation Supervision:
1. Provide services of approved Platinum Level engineered systems distributor of Gamewell-FCI for equipment, programming, and installation supervision.
2. Provide proof of factory training within 14 calendar days of award of the Contract.

E. Software Modifications:
1. Provide services of Platinum Level Gamewell-FCI factory-trained and authorized technician to perform system software modifications, upgrades, or changes.
2. Provide use of all hardware, software, programming tools, and documentation necessary to modify fire alarm system software on-site.
3. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones.
4. System structure and software shall place no limit on type or extent of software modifications on-site.
5. Modification of software shall not require power-down of system or loss of system fire protection while modifications are being made.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials from damage during handling and installation.

## 1.7 COORDINATION

A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems, existing elevators, HVAC systems, and security/door locking systems.

## 1.8 WARRANTY

A. Warranty Period for System Equipment: 3 years from date of final acceptance.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

A. Gamewell-FCI, Honeywell Fire Systems, 12 Clintonville Road, Northford, Connecticut 06472. Phone (203) 484-7161. Fax (203) 484-7118. Website: <www.gamewellfci.com>.

B. References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality. Equivalent equipment from Honeywell or other manufacturer may be substituted for the specified equipment, as long as minimum standards are met.

C. Substitute equipment proposed as equal to equipment specified shall meet or exceed requirements of this section. For equipment other than Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System, provide proof that such substitute equipment equals or exceeds features, functions, performance, and quality of specified equipment. This proof shall be provided by submission of a copy of specification with each copy of the submittals that has had each paragraph marked as either compliant or non-compliant along with a letter from engineering manager or product manager at factory that certifies information presented as either compliant or non-compliant including a detailed explanation of each paragraph identified as noncompliant. In order to ensure that the Owner is provided with a system that incorporates required survivability features, this letter shall also specifically certify that the system is capable of complying with the test requirements of this section.

### 2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

A. Distributed Networked Fire Alarm System: Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System.

### 2.3 INTELLIGENT NETWORK INCC COMMAND CENTER HARDWARE

A. Intelligent Network INCC Command Center (INCC): Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules (ILI-MBE3/ ILI95-MB-E3), manual switching, phone, and microphone inputs to the network. INCC shall consist of the following units and components:

1. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.
2. Power Supply Module (PM-9) with batteries.
3. Intelligent Network Interface Voice Gateway (INI-VG).
4. 80-Character LCD Display (LCD-E3).
5. Intelligent Loop Main Board Interface (ILI-MB-E3 or ILI95-MB-E3).
6. Optional Intelligent Loop Supplemental Interface (ILI-S-E3 or ILI95-S-E3).
7. Optional DACT (DACT-E3).
8. Optional ARCNET Repeater (RPT-E3) with fiber optic modules (FSL-E3 or FMLE3).
9. Optional 1/4 VGA touch-screen display (NGA).
10. Optional Auxiliary Switch Module (ASM-16).
11. Optional LED Driver Module (ANU-48)
12. Optional Microphone Assembly (INCC-MIC).

13. Optional Telephone Assembly (INCC-TEL).
14. Optional AM-50 Series amplifiers (AM-50, AM-50-70).
15. Optional Addressable Node Expander (ANX-SR, ANX-MR-FO, ANX-MR-UTP).

B. System Cabinet:

1. Surface or semi-flush mounted with texture finish.
2. Consist of back box, inner door, and door.
3. Available in at least 3 sizes to best fit project configuration.
4. Houses 1 or more PM-9 Power Supply Modules, INI-VG Intelligent Network Interface Voice Gateway, 1 or more ILI-MB-E3/ILI95-MB-E3 assemblies, and other optional modules as specified.
5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
6. Wiring Gutter Space: A minimum of 1-inch wiring gutter space behind mounting plate.
7. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.

C. Power Supply Module (PM-9): Use latest technologies to provide system power, incorporates the following features:

1. Power-saving switching technology using no step-down transformers.
2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions for INCC Command Center Modules.
3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.

D. Batteries:

1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24- hour period, as required by NFPA 72, Local Systems.

