

Era ISD

Request For Proposal

FIRE ALARM RENOVATION

2022-2023

Instructions to Contractors

General Comments

This document and all appendices are considered part of the required specifications to the ERA ISD – “Request for Fire Alarm Renovation.”

Era ISD reserves the right to modify any part of the document at its discretion.

Era ISD reserves the right to reject any and all proposals.

Pre-Bid Conference and School Walk

Pre-Bid Conference and School Walk will be:

Monday, October 31, 2022, 9:00 a.m.

Era ISD Administration Office, 108 Hargrove Street, Era, Texas

Submission Requirements

One (1) original and two (2) copies of the proposal will be due on

Friday, November 18, 2022 by 2:00 pm

Sealed Proposals should be delivered by the required date and time to:

Era ISD

Era ISD Administration Building 108 Hargrove Street Era, Texas 76238

Emailed and/or faxed proposals **will not** be accepted. Late proposals will be disqualified.

Start Date/Completion Date

The successful Contractor will begin service as soon as practical after the award date. Contract should be substantially completed by March 31, 2023 and fully completed by April 30, 2023.

Termination/Cancellation

In the event that Contractor is non-compliant with any portion of the contract, Era ISD will give Contractor 30-day written notice to comply. If compliance is unsatisfactory after 30 days, then final written notice may be given to terminate contract 30 days thereafter.

Payments

After approval, the invoice will be forwarded for payment. Payment will be made monthly on a net 30 schedule.

Firm Offer

Each vendor must agree in advance, in written form, to submit a proposal with costs figures which will be in effect for at least thirty (30) calendar days after the opening date of the proposals.

A written award or contract furnished to the successful proposer, within the time for acceptance specified in the proposal, shall be deemed to result in binding contract without further action by either party.

Contract Award

The selection of a Contractor is planned to be finalized and announced by December 13, 2022. This decision will be the one that Era ISD determines to be in its best interest, most responsive to its needs, and offers the greatest benefit for the proposed cost. Please see **Appendix II** for Evaluation Criteria.

Addenda

Any "Addenda" or "Instructions to Contractors" issued by the Era ISD prior to the time for receiving bids, shall be covered in the proposal. In closing, the "Addenda" shall become a part thereof.

APPENDIX I
Required Documents

Form 1295

Conflict of Interest Questionnaire

Non-Collusion Bidding Statement

Suspension or Debarment Certification

Felony Conviction Notification

Senate Bill 9 Contractor Certification – Contractor Employees

House Bill 89 – Section 2270.001 Verification – “Boycott Israel”

Senate Bill 252 – Chapter 2252 Verification – “Foreign Terrorist Organizations”

Insurance Requirements

Payment Bond

Performance Bond

Execution Offer Form

APPENDIX II
Evaluation Criteria

Selection Criteria Points

| | |
|--|-----------|
| 1. Price – Value | 35 Points |
| 2. Proposer’s Experience and reputation | 30 Points |
| 3. Proposer’s past performance and quality of work | 5 Points |
| 4. Proposer’s personnel to be assigned to the project | 5 Points |
| 5. Conformance with proposed contract document requirements | 5 Points |
| 6. Proposed warranty coverage | 15 Points |
| 7. Impact on the ability of the district to comply with existing law related to historically underutilized, women owned, small, or disadvantaged business. | 5 Points |

TOTAL

100



DESIGN SOLVE INSURE

EMA Engineering & Consulting

PROJECT MANUAL

EMA PROJECT NO. 1 001 0493 001

SEPTEMBER 01, 2022

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

**ENGINEER:
EMA ENGINEERING & CONSULTING
328 SOUTH BROADWAY AVENUE
TYLER, TEXAS 75702
903-581-2677**

REGISTRATION NO. F-893

TOTAL CLIENT FOCUS

SEALS PAGE



09-01-2022

EMA PROJECT NUMBER 1 001 0493 001

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

TABLE OF CONTENTS

FIRE ALARM

DIVISION 28

| | |
|----------|--|
| 28 05 00 | General Fire Alarm System Requirements |
| 28 46 21 | Fire Detection and Alarm System |

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EMA REGISTRATION NO. F-893

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

FIRE ALARM

DIVISION 28

| | |
|----------|--|
| 28 05 00 | General Fire Alarm System Requirements |
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**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

SECTION 28 05 00

GENERAL FIRE ALARM SYSTEM REQUIREMENTS

PART 1 – GENERAL

1.1 WORK INCLUDES

- A. Fire alarm system complete including demolition of existing systems, cabling, special backboxes, hardware, and all other required devices and equipment.
- B. Installation of system equipment per specifications and contract drawings.
- C. Coordinate wireway, raceway, conduits, power, and outlet requirements with the Owner.
- D. Fire Alarm System Contractor shall provide and install prior to cable installation plastic snap in bushings at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves to protect the cabling from damage.
- E. Furnishing of all required materials, equipment, tools, scaffolding, labor, and transportation necessary for the complete installation of the fire alarm system as specified herein.
- F. Cable pathways, conduit, and cable support systems shall be complete with bushings, deburred, cleaned, and secure prior to installation of cable.
- G. It is the intent of these specifications to provide complete installations although every item necessary may not be specifically mentioned or shown.
- H. Repair, patching, painting of all building finishes that may be disturbed during the installation of the system shall be by the Fire Alarm System Contractor.

1.2 WORK TO BE INCLUDED BY THE ELECTRICAL CONTRACTOR IN BASE CONTRACT PROPOSAL

- A. Provide underground conduit as outlined on drawings as required. Underground conduit installation includes the trenching, bedding, backfilling as required by codes and the finish ground soils and/or roadway type finishes. Boring under roadways, as required per code conduit depth is acceptable.
- B. Provide overhead arial wireway with lead messenger cable, supports, UV resistant and weatherproof cable, and electrical wall boxes and weatherproof sealants. Installed to industry standards in a professional manner.
- C. Coordination of requirements of Division 28 with the Owner.
- D. Any work that may require the services of a licensed electrical contractor shall be contracted by and paid for by the Fire Alarm System Contractor in the fire alarm contract proposal.

1.3 WORK NOT INCLUDED

- A. The Fire Alarm System Contractor shall make no agreement that obligates the Owner to pay any company providing communications, monitoring, or other services. The Fire Alarm System Contractor shall not make selection, purchase, or installation of interconnect instruments/equipment to be used on this project.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1.4 CODES, STANDARDS, AND THEIR ABBREVIATIONS

A. General:

1. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.
2. In addition to the requirements outlined in other sections of the specifications the following standards are imposed as applicable to the work in each instance:
 - a. OSHA Safety and Health Regulations for Construction.
 - b. NFPA No. 70 National Electrical Code.
 - c. NESC National Electrical Safety Code, ANSI Standard C2.
 - d. NEIS National Electrical Installation Standards.
 - e. Local Codes and Ordinances.

B. Where local codes or practices exceed or conflict with the NEC, it shall be the Fire Alarm System Contractor's responsibility to perform the work in accordance with the local code prevailing and local interpretations thereof. Any such additional work shall be performed at no additional cost to the Owner.

C. Materials and components shall be UL listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.

D. The Fire Alarm System Contractor shall obtain all permits required to commence work. Upon completion of the Work, the Fire Alarm System Contractor shall obtain and deliver to the Owner's Representative a Certificate of Inspection and Approval from one of the following authorities: The State Board of Fire Underwriters, the City of Era, Texas, Cooke County Fire Marshal's Office, The State Fire Marshal's Office, and other authorities having jurisdiction. The Fire Alarm System Contractor shall pay required permit fees.