E. Intelligent Network Interface Voice Gateway INCC Command Center (INI-VG): INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of board shall have the following features as a minimum:

1. Microprocessor shall monitor all system events and perform all system programs, for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall supporting Boolean logic including AND, OR, NOT, TIMING functions for maximum flexibility.
2. Network Interface: Operate at 625 K baud configurable with any combination of wire and/or fiber topologies. Interface shall communicate with up to122 nodes in peer-to-peer fashion.
3. Fire Fighter Phone Riser: INI-VG shall generate local phone riser for use with AOM-TEL phone modules for connection to fire fighter phone stations and/or for connection of local phone when used as INCC Command Center, including phone circuits. INI-VG shall mix its local phone riser to network in true Class A fashion. Systems not capable of true Class A communications for fire fighter's phone risers shall not be acceptable.

4. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIMING, COUNT, SCHEDULE functions.
5. Microphone Input: On-board and allow for addition of local microphone when used as INCC Command Center, including speaker circuit control.
6. Signal Processing: INCC shall use advanced Digital Signal Processing (DSP) technology to allow maximum flexibility of digital audio and control capabilities and operation. Signals to and from INCC shall be transmitted over single pair of twisted unshielded wire or fiber optic pair.
UCHS-FIRE ALARM UPGRADES 283100 - 10 FIRE ALARM SYSTEM
7. Field Programmable: INCC shall be capable of being fully programmed or modified by Field Configuration Program (FCP), to be downloaded via portable computer from any node in system.
8. Control-by-Event Programming (CBE): INCC shall be capable of programming using Boolean logic including AND, OR, NOT, COUNT, TIMING, and SCHEDULE functions to provide complete programming flexibility.
9. Remote INCC Command Center Options: System shall have capability of adding remote INCC Command Centers or re-locating INCC Command Centers utilizing only single pair of twisted unshielded wire or fiber optic pair for all functions.
10. RS-485 Serial Output: System shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet.
11. Riser Wiring: All data, voice, and fire fighter phone riser shall transmit over single pair of twisted unshielded wire or fiber optic pair for all functions configured in Class A format. Any short or open in data, voice, or phone sections shall not affect transmission over remainder of network.
12. Class A Network: All communication between control panels and transponders shall be through supervised Style 7 token passing network. In event of single short, open, or ground, all system communication shall operate as normal and report fault. This protection shall incorporate all data, voice, and fire fighter phone transmissions. Upon single short, open, or ground of either system data, live voice, pre-recorded channels, or phone risers, the function of each of these items shall continue to operate. "Degrade" functionality shall not be acceptable. This shall be demonstrated at system acceptance.

F. LCD Display Module (LCD-E3):
1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
   a. AC Power On: Green.
   b. Alarm: Red.
   c. Supervisory: Yellow.
   d. System Trouble: Yellow.
   e. Power Fault: Yellow.
   f. Ground Fault: Yellow.
   g. System Silenced: Yellow.
2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.

3. Panel shall contain 4 functional keys:
    a. Alarm Acknowledge.
    b. Trouble Acknowledge.
    c. Signal Silence.
    d. System Reset/Lamp Test.
4. Panel shall contain 3 configuration buttons:
    a. Menu/Back.
    b. Back Space/Edit.
    c. OK/Enter.
5. Panel shall have 12-key telephone-style keypad to permit selection of functions.

G. Intelligent Loop Interface (ILI-MB-E3/ILI95-MB-E3): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure or integrated with Intelligent Network INCC Command Center (INCC) as specified.

1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
3. RS-485 Serial Output: Each ILI-MB-E3/ILI95-MB-E3 shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.
4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation. "Degrade" configurations under these conditions shall not be acceptable.
5. Control-by-Event (CBE) Program: ILI-MB-E3/ILI95-MB-E3 shall be capable of programming using Boolean logic including AND, OR, NOT, TIMING, COUNT, SCHEDULE functions to provide complete programming flexibility.
6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
8. Electrically Supervised:
    a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.

b. Yellow "SYSTEM TROUBLE" LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledged by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.