1.5 LIST OF ASSOCIATIONS AND STANDARDS:

| | |
|--------|---|
| ADA: | Americans with Disabilities Act. |
| ANSI: | American National Standards Institute, 1430 Broadway; New York, NY 10018. |
| ASTM: | American Society for Testing and Materials, 1916 Race Street; Philadelphia, PA 19103. |
| BICSI: | (RCDD5 Standards), 8610 Hidden River Parkway, Tampa, FL 33637 |
| CBM: | Certified Ballast Manufacturers Association, 2116 Keith Building; Cleveland, Ohio 44115. |
| IEEE: | Institute of Electrical and Electronics Engineers, 345 East 47th Street; New York, NY 10017. |
| ICEA: | Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664. |
| NEC: | National Electrical Code; NFPA No. 70. |
| NECA: | National Electrical Contractors Association, Inc., 7315 Wisconsin Ave.; Washington, DC 20014. |
| NEMA: | National Electrical Manufacturers Association, 155 East 44th Street; New York, NY 10017. |
| NESC: | National Electrical Safety Code, ANSI Standard C2. |
| NFPA: | National Fire Protection Association, 60 Batterymarch Street; Boston, MA 02110. |
| OSHA: | Occupational Safety and Health Administration, US Department of Labor; Washington, DC 20402. |
| TAS: | Texas Accessibility Standards (TAS) Article 9102. |
| UL: | Underwriters Laboratories, Inc., 333 Pfigsten Road; Northbrook, IL 60062. |

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 A. Nothing in the Contract Documents shall be construed to permit work not conforming to these
2 codes.
3
4 B. When two or more codes or standards are applicable to the same work, then the stricter code
5 or standard shall govern.
6
7 C. The date of the code or standard is that in effect on the date of issue stated on the contract
8 documents, except when a particular publication date is specified.
9
10 D. The Fire Alarm System Contractor shall comply with all State, Federal, NFPA, local codes and
11 ordinances that may alter any part of the plans or specifications. The Fire Alarm System
12 Contractor shall bear all costs for correcting any deficiencies due to non-compliance.
13
14 E. Where local codes and ordinances are not in writing or on record, but local precedence have
15 been set, the Owner shall pay for any additional resulting cost.
16
17 1.6 DEFINITIONS
18
19 A. Approval: It is understood that approval must be obtained from the Owner in writing before
20 proceeding with the proposed work. Approval by the Owner of any changes, submitted by the
21 Fire Alarm System Contractor, will be considered as general only to aid the Fire Alarm System
22 Contractor in expediting his work.
23
24 B. The Builder: The primary contractor engaged to oversee the construction project. They may
25 be technically described as a Construction Manager, General Contractor, Managing
26 Construction Contractor, the Owner, et cetera.
27
28 C. The Contractor: The Contractor engaged to execute the work included a particular section
29 only, although he may be technically described as a Subcontractor to the Builder. If the
30 Contractor, engaged to execute said work, employs Sub-Contractors to perform various
31 portions of the work included under a particular Section, they shall be held responsible for the
32 execution of this work, in full conformity with Contract Document requirements. The Contractor
33 shall cooperate at all times and shall be responsible for the satisfactory cooperation of his
34 Subcontractors with the other Contractors on the job so that all of the various sections and
35 phases of work may be properly coordinated without unnecessary delays or damage.
36
37 D. The Electrical Contractor: The Electrical Contractor shall be engaged and contracted by the
38 Fire Alarm System Contractor to execute the work as required for power to fire alarm system
39 equipment.
40
41 E. PDF file or .pdf: The filename extension associated with "Portable Document Format" files,
42 which are multi-platform computer files in the ISO 32000-1:2008 open standard format
43 developed and licensed by Adobe Systems. These files are a digital electronic representation
44 of text, documents, images, and technical drawings in a font and color-accurate fixed-layout
45 format that is platform and display resolution independent. PDF files can be electronically
46 transmitted, viewed, or printed with various free PDF reader application programs, and may
47 allow markups/comments with various PDF editing application programs.
48
49 F. Provide: Defined as requiring both the furnishing and installation of the item or facility
50 indicated, complete in all respects and ready for operation unless otherwise specifically noted.
51
52 1.7 WARRANTY
53
54 A. The Fire Alarm System Contractor shall warranty his work against defective materials and
55 workmanship for a period of one year from date of acceptance of the job.
56

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 B. Neither the final payment nor any provisions in Contract Documents shall relieve the Fire
2 Alarm System Contractor of the responsibility for faulty materials or workmanship.
3
4 C. The Fire Alarm System Contractor shall remedy any defects due thereto and pay for any
5 damage to other work resulting there from, which shall appear within a period of one year from
6 date of substantial completion.
7
8 D. The Owner shall give notice of observed defects with reasonable promptness.
9
10 E. This Warranty shall not be construed to include the normal maintenance of the various
11 components of the system covered by these specifications.
12

13 1.8 SITE VISIT

- 14
15 A. Before submitting a proposal, each proposed Fire Alarm System Contractor shall examine all
16 plans and specifications relating to the work, shall visit the site of the project, and become fully
17 informed of the extent and character of the work required including all system components
18 that are not readily visible or accessible.
19
20 B. No consideration will be granted for any alleged misunderstanding of the materials to be
21 furnished or the amount of work to be done, it being fully understood that the tender of a
22 proposal carries with it the agreement to all items and conditions referred to herein or indicated
23 on the accompanying plans or required by nature of the site of which may be fairly implied as
24 essential to the execution and completion of any and all parts of the work.
25

26 1.9 SUBMITTALS

- 27
28 A. Submittal procedures shall be per this specification and Owner requirements.
29
30 B. Provide a complete submittal for each section as specified.
31
32 C. Submit complete submittal package within 30 calendar days after award of this work for
33 approval. Equipment is not to be ordered without approval. Partial submittals are not
34 acceptable for review. Each submittal shall include a dated transmittal.
35
36 D. A submittal may be electronically transmitted in PDF file format (preferred) or paper copies
37 may be provided in quantities indicated in Division 1. Paper copies shall be organized
38 including index tabs in a 3-ring black binder of sufficient size.
39
40 E. See Section 28 46 21 Part 1, 1.4 Submittals for complete submittal issuance details.
41
42 F. The Owner's review of submittals is only for confirmation of adherence to design of project
43 and does not relieve the Contractor of final responsibility for furnishing all materials required
44 for a complete working system and in complying with the Contract Documents in all respects.
45

46 1.10 PROJECT RECORD DOCUMENTS

- 47
48 A. The Fire Alarm System Contractor shall keep a set of plans on the job, noting daily all changes
49 made in connection with the final installation.
50
51 B. Upon submitting his request for final payment, he shall turn over to the Owner, for subsequent
52 transmittal to the Owner revised plans showing "as installed" work or "As-built Shop Drawings".
53
54 C. In addition to the above, the Fire Alarm System Contractor shall accumulate during the jobs
55 progress the following data in PDF file format (preferred) or paper copies to be turned over to
56 the Owner for checking and subsequent delivery to the Owner:

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1. All warranties, guarantees, and manufacturer's directions on equipment and material covered by the Contract.
2. PDF file or paper copies of all Shop Drawing prints and CAD or BIM engineering drawing program files.
3. Any software programs, data/programming files, passwords, special interface cables, or keys that may be needed to maintain or access equipment.
4. Set of operating instructions. Operating instructions shall also include recommended maintenance and seasonal changeover procedures.
5. Any and all other data and/or plans required during construction.
6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
7. The first page, or pages, shall have the names, addresses, and telephone numbers of the following:
 - a. Fire Alarm System Contractor.
 - b. Major Equipment Suppliers and equipment warranties.
 - c. Submit communication systems warranties.

1.11 TRAINING

- A. Upon completion of the work and at a time designated by the Owner, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all fire alarm systems equipment and systems.
- B. See other sections for time requirements.

1.12 PLANS AND SPECIFICATIONS

- A. The intent of the project drawings is to establish the types of systems and functions, but not to set forth each item essential to the functioning of the system.
- B. Contract drawings are generally diagrammatic and show approximate location and extent of work. The contract drawings are based on casual field observation. It shall be the sole responsibility of the Fire Alarm System Contractor to locate all fire alarm system devices throughout each building for demolition and replacement.
- C. Local adopted codes with local amendments may have changed since the current fire alarm system to be replaced was installed. The replacement fire alarm system shall be upgraded and installed to current national, state, and local codes with adopted local amendments. Failure to design and install the replacement fire alarm system to current codes and standards will be revised and installed at no additional cost to the owner.
- D. Install the work complete including minor details necessary to perform the function indicated. Provide fire alarm systems (including all hook-ups) complete in every respect and ready to operate.
- E. If clarification is needed, consult the Owner.
- F. Review pertinent drawings and adjust the work to conditions shown. Where discrepancies occur between drawings, specifications, and actual field conditions, immediately notify the Owner for his interpretation.
- G. The Owner reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1.13 PRODUCT SUBSTITUTIONS:

- A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated in the plans and specifications shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Owner, of equivalent or better quality than that of the product specified.
- B. Proposed Fire Alarm System Contractors wishing to propose systems which differ in manufacturer, features, functions, or operating characteristics from those outlined in these specifications must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.
- C. For manufacturers equipment or models other than that specified, the proposed Fire Alarm System Contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified and include relevant technical and cost data. This shall include a complete description of the proposed substitution, drawings, catalog cuts, performance data, test data, or any other data or information necessary for evaluation.
- D. The Owner will consider all such submittals and the Owner will issue an addendum listing items that the Owner considers acceptable. Only such items as specified or approved as acceptable will be installed on this project.
- E. Substitute products for which the proposed Fire Alarm System Contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of the alternate system shall be based on the decision of the Owner. Prior approval to make a proposal for this project does not automatically ensure the system will be an acceptable equivalent.
- F. The Fire Alarm System Contractors' proposal represents that the contract proposal price is based solely upon the materials, equipment, and labor described in the Contract Proposal Documents (including addenda, if any) and that he contemplates no substitutions or extras.
- G. The manufacturer of the proposed substitute unit shall provide samples for evaluation, when required, at no charge and non-returnable.
- H. Requests for substitution are understood to mean that the Fire Alarm System Contractor:
 1. Has personally investigated the proposed substitution and determined that it is equivalent or superior in all respects to that specified.
 2. Will provide the same guarantee for the substitution that he would for that specified.
 3. Will, at no cost to the Owner, replace the substitute item with the specified product if the substitute item fails to perform satisfactorily.
 4. After Award of the Contract, substitutions will be considered only under one or more of the following circumstances:
 - a. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
 - b. The specified product is unavailable through no fault of the Fire Alarm System Contractor.
 - c. The manufacturer refuses to warranty the specified products as required.
 - d. Subsequent information indicates that the specified product is unable to perform properly or to fit in the designated space.
 - e. In the Owner's sole judgment, the substitution would be in the Owner's best interest.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- f. Revisions to the electrical system caused by substitutions shall be under the supervision of the Owner, at a standard hourly rate charged by the Owner. Charges from the Owner shall be paid by the Fire Alarm System Contractor originating the changes.

1.14 FUTURE USE CABLING

- A. When cabling is installed for future use, it shall be identified with a tag of sufficient durability to withstand the environment involved.
- B. Locations and Existing Conditions:
1. Location and condition of any existing equipment or services, when shown, have been obtained from substantially reliable sources, are shown as a general guide only, without guarantees as to accuracy.
 2. The Fire Alarm System Contractor will examine the site, verify all requirements, service points, and availability of all services required to complete this project. No consideration will be granted for any alleged misunderstanding of the materials and labor to be provided as necessitated by nature of the site including those items that may be fairly implied as essential to the execution and completion of any and all parts of this project.

1.15 EXISTING FIRE ALARM SYSTEM

- A. As noted on the plans and specifications the Fire Alarm System Contractor shall be responsible for complete demolition of the existing fire alarm system, including demolition of any devices and cabling previously abandoned. Demolition shall include:
1. Disconnection and removal of all fire alarm devices not to remain in service in walls, floors, and ceilings.
 2. Identification and verification of abandoned wiring and equipment. All disconnected or abandoned devices that are visible shall be removed, i.e., non-functional fire pulls, bells, speakers, signals, et cetera. Remove abandoned wiring to the source of the supply everywhere possible, the accessible portions of all inaccessible abandoned cabling shall be removed.
 3. Removal of exposed abandoned conduit and supports including brackets, stems, hangers, and other accessories located on walls and above accessible finished ceilings. Cut abandoned conduit flush with walls, floors, etc., and patch surfaces.
 4. Provide a blank cover, the type approved by the Owner, for abandoned device backboxes that are impractical to remove from masonry construction without unnecessary damage.
 5. Confirm with Owner regarding the handling and disposal/reuse of removed material, equipment, devices, et cetera.
 6. Off-site disposal in a legal manner of all materials not requested to be turned over to the Owner. Comply with government regulations pertaining to environmental protection, and disposal of materials and equipment. Do not burn any materials on the site.
 7. Repair of any finishes or adjacent construction damaged during modification, extension, and demolition work. Repair and paint surfaces and finishes as required to match the existing finishes.

1.16 EXAMINATION

- A. Verify field conditions including existing systems, equipment models, configurations, circuiting arrangements, cabling, and devices. Adjust all circuiting, cabling, and materials to be provided as required by job conditions.
- B. Project drawings are based on casual field observation and existing record documents when available, report any significant discrepancies to the Owner before disturbing existing systems.
- C. The Fire Alarm System Contractor accepts the existing conditions when beginning demolition.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1.17 IMPLEMENTATION

- A. Verify phasing in regard to systems and coordinate before energizing any system.
- B. When required during phases of construction to maintain existing systems in service in particular areas, provide temporary wiring and connections as necessary to accommodate construction.

1.18 OPERATION OF NEW EQUIPMENT PRIOR TO PROJECT COMPLETION

- A. When the phasing of a project requires that fire alarm systems are operable in certain areas and the Owner needs to operate the equipment the Fire Alarm System Contractor shall make such provisions. The warranty period shall commence on new equipment when it is operated for the beneficial use of the Owner. Regardless of whether or not the equipment has or has not been operated, the Fire Alarm System Contractor shall properly clean the equipment, properly adjust, and complete all punch list items before final acceptance by the Owner. In these cases, the date of acceptance and the start of the warranty may be different dates.

1.19 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment in areas of renovation that are to remain or be reused.

1.20 PROTECTION OF EQUIPMENT AND MATERIALS

- A. The Fire Alarm System Contractor shall take such precautions as may be necessary to protect his apparatus from damage.
- B. This shall include the creation of all required temporary shelters to protect any apparatus above the floor of the construction and the covering of apparatus in the completed building with tarpaulins or other protective covering.
- C. Failure to comply with the above to the satisfaction of the Owner's inspector will be sufficient cause for the rejection of the equipment in question and its complete replacement by the Fire Alarm System Contractor.