9. Drift Compensation - Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify individual unit that requires maintenance.

10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.

11. Off-Premises Connection:

a. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station. Panel shall contain disconnect switch to allow testing of system without notifying fire department.

12. Central Station: Fire alarm control panel shall provide integral Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges.

13. Network Annunciator: Each ILI-MB-E3 or ILI95-MB-E3 and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.

14. Redundant History Log: Each ILI-MB-E3 or ILI95-MB-E3 shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from INCC Command Center followed by extraction of history log from any loop driver location, including INCC Command Center or Transponder.

15. LEDs Indicator and Outputs: Each ILI-MB-E3/ILI95-MB-E3 Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
    a. Power: Green.
    b. Alarm: Red.
    c. Supervisory: Yellow.
    d. General Trouble: Yellow.
    e. Ground Fault: Yellow.
    f. Transmit: Green.
    g. Receive: Green.
16. Auxiliary Power Outputs: Each ILI-MB-E3/ILI95-MB-E3 Loop Interface shall provide the following supply outputs:
    a. 24 VDC non-resettable, 1 amp. maximum, power limited.
    UCHS-FIRE ALARM UPGRADES 283100 - 13 FIRE ALARM SYSTEM
    b. 24 VDC resettable, 1 amp. maximum, power limited.
17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
20. NON-FIRE Alarm Module Reporting: Non-reporting type ID 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 message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
21. 1-Man Walk Test:
    a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. 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.
    b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.

22. Signaling Line Circuits: Each ILI-MB-E3 module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.
24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.

H. Auxiliary Switch Module (ASM-16):

1. Each ASM-16 has 16 programmable push-button switches.
2. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
3. Flexible switch configurations to allow flexible set-up of phone, speaker, and auxiliary function circuits.
4. An insertable label to identify function of each switch and LEDs combination.
5. Provide capability to communicate with up to 16 ASM-16 modules locally, up to 3,000 feet from INCC Command Center.
6. Specialty modules that only perform 1 task such as speaker, phone, or auxiliary shall not be acceptable.

I. Microphone Assembly: Include the following items:

1. Mounting cabinet which occupies 1 module location on inner door of INCC.
2. Interconnect cable for connection of microphone to INI-VG.
3. 1 noise canceling microphone with push-to-talk button.

J. Intelligent Network Interface Voice Gateway (INI-VG): INI-VG shall be a multi-function board interchangeable in both INCC and INX. Functions of board shall include the following features as a minimum:

1. Network interface operating at 625 K baud configurable with any combination of wire and/or fiber topologies. Interface shall communicate with up to 122 total INCC, INX, and E3 and S3 control panels in peer-to-peer fashion.
2. Fire Fighter Phone Riser: INI-VG shall generate local phone riser for use with AOM-TEL phone modules for connection to fire fighter phone. INI-VG shall mix its local phone riser to network in true Style 7 fashion.

3. Signaling Line Circuit (SLC): INI-VG shall generate local SLC to communicate with and control up to 16 AOM-TEL modules and 32 AOM-2S or AOM-MUX circuits for fire phone interfacing and additional split-speaker circuits.
4. RS-485: Provide capability to communicate with up to 16 ASM-16 modules, when used in INX mode up to 3,000 feet.
5. Advanced Processing: INI-VG shall incorporate latest in digital signaling processing technology with supporting Boolean logic including AND, OR, NOT, TIME DELAY functions.
6. Voice Generation: INI-VG shall incorporate all processing to allow for 16 distinct pre-recorded messages used in priority fashion with message 1 as highest priority. Total length for 1 to 16 messages shall be up to 3 minutes.

K. Power Supply Module (PM-9): PM-9 power supply shall supply all power necessary under normal and emergency conditions. Power supply shall provide capacity to charge up to 55 amp-hour batteries while under full load. Technology used shall be of power saving switching configuration, eliminating need of stepping transformer.