1.21 FINAL OBSERVATION

- A. It shall be the duty of the Fire Alarm System Contractor to make a careful observation trip of the entire project, assuring themselves that the work on the project is ready for final acceptance before calling upon the Owner to make a final observation.
- B. To avoid delay of final acceptance of the work, the Fire Alarm System Contractor shall have all necessary bonds, warranties, receipts, affidavits, et cetera, called for in the various articles of these specifications, prepared and signed in advance, together with a letter of transmittal, listing each paper included, and shall deliver the same to the Owner at or before the time of said final observation. The Fire Alarm System Contractor is cautioned to check over each bond, receipt, et cetera, before preparing for submission to verify that the terms check with the requirements of the specifications.
- C. The following and other provision of Division 1 General Conditions will be required at time of final completion:
 - 1. Final clean up completed.
 - 2. All systems are fully operational, all material and devices installed.
 - 3. As built (as installed) drawings and operations manuals.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1.22 PROHIBITED MATERIALS

- A. No new asbestos, lead, or materials containing these substances shall be permitted in this project. The Fire Alarm System Contractor shall consult the Owner concerning these materials if their presence is suspected. All work in or around existing asbestos or lead materials is at the sole risk of the Fire Alarm System Contractor and his personnel.

1.23 CUTTING AND PATCHING

- A. Notify the Builder sufficiently ahead of construction of any floors, walls, ceiling, roof, et cetera, of any openings that will be required for his work.
- B. The Fire Alarm System Contractor shall see that all sleeves required for his work are set at proper times to avoid delay of the job.
- C. All necessary cutting of walls, floors, partitions, ceilings, et cetera, as required for the proper installation of the work under this Contract shall be done at the Fire Alarm System Contractor's expense. All work shall be in a neat and workmanlike manner, and as approved by the Owner.
- D. Patching and painting of openings and/or alterations shall be provided by the Fire Alarm System Contractor or at the Fire Alarm System Contractor's expense. All patching and painting shall be done in a neat and professional manner, shall match adjacent finishes and be approved and accepted by the Owner.
- E. No joists, beams, girders, or columns shall be cut by any Fire Alarm System Contractor without first obtaining written permission of the Owner.
- F. All openings in firewalls and floors shall be completely sealed after installation for a completely airtight installation. Sealing material shall be non-combustible and UL approved. The installed sealing assembly shall not cause the fire rating of the penetrated structure to be decreased.
- G. All openings in exterior walls shall be sealed watertight.
- H. Seal voids around conduits penetrating fire-rated assemblies and partitions using fire stopping materials and methods in accordance with NFPA and local codes.

1.24 MANUFACTURERS' INSTRUCTIONS

- A. All equipment and devices shall be installed in accordance with the drawings and specifications, manufacturer's instructions, and applicable codes.
- B. Where specifications call for installation of a product to be in accordance with manufacturer's instructions and/or where manufacturer's instructions are required for installation of a product, it shall be the Fire Alarm System Contractor's responsibility to obtain the necessary applicable manufacturer's instructions and install the product in accordance with the manufacturer's instructions.
- C. It shall be the Fire Alarm System Contractor's responsibility to install all equipment, materials, and devices required, even if manufacturer's instructions are absolutely unattainable.

1.25 INSTALLATION

- A. The Fire Alarm System Contractor shall coordinate installation of the fire alarm systems with the Owner to ensure a complete working system for the Owner.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 B. Where required for accessibility all conduit and boxes for all fire alarm systems shall be
2 provided by the Fire Alarm System Contractor, any and all allowances shall be included.
3 Normally low voltage wiring shall run open and supported in accessible attic space. All low
4 voltage wiring in exposed areas such as gyms, stages, shops, and field houses shall be
5 enclosed in conduit.
6
7 C. Conduit, innerduct, track, or raceway shall conceal and protect wiring in exposed areas, within
8 walls, through in- accessible areas, floors, chases, under slab, crawlspaces, or underground.
9
10 D. All conduit, duct, track, and raceway runs shall be spaced apart to allow for maintenance, such
11 as the installation of couplings, without disturbing adjacent pathways.
12
13 E. All work must be performed by workers skilled in their trade. The installation must be complete
14 whether the work is concealed or exposed.
15
16 F. Provide stainless screw/bolt hardware wherever stainless devices are used and in potentially
17 wet areas.
18
19 G. Coordinate the actual locations of devices and outlets and equipment with building features
20 and as noted on the drawings and from field observation. Review with the Owner any proposed
21 changes in outlet or equipment location. Relocation of devices, before installation, of up to 3
22 feet from the position indicated, may be directed without additional cost. Remove and relocate
23 outlets placed in an unsuitable location when so requested by the Owner.
24

25 **1.26 ADDITIONAL MATERIALS: INCLUDE IN THE BASE CONTRACT PROPOSAL**

- 26
27 A. All costs to provide 10 additional fire alarm initiation devices, including all backboxes, conduit,
28 cable and devices as directed by the Owner.
29
30 B. All costs to provide 10 additional fire alarm notification devices, including all backboxes,
31 conduit, cable and devices as directed by the Owner.
32
33 C. All costs to provide 10 additional fire alarm duct detector devices, including all backboxes,
34 conduit, cable and devices as directed by the Owner.
35
36

37 **PART 2 – PRODUCTS**

- 38
39 A. Not Applicable
40

41
42 **PART 3 – EXECUTION**

- 43
44 A. Not Applicable
45

46 **END OF SECTION**

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

SECTION 28 46 21

FIRE DETECTION AND ALARM SYSTEM

PART 1 – GENERAL

1.1 WORK INCLUDES

- A. For each building with a fire alarm system, remove the entire existing fire alarm system including the panel and all peripherals, devices, and cabling.
- B. Provide a new addressable voice evacuation fire alarm system. Size the new panel to allow space for the addition of subassemblies (contained within the panel housing) to provide coverage by addressable devices of the entire existing facility, plus a 30% expansion of all devices at a future date. Each signaling line circuit (SLC) shall be limited to 80% of its total device capacity during the initial installation.
- C. Furnish and install all equipment, accessories, and materials in accordance with the project specifications and drawings, in conjunction with the Fire Alarm System Contractors site survey, to provide a complete and operating system.
- D. Equipment specified herein is designed to provide specific functional and operational characteristics. It is the responsibility of the Fire Alarm System Contractor to provide all features and functions as outlined in these specifications.
- E. It shall be the responsibility of the Fire Alarm System Contractor to obtain all required approvals, permits, and certifications from authorities having jurisdiction.
- F. NOTE: IN ALL OPEN CEILING AREAS, ALL FIRE ALARM CABLING SHALL BE ENCLOSED IN CONDUIT. It shall be the responsibility of the Fire Alarm System Contractor to provide and install all conduit systems, standard electrical boxes for the fire alarm system as outlined on the project drawings and as required.
- G. All electrical work shall be performed and completed by a qualified licensed electrician, employed by a licensed company. All electrical work costs shall be included in the Fire Alarm System Contractor's proposal for this project.
- H. The Fire Alarm System Contractor shall provide, through a licensed electrical contractor, 120VAC power as required to the fire alarm system main panel, remote amplifiers, and remote power supply panels, through individual dedicated branch circuits, maximum 20 amperes each. The branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters. Each such circuit breaker shall be labeled in red, in a visible area utilizing a self-laminating, flexible vinyl film, non-smear, machine printed label, at the power distribution panel as FIRE ALARM. Secure the "ON" breaker handle with a lockout clip that is red and clearly labeled "FIRE ALARM" equal to Space Age Electronics "ELOCK" or equivalent. A breaker panel key shall be stored within the locked cabinet of each fire alarm control unit. The location of all circuit breakers serving the fire alarm control unit shall be posted in the fire alarm control unit cabinets. Each cabinet shall be grounded securely to the building grounding system.
- I. For fire safety control functions that may include, but not limited to, fire door hold open/release, coiling fire door release, air handler shutdown, smoke damper or fire/smoke damper control, high volume low speed (HVLS) fan shut down, elevator recall, and automatic door unlocking, including the opening of motorized security grills on alarm, the contractor providing the appliance or device shall wire it internally for fail-safe shut-down and provide a labeled 3' coil

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

of cable outside the unit to allow the Fire Alarm System Contractor to make final connection to the controlling relay. Each fire safety control function circuit-controlled device shall be configured such that when the fire alarm system safety control circuit is re-energized, by a fire alarm control panel reset, the device shall return to normal operation (e.g., re-start or be ready to re-start) without a need for manual or environmental control system intervention. Line voltage, 120 VAC fire safety control function circuits shall be wired by the Electrical Contractor and shall be standard non-supervised line voltage circuits in conduit, utilizing the type of conductors specified in Division 26 for light and power circuits.

- J. Provide all testing, documentation, training, and warranty service contract as outlined in these specifications.

1.2 RELATED SECTION

- A. Section 28 05 00 - General Fire Alarm System Requirements.

1.3 CODES AND REGULATIONS

- A. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.
- B. The equipment, materials, and installation shall confirm to the latest version of all applicable codes, standards and regulations of authorities having jurisdiction including the following:
1. NFPA 1, Uniform Fire Code
 2. NFPA 13, Standard for the Installation of Sprinkler Systems
 3. NFPA 70, National Electrical Code, Articles 250, 300, 725, 760, and 800.
 4. NFPA 72, 2016 National Fire Alarm and Signaling Code.
 5. NFPA 90A, Installation of Air Conditioning and Ventilation Systems.
 6. NFPA 101, Code for Safety to Life from Fire in Buildings and Structures.
 7. IEC 60268-16:2011(E) Sound system equipment – Part 16: Objective rating of speech intelligibility by speech transmission index.
 8. ISO 7240-24:2010 Fire detection and fire alarm systems - Part 24: Sound-system loudspeakers.
 9. ANSI 117.1 American National Standard for Accessible and Useable Buildings and Facilities.
 10. ASME A17.1 Safety Code for Elevators and Escalators
 11. Americans with Disabilities Act.
 12. Texas Accessibility Standards (TAS).
 13. Texas Insurance Code Chapter 6002 Fire Detection and Alarm Device Installation and 28 TAC §§ 34.600 The Fire Alarm Rules.
 14. International Building Codes (IBC).
 15. Local and State Building Codes.
 16. All requirements of the local Authority Having Jurisdiction (AHJ).

1.4 SUBMITTALS

- A. Submittal procedures: See also Section 28 05 00.
- B. Submit a complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Each submittal shall include a dated transmittal.
- C. Partial submittals are not acceptable for review. Product Data and Shop Drawings may be sent as one submittal package or may be sent separately only. Submittals that are not complete as specified will be rejected.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 D. Submittal may be electronically transmitted in PDF file format.
- 2
- 3 E. For each Submittal provide a cover sheet with the name and location of the project, the name,
- 4 address and telephone number of the Fire Alarm System Contractor, and the name, address,
- 5 and telephone number of the submitting sub-contractor. Include on or after the cover sheet
- 6 sufficient space for review stamps.
- 7
- 8 F. Product Data Submittal to include:
- 9 1. Letter from the fire alarm control panel manufacturer stating that the Fire Alarm System
- 10 Contractor is a Factory Authorized Distributor for the area where the project is located.
- 11 2. Current copy of the Fire Alarm System Contractors Alarm Certificate of Registration
- 12 (ACR) for sales, service, and installation of fire alarm systems issued by the Texas State
- 13 Fire Marshal's Office.
- 14 3. Copy of the commercial (non-residential) Alarm Planning Superintendent's License
- 15 (APS) responsible for the design of the system submitted.
- 16 4. An indication of any deviations from Contract Document requirements, including
- 17 variations and limitations. Show any revisions to equipment layout required by use of
- 18 selected equipment.
- 19 5. A product data index and complete equipment list including for each product submitted
- 20 for approval the manufactures name and part number, including options and selections.
- 21 6. Cut-sheets or catalog data illustrating the physical appearance, size, function,
- 22 compatibility, standards compliance, and other relevant characteristics of each product
- 23 on the equipment list. Include special boxes, cable and other material as requested by
- 24 the Owner.
- 25 7. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact
- 26 product and options being submitted.
- 27 8. Submit design data when the scope of work requires, including schematics, risers,
- 28 sequences, or other data.
- 29 9. If not included in the Shop Drawings, calculations for notification device circuit current
- 30 drop, conductor size, and backup power requirements for each unit.
- 31 10. Any resubmittal shall include a complete revised equipment list and any product data that
- 32 is revised.
- 33
- 34 G. Shop Drawings Submittal to include:
- 35 1. A cover page that includes project name and address, index of drawings, scope of work
- 36 description, current code editions, local AHJ information, a sequence of operation
- 37 matrix, bill of material, device and cable legends, typical diagrams, schedules, location
- 38 map and details.
- 39 2. Accurate to scale (min. 1/8" = 1') floor plan drawings showing all equipment and device
- 40 layouts prepared using a CAD or BIM engineering drawing program. Show a plan north
- 41 indicator. Locate all components of the system, indicating circuit routing, cable type, and
- 42 gauge. Label all devices as to device number in the circuit and the circuit number and
- 43 origin.
- 44 3. Riser diagrams of all components of the system. Show control panels, power supply
- 45 panels, amplifiers, annunciators, network interfaces, all initiation and notification devices.
- 46 Partial or typical riser diagrams are not acceptable.
- 47 4. If not included in the Product Data Submittal, include calculations for notification device
- 48 circuit current drop, conductor size, and backup power requirements for each unit.
- 49 5. Shop or coordination drawings shall include information that will allow the Fire Alarm
- 50 System Contractor to coordinate interdisciplinary work and when necessary, guide the
- 51 manufacturer or fabricator in producing the product.
- 52 6. Resubmittal of shop drawings shall include a revision notation and clouded changes.
- 53