L. Audio Amplifier (AM-50): Include as a minimum, the following features:
1. 50-watt switching audio amplifier:
   a. AM-50-25 amplifier produces $25V_{RMS}$ at 50 watts digital audio output.
   b. AM-50-70.7 amplifier produces $70V_{RMS}$ at 50 watts digital audio output.
2. 2 individually addressable speaker circuits, each with capability of handling part or all of 50-watt supplied power.
3. Power shall be 24 VDC supplied via terminal block from local PM-9 power supply.
4. Ability to select from 1 of 16 pre-programmed messages in INI-VG, and paging from locally or from INCC Command Center.
5. Back-up amplification configurable so 1 AM-50 can perform back-up or 3, or perform 1-to-1 back-up if configured to do so in programming.
6. Status LEDs to indicate normal operation and trouble condition.

## 2.4 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPFF)

A. Supplemental Notification Appliance Circuit (HPFF) shall be Model HPFF8 offering up to 8.0 amps (8.0 amps continuous) of regulated 24-volt power. HPFF shall include the following features:
1. Integral Charger: Charge up to 18.0 amp-hour batteries and support 60-hour standby.
2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
3. Surface-mount back box.
4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
5. Power limited circuitry in accordance with applicable UL standards.
6. Operates as sync follower or a sync generator.

**2.5 SYSTEM PERIPHERALS – VelociI**

A. Addressable Devices - General:

1. Provide address-setting means using rotary-decimal switches.
2. Use simple to install and maintain decade-type (numbered 0 to 9) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.
3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
4. Addressable Thermal and Smoke Detectors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LEDs can be programmed off via fire control panel program.
5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
6. Using software in INCC Command Center, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
8. Following bases and auxiliary functions shall be available:
    a. Standard base with remote LED output.
    b. Sounder base rated at 85 dBA minimum.
    c. Form-C relay base rated 30 VDC, 2.0 A.
    d. Isolator base.
9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.
10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (ION, PHOTO, THERMAL).

B. Addressable Manual Stations (MS-7AF):

1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet (30.5 m) from front or side.
3. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
4. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.

5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.

C. Intelligent Thermal Detectors (ATD-RL2F): Intelligent addressable devices rated at 135 degrees F (58 degrees C) and have rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. Connect via 2 wires to fire alarm control panel signaling line circuit.

D. Intelligent Photoelectric Smoke Detectors (ASD-PL2F): Use photoelectric (light scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.

E. Intelligent Duct Smoke Detector Base (DNR, DNRW):

1. In-Duct Smoke Detector Housing: Use ASD-PL2F intelligent photoelectric detector, ASD-PL2FR intelligent remote test photoelectric detector or ASD-IL2F intelligent ionization detector, which provides continuous analog monitoring and alarm verification from panel.
2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.
3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide an (RTS151KEY) Remote test station accessory, designed to test a remotely located Intelligent Duct Smoke detector with remote alarm indicator.
4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.

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5. DST Sampling Tube
    a. No tools needed for installation or removal
    b. Installs/removes from front or back of detector
    c. Available in 1 ft, 1.5ft, 3 ft, 5 ft, and 10 ft lengths

F. Addressable Dry Contact Monitor Modules (AMM-2F):

1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
2. Mount in standard deep electrical box.
3. IDC Zone: Suitable for Style B operation.

G. Addressable Relay Modules (AOM-2RF):

1. Provide two isolated sets of Form-C contacts, which operate as a double pole double throw switch. The module shall allow the control panel to switch these contacts on command. The module shall not provide supervision for the notification appliance circuit (NAC). Module shall have both normally open and normally closed connections available for field wiring.
2. Available for HVAC control and other building functions. Relay shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.

3. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

**2.6 SYSTEM PERIPHERALS - E3 SERIES**

A. LCD Display Annunciator:
1. Furnish and install as indicated on the Drawings a remote serial annunciator, Model LCD-7100. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
a. Alarm Acknowledge.
b. Trouble Acknowledge.
c. Signal Silence.
d. System Reset/Lamp Test.
e. System Drill Test.
2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
a. Alarm.
b. Supervisory.
c. System Trouble.
d. Power Fault.
e. System Silenced.
3. Mount on standard 3-gang surface or flush electrical box.
4. Each ILI-MB-E3/ILI95-MB-E3: Accommodate up to 5 remote LCD-7100 annunciators which shall be located up to 3,000 feet from control panel.