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1.5 QUALIFICATIONS OF A PROPOSED FIRE ALARM SYSTEM CONTRACTOR

- A. Proposed Fire Alarm System Contractors who do not currently possess the necessary qualifications, trained and experienced personnel, financial capacity, required current licenses, and meet the other requirements herein described will be disqualified.
- B. The Fire Alarm System Contractor shall be currently licensed by the State of Texas Fire Marshal to sell, install, and service commercial fire alarm systems in accordance with the Texas Insurance Code.
- C. The proposed Fire Alarm System Contractor, as a business entity, shall be an authorized and designated representative of the fire alarm panel equipment manufacturer, with full warranty privileges, and shall have been actively engaged in the business of selling, installing, and servicing commercial building fire alarm systems for a period of at least 5 years.
- D. Recently formed companies are acceptable only if specific pre-approval is requested, and granted by the Owner, based on experience of key personnel, current and completed projects, and all licensing requirements are met 10 working days prior to the contract proposal date.
- E. The proposed Fire Alarm System Contractor shall have an office within 150 miles of the job site, staffed with factory trained and certified technicians who are qualified and licensed to supervise the installation, to be responsible that the system is installed as submitted, to conduct system start up and perform a 100 percent operational audit of all installed devices, to instruct the Owners representatives and the local Fire Marshal in the proper operation of the system, and to provide service throughout the warranty period. The Fire Alarm System Contractor shall be capable of dispatching technicians to repair a system within six hours of a service request.
- F. The proposed Fire Alarm System Contractor shall be fully experienced in the design and installation of the type of Fire Alarm System herein specified and shall furnish with the contract proposal an itemized list of the installations of the type specified herein. The list shall include the name of the project, date of completion, the amount of the contract, the name, and telephone number of a qualified person to contact for reference. This list must contain at least two (2) projects within a 150-mile radius of this project to allow owners representatives to visit the job sites for review of the system installation and service. Each reference project listed must utilize a fire alarm control panel by the same manufacturer as the proposed system.
- G. The Fire Alarm System Contractor shall have a full-time employee who is a state licensed Alarm Planning Superintendent (APS). They shall be responsible for the design of the system submitted and shall sign all submittal drawings.
- H. All work associated with the installation of the fire alarm system shall be under the direct supervision of a technician who holds a state Fire Alarm License (FAL).
- I. The Fire Alarm System Contractor shall employ factory trained and technicians capable of supporting the maintenance of the system. No contract employees are allowed unless they have been to the factory service school within the last 18 months. A certificate of this training shall be provided with the Fire Alarm System Contractors' submittal.
- J. The Fire Alarm System Contractor shall not have any grievances or complaints of record with either the Owner, Local Authorities Having Jurisdiction, or the State Fire Marshal. A Fire Alarm System Contractor that has any prior finding(s) of a violation or has any litigation of this type in process with the Local Authorities Having Jurisdiction or the State Fire Marshal is unacceptable.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 K. The ability of a proposed Fire Alarm System Contractor to obtain stamped and signed plans
2 and provide a performance bond shall not be regarded as the sole qualification of the Fire
3 Alarm System Contractors' competency and responsibility to meet the requirements and
4 obligations of the contract.
5
6 L. The Builder shall be satisfied that a proposed Fire Alarm System Contractor meets all the
7 requirements expressed herein before including the Fire Alarm System Contractor's proposal
8 in the project.
9
10 M. The Owner may investigate, as they deem necessary to determine the ability of the proposed
11 Fire Alarm System Contractor to perform the work. The proposed Fire Alarm System
12 Contractor shall furnish to the Owner with any information or data requested for this purpose.
13
14 N. The Owner reserves the right to reject any contract proposal if the evidence submitted, or their
15 investigation, fails to indicate that the Fire Alarm System Contractor is qualified to fulfill of any
16 part of the contract or to complete the work contemplated therein.
17
18 O. The Owner reserves the right to reject the proposal of any Fire Alarm System Contractor who
19 has previously failed to perform properly, or complete on time, contracts of a similar nature.
20
21

22 **PART 2 – PRODUCTS**

23
24 **2.1 GENERAL**

- 25
26 A. Type: Complete 24 VDC, closed circuit, electrically supervised, analog addressable, intelligent
27 reporting, microprocessor-controlled fire detection and alarm system combined with an in-
28 building voice evacuation control system.
29
30 B. The system shall meet all requirements for a protected premises and supervising station fire
31 alarm system per NFPA 72.
32
33 C. The system and all components provided shall be tested and found suitable for the specified
34 purpose as part of a protected premises protective signaling (fire alarm) system by a nationally
35 recognized approvals agency acceptable to the AHJ.
36
37 D. All date keeping hardware, firmware, and software provided shall be fully compliant with the
38 calendar year designated in four-digit date format. Any time or date related functions must
39 operate normally, leap year, and daylight savings time must be supported.
40
41 E. The control units, power supplies, batteries, subassemblies, software, firmware, all cable
42 types, detection, notification, control devices, and all accessories required to provide a
43 complete operating system shall be listed and labeled by Underwriters Laboratories, Inc. for
44 fire alarm system use under the latest appropriate testing standard including but not limited to
45 the following:
46 UL 38 Manually Actuated Signaling Boxes for Use with Fire Protective Signaling
47 Systems.
48 UL 50 Enclosures for Electrical Equipment.
49 UL 193 Alarm Valves for Fire-Protection Service
50 UL 217 Single and Multiple Station Smoke Detectors.
51 UL 228 Door Closers-Holders, With or Without Integral Smoke Detectors.
52 UL 268 Smoke Detectors for Fire Protective Signaling Systems.
53 UL 268A Smoke Detectors for Duct Application.
54 UL 346 Waterflow Indicators for Fire Protective Signaling Systems.
55 UL 444 Communications Cables.
56 UL 464 Audible Signal Appliances.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- | | | |
|----|---------|---|
| 1 | UL 497B | Protectors for Data Communications and Fire Alarm Circuits. |
| 2 | UL 521 | Heat Detectors for Fire Protective Signaling Systems. |
| 3 | UL 539 | Single and Multiple Station Heat Detectors. |
| 4 | UL 793 | Automatically Operated Roof Vents for Smoke and Heat. |
| 5 | UL 864 | Control Units for Fire Protective Signaling Systems, Ninth Edition |
| 6 | UL 910 | Test for Cable Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air. |
| 7 | | |
| 8 | UL 1424 | Cables for Power-Limited Fire Alarm Circuits. |
| 9 | UL 1479 | Fire Tests of Through-Penetration Firestops. |
| 10 | UL 1480 | Speakers for Fire Protective Signaling Systems. |
| 11 | UL 1481 | Power Supplies for Fire Protective Signaling Systems. |
| 12 | UL 1581 | Electrical Wires, Cables, and Flexible Cords. |
| 13 | UL 1635 | Digital Alarm Communicator System Units. |
| 14 | UL 1638 | Visual Signaling Appliances - Private Mode Emergency and General Utility Signaling. |
| 15 | | |
| 16 | UL 1711 | Amplifiers for Fire Protective Signaling Systems. |
| 17 | UL 1971 | Signaling Devices for the Hearing Impaired. |
| 18 | UL 2043 | Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces. |
| 19 | | |
| 20 | UL 2572 | Control and Communication Units for Mass Notification Systems. |
| 21 | | |
| 22 | F. | Only equipment devices that have been located have been shown on the contract drawings. |
| 23 | | Specific wiring between equipment has not been shown. |
| 24 | | |
| 25 | G. | All equipment and components shall be installed in strict compliance with manufacturers' recommendations and the requirements of the components UL listing. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, electrical requirements, cable types, and physical equipment sizes, et cetera, before beginning system installation. Refer to the manufacturers' riser / connection diagrams for all specific system installation / termination / wiring data. |
| 26 | | |
| 27 | | |
| 28 | | |
| 29 | | |
| 30 | | |
| 31 | | |
| 32 | H. | Controls for the in-building fire emergency voice/alarm communications system shall be at a location approved by the authority having jurisdiction (AHJ) and located or secured to allow access only by trained and authorized personnel. |
| 33 | | |
| 34 | | |
| 35 | | |
| 36 | I. | The Fire Alarm System Contractor shall be responsible for sizing, verifying, and supplying proper power supply(s) necessary to operate the system and audible/visual signals. |
| 37 | | |
| 38 | | |
| 39 | J. | All equipment and components shall be new and the manufacturer's current model. All like devices shall be of the same manufacturer and model number. |
| 40 | | |
| 41 | | |
| 42 | K. | Provide stainless screw/bolt hardware wherever stainless devices are used and in potentially wet areas. |
| 43 | | |
| 44 | | |
| 45 | L. | Standard electrical backboxes, junction boxes, conduit, flexible conduit, and raceways shall be metal. Plastic electrical boxes, conduits and raceways will not be allowed. Electrical boxes and conduits shall be installed and supported per the requirements of NFPA 70. |
| 46 | | |
| 47 | | |
| 48 | | |
| 49 | M. | All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load. Ceiling mounted devices shall not be supported solely by the ceiling tile or sheetrock. Provide a listed ceiling joist bar hanger and back box support system. |
| 50 | | |
| 51 | | |
| 52 | | |
| 53 | | |
| 54 | | |

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

2.2 ACCEPTABLE MANUFACTURES

- A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Owner, of equivalent or better quality than that of the product specified. Proprietary equipment that is sourced from a single vendor is not acceptable.
- B. Proposed Fire Alarm System Contractors wishing to propose any product substitution must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.
- C. For manufacturers equipment or models other than that specified, the proposed Fire Alarm System Contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified.
- D. Substitute products for which the proposed Fire Alarm System Contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of alternate products shall be based on the decision of the Owner. Prior approval to make a proposal for this project does not automatically ensure products will be an acceptable equivalent.
- E. It is the responsibility of the Fire Alarm System Contractor to provide all features and functions as outlined in these specifications. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the Fire Alarm System Contractor from strict compliance with the requirements of this specification.
- F. The manufacturers model numbers, functions, and features described in this specification section are those of Silent Knight Intelliknight, Maple Grove, Minnesota, and this shall constitute the quality and performance of the equipment to be furnished. The following are acceptable fire alarm control panel manufactures; any other proposed suppliers must be pre-approved:
- Silent Knight Intelliknight, Maple Grove, Minnesota
 - Hochiki FireNET, Buena Park, California
 - Fire-Lite Alarms, Northford, Connecticut
 - Potter Signal, St. Louis Missouri

2.3 CIRCUIT TYPES

- A. General: All low voltage fire alarm circuits shall be power limited, electrically, or electronically supervised, and of the correct cable type and gauge. Low voltage fire alarm cables of various types are to be permitted within the same raceway or conduit. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box, or raceway containing these conductors, as per NEC Article 760. T-taps in signaling line circuits or electrically supervised circuits are prohibited by this specification. All junction boxes and conduit ends shall be marked red for all low voltage fire alarm circuits.
- B. All fire alarm systems shall be installed in such a manner that the failure of any single alarm-actuating or alarm-indicating device will not interfere with the normal operation of any other such devices. All circuit types shall comply with NFPA 72 Chapter 12.
1. Signaling Line Circuit (SLC): SLC circuits shall be wired Class A redundant path. Class A separation of cable routing shall be observed per NFPA 72, 12.3.8. Signaling Line Circuit cable shall be RED in color.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

2. Voice Evacuation Notification Appliance Circuits (Voice NAC): Speaker circuits may be 25 or 70 VRMS to be determined by the Fire Alarm System Contractor. Shielded cable shall be utilized to minimize electrical noise interference with voice transmission. These circuits shall be wired Class B with electrical supervision and end of line devices. Speaker circuit cable shall be YELLOW in color and not less than 14 AWG in size.
3. Visual Notification Appliance Circuit (NAC): These circuits shall be wired Class B with electrical supervision and end of line devices. Strobe circuit cable shall be YELLOW in color and not less than 14 AWG in size.
4. Initiating Device Circuits (IDC): Initiating device circuits shall be arranged to serve like categories (beam detectors, heat detectors, tamper switches). Mixed category circuitry shall not be permitted in a single IDC. A two-wire IDC shall contain only devices that require point-contact to operate. A four-wire IDC shall include an additional supervised circuit to supply 24 VDC operating power to devices that require it. These circuits shall be wired Class B with electrical supervision and end of line devices, or power supervisory/end of line devices for four-wire circuits. Devices requiring 24 VDC shall be powered from the fire alarm system only. IDC circuit cable shall be RED in color.
5. Line voltage, 120 VAC, fire safety control function circuits shall in all cases feature Class D "fail safe" operation and shall not have power backup. These circuits shall be controlled by a fire alarm system activated addressable control relay and auxiliary relay pair located within three feet of the device controlled and on activation, or loss of power, the connected devices shall actuate to their fire safety condition (i.e., fire door holders shall release, smoke dampers and fire/smoke dampers shall close). Line voltage fire safety control function circuits shall be wired by the Electrical Contractor and shall be standard non-supervised line voltage circuits in conduit, utilizing the type of conductors specified in Division 26 for light and power circuits.

2.4 FIRE ALARM CONTROL PANEL

- A. Type: Microprocessor based modular design, analog intelligent addressable reporting fire detection and alarm system with integrated in-building emergency voice evacuation control system.
- B. Manufacturer / Model: **Silent Knight IntelliKnight Model 6820EVS** analog addressable fire alarm control panel with integrated in-building emergency voice evacuation control system, microphone inside panel, and with SK protocol addressable devices.
- C. The following are required system components and functions:
 1. Keypad for functions and programming, two buttons each for scrolling alarm/supervisory/trouble data on the LCD, four front panel switches for RESET, SILENCE, ACKnowledge and DRILL, twelve buttons 1 through 0 plus * and # for programming input, five LEDs for Alarm, Supervisory, Trouble, Silenced and Power, four arrow buttons with an enter key for scrolling and programming input, four programmable function keys. When multiple devices are reporting alarm condition, there shall be a visual indication that other devices are in alarm.
 2. Provide an integrated UL approved IP and digital communicator transmitter control unit with the option of adding a cellular module. The communicator shall report system status signals to a remote UL listed monitoring service.
 3. Provide sufficient battery capacity for operation without AC power for twenty-four hours of normal supervision and fifteen minutes of alarm operation at the end of this period. Include a 20% safety factor in battery calculations to ensure adequate performance for the service life of batteries.
 4. The FACP shall check for the presence of ground faults in field wiring and report results on the LCD readout, is it a violation of this specification for any ground fault detection system to be disabled.
 5. A single ground or open on any system SLC, IDC, NAC, or fire safety control function circuit shall not cause a system malfunction or the loss of ability to report an alarm.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

6. The FACP shall have 20% spare capacity on the power supply, the signaling line circuit and all input and output circuits at final acceptance to allow for future expansion by the Owner.
7. When the door is opened, all operator controls shall be accessible, and all internal components shall be enclosed (i.e., dead front panel). All components shall be securely mounted, all cable shall be routed, and tie wrapped in a neat, professional manner. Conduit shall enter the fire alarm control panel only where conduit entry is specified by the FACP manufacturer.
8. The CPU and associated equipment are to be protected consistent with UL 864 standards so that voltage surges or line transients will not affect them. All external connections of the FACP shall withstand six kilovolt transients to chassis ground.
9. The emergency voice/alarm system shall provide high-intelligibility voice signal amplification to drive 25 or 70 VRMS speakers as required. Provide as indicated a panel mounted, low impedance, dynamic, push-to-talk microphone. The system shall broadcast a digitally recorded message up to four minutes in length on alarm. The message shall automatically repeat, play alarm tones, and repeat as long as the FACP is in alarm unless the message is overridden by keying the microphone. The local Fire Marshal shall approve the recorded message, unless otherwise instructed the message shall be; One round of code-3 temporal horn followed by "Attention, Attention, a fire emergency has been reported. Please leave the building using the nearest exit" or an equivalent standard statement.
10. The system shall also provide for manual voice capability by keying the microphone, which shall override the pre-recorded message. The system shall be capable of emergency voice announcements at any time, whether the FACP is in alarm or not. Strobe operation shall be from the FACP or power supply expanders and synchronized. Strobe operation shall not be interrupted by microphone activation.
11. A microphone shall be located within the main FACP.
12. For all microphones mounted remotely from the voice evacuation control unit, the circuit shall be supervised and activate a trouble signal if the circuit is disturbed.

2.5 CENTRAL STATION MONITORING

- A. The fire alarm control panel internal communicator allows for system status reporting to a UL Central Station as well as for local and remote up/downloading of system operating options, event history and detector sensitivity.
- B. Provide IP and/or cellular communication to a UL Central Station as required by the Owner. The Owner shall select the monitoring service, remote supervising station, or central station and be responsible for connections and monthly monitoring costs. For central station service, the installation shall be certificated or placarded by the selected central station.
- C. Communications to the Central Station shall transmit alarm, supervisory and trouble signals descriptively as defined in NFPA 72, with the correct addressable device designation, identification, and location. Alarms shall not be permitted to be transmitted as a general alarm or zone condition.
- D. IP communication works over an Ethernet 10/100 Base network connection. All equipment used for the IP connection (such as a router, switch, etc.) must be powered from an un-switched branch circuit with UPS standby power.
- E. IP and cellular communication transmission shall utilize the Honeywell commercial fire communicator model HWF2-COM with metal enclosure and keylock. The HWF2-COM is an IP and cellular option for commercial fire alarm control panels and shall be NFPA 72 compliant for sole, primary, and backup communicator and programmed to operate per UL864 requirements. The communicator shall be installed per manufacturer's written instructions.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 F. The HWF2-COM shall be installed in the same room as the fire alarm control panel and within
2 fifty-foot of the fire alarm control panel. The cellular provider model to be determined by the
3 greater signal strength on site. When required provide an external antenna for signal strength
4 optimization. Installation of the external antenna shall be per manufacturer's instruction and
5 shall consist of the following:
6 1. Fifty-foot Antenna Cable model 7626-50HC.
7 2. 3dBA Gain External/Remote Antenna model CELL-ANT3DB.
8 3. SMA to N Adapter model WA7626-CA.
9
- 10 G. The Fire Alarm System Contractor shall provide all activation circuits and the communicator
11 shall be ready for programming by the monitoring provider selected by the Owner. The Fire
12 Alarm System Contractor shall coordinate with and provide all necessary information to the
13 representative of the service provider selected by the Owner.
14
- 15 2.6 NETWORK GRADE CABLING FOR DIGITAL COMMUNICATOR SERVICE
16
- 17 A. Provide two parallel runs of Category 5e minimum Ethernet network grade cabling as required
18 to support the digital communicator system in this specification section. Extend from the drop
19 location inside the digital communicator panel to the building Telco Demarcation Point/Main
20 Distribution Frame location and terminate at each end in a surface mount block. Coordinate
21 Telco or Data termination location with the owner prior to installation. The data/telephone
22 signal cabling shall be NEC type CMP cable, TX5500 Category 5e UTP cable, Panduit part
23 number PUP5504BU-UY with a Blue plenum rated jacket, 23 AWG solid bare copper
24 conductor, 4 pair with separator or equivalent. Modular RJ-45 jack inserts shall be to be
25 Panduit part number NKP5E88MBU, blue color, Category 5e NetKey Keystone modular jacks,
26 or equivalent. Surface mount housings shall be Panduit part number NK2BXIW-A, or
27 equivalent, "biscuit blocks" designed to hold two NetKey Keystone modules. Cable runs shall
28 be tested to verify Category 5e performance.
29
- 30 2.7 FIRE ALARM REMOTE ANNUNCIATOR
31
- 32 A. Provide as indicated on the drawings a remote annunciator red in color and flushed mounted.
33 The remote annunciator shall be the Silent Knight model SK-5860R.
34
- 35 B. Provide with key lock enable/disable operation of system controls/switches.
36
- 37 2.8 FIRE ALARM LOCAL OPERATOR CONSOLE (LOC)
38
- 39 A. Provide as indicated on the drawings a remote local operator console in wall cabinet with
40 microphone. Flush mount cabinet shall be Silent Knight model EVS-LOC Local Operator
41 Console.
42
- 43 B. Key alike to FACP.
44
- 45 2.9 FIRE ALARM FLOOR PLAN MAP
46
- 47 A. Provide adjacent to the fire alarm control panel and adjacent to the fire alarm remote
48 annunciators an updated plan view of all building areas covered by the fire alarm system
49 meeting the following requirements:
50 1. Framed and secured to the wall and plan covered with clear acrylic panel, SpaceAge
51 Electronics Inc. model SSU52003 Display Frame or equivalent.
52 2. Size plan to clearly show all required information.
53 3. Orient building to place the entry nearest to control panel at the bottom of plan.
54 4. "YOU ARE HERE" indicator with arrow.
55 5. Logical alarm zones.
56 6. Room names and numbers. (Verify with Owner)

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

7. Show each initiating device with symbol and identification number programmed in the panel. Indicate SLC circuit and device number (XX:xxxx). Do not show audio/visual devices.
8. Symbol legend.
9. True north arrow.
10. Scale indicator.

2.10 SYSTEM RECORD DOCUMENT CABINET

- A. Provide, in accordance with NFPA 72 Chapter 7 Documentation, an adequately sized record documentation cabinet located at the system control unit or at an on-premises location approved by the AHJ and identified at the system control unit. Printed and/or electronic documentation shall include an owner's manual, published instructions, a design narrative and layout, record drawings, site specific software, passwords, and a record of installed software and firmware version numbers. The record documentation cabinet shall be 18-gauge minimum cold rolled steel with a red powder coat finish, a stainless steel-piano hinge, and keyed door lock. The cover shall be permanently screened with 1" high lettering stating "SYSTEM RECORD DOCUMENTS" in white letters. The interior shall accommodate as required standard 8.5" x 11" manuals and loose document records, a permanently mounted digital flash drive with USB-B connector, a business card holder, and key ring hooks. The cabinet shall be a Space Age Electronics, Inc. Part # SSU00689 System Record Document Cabinet or equivalent.

2.11 AUXILIARY ENCLOSURE

- A. Provide where required an auxiliary enclosure to serve as a junction box and to house modules. Each surface mount enclosure shall be 12" wide x 14" high x 4" deep or as required. Enclosure shall feature a 12.25" x 10.25" removable panel that may be drilled to mount devices. Enclosure shall be constructed of 16-gauge steel with butt hinges and cylinder lock accessory kit. Enclosure shall meet NEMA Type 1 standards and be finished with a gray polyester powder coating inside and out. Face of enclosure shall be clearly labeled "FIRE ALARM SYSTEM". Label shall be 1/16" thick two ply black/white acrylic sheet engraving stock with all sides beveled.
- B. Hoffman catalog number A-14N124 with A-14N12P panel and A-12AR cylinder lock kit or approved equivalent.

2.12 STROBE SIGNAL POWER EXPANDERS

- A. Provide as required Silent Knight model SK-PS6 or SK-PS10 remote power supplies.
- B. Each power supply shall individually report a trouble condition including battery charging failure, battery failure, NAC loss, AC power loss (delay acceptable), power brownout, or ground fault detection.
- C. A trouble condition on an external power supply shall not interfere with normal operation the rest of the system.
- D. In the event of a trouble condition, each power supply shall provide location annotated individual point supervisory incident reporting to the main fire alarm control panel. This may be accomplished using one addressable module per power supply or via power supplies with multiplexed system bus communication or an integrated addressable interface.
- E. Provide sufficient battery capacity for operation without AC power for twenty-four hours of normal supervision and fifteen minutes of alarm operation at the end of this period; include a

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 20% safety factor in battery calculations to ensure adequate performance for the service life
2 of batteries.
3
4 F. Each signal power expander shall be labeled in a visible area indicating the power circuit
5 feeding the unit (Panel:xxxx Circuit:xxxx) and if intelligent, the device address (XX:xxxx),
6 utilizing self-laminating, white flexible vinyl film, non-smear, machine printed labels. The print
7 shall be black, bold and not less than ¼" in height and legible from the floor.
8
9 G. Conduit shall enter the equipment backbox only where conduit entry is specified by the
10 manufacturer.
11
12 2.13 VOICE EVACUATION SPEAKER SIGNAL POWER EXPANDERS
13
14 A. Provide as required Silent Knight model EVS-50W (50-watt amplifiers), EVS-100W (50/100W
15 watt amplifiers), EVS-125W (125 watt amplifiers).
16
17 B. Each power supply shall individually report a trouble condition including battery charging
18 failure, battery failure, NAC loss, AC power loss (delay acceptable), power brownout, or
19 ground fault detection