B. Strobes:
1. Compliance: ADA and UL 1971.
2. Maximum Pulse Duration: 0.2 second.
3. Strobe Intensity: UL 1971.
4. Flash Rate: UL 1971.
5. Strobe Candela Rating: Determine by positioning selector switch on back of device.

C. Speaker/Strobes:
1. Operate on 25 VRMS or with field-selectable output taps from 0.5 to 2.0 watt 2. Speakers in Corridors and Public Spaces: Produce nominal sound output of 84 dBA at 10 feet (3 m).
3. Frequency Response: Minimum of 400 Hz to 4,000 Hz.
4. Back of Each Speaker: Sealed to protect speaker cone from damage and dust.
5. Audibility: NFPA 72.
6. Maximum Pulse Duration: 0.2 second.
7. Strobe Intensity: UL 1971.
8. Flash Rate: UL 1971.
9. Strobe Candela Rating: Determine by positioning selector switch on back of device.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Examine areas and surfaces to receive fire alarm system.

1. Notify Architect of conditions that would adversely affect installation or subsequent use.
2. Do not begin installation until unacceptable conditions are corrected.

### 3.2 INSTALLATION

A. Install fire alarm system in accordance with NFPA 72, NFPA 70, state and local codes, manufacturer's instructions, and as indicated on the Drawings.

B. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas.

C. Do not install smoke detectors before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.

D. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.

E. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install not less than 42 inches, nor more than 48 inches, above finished floor measured to operating handle.

### 3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.

B. Testing:

1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
2. Close each sprinkler system control valve and verify proper supervisory alarm at INCC Command Center.
3. Verify activation of flow switches.
4. Open initiating device circuits and verify that trouble signal actuates.
5. Open signaling line circuits and verify that trouble signal actuates.
6. Open and short notification appliance circuits and verify that trouble signal actuates.
7. Ground initiating device circuits and verify response of trouble signals.
8. Ground signaling line circuits and verify response of trouble signals.
9. Ground notification appliance circuits and verify response of trouble signals.

10. Check alert tone and prerecorded voice message to alarm notification devices.
11. Check installation, supervision, and operation of intelligent smoke detectors.
12. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at INCC Command Center and correct activation of control points.
13. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.

C. Acceptance Testing:

1. Before installation shall be considered completed and acceptable by AHJ, a complete test using as a minimum, the following scenarios shall be performed and witnessed by representative approved by Engineer. Monitoring company and/or fire department shall be notified before final test in accordance with local requirements.
2. Contractor's job foreman, in presence of representative of manufacturer, representative of Owner, and fire department shall operate every installed device to verify proper operation and correct annunciation at control panel.
3. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
4. Completely disconnect INCC Command Center from rest of network, including Voice INCC Command Center. Activate initiating device from transponder. All speaker circuits activated from each transponder shall transmit the correct evacuation or alert message. These messages shall be same messages transmitted with INCC Command Center activated. Default tones or messages shall not be acceptable.
5. Completely disconnect INCC Command Center from rest of network. Activate initiating device. All control outputs supported by transponder SLC circuits shall operate under project programming mode. Default or degrade mode programming shall not be acceptable.
6. Fire fighter phone riser shall be directly shorted between INCC Command Center and first transponder, followed by test of fire phones between INCC Command Center and farthest transponder. Phones shall operate in normal fashion.
7. All audio risers shall be directly shorted between INCC Command Center and first audio transponder, followed by activation of alarm initiating device. Correct prerecorded messages shall transmit from all speakers, including evacuation and alert channels. Default or degrade messages shall not be acceptable.
8. When testing has been completed to satisfaction of both Contractor's job foreman and representatives of manufacturer and Owner, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to Owner and fire department.
9. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

### 3.4 DEMONSTRATION

A. Provide instruction as required for operating fire alarm system.

B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

END OF SECTION 28 31 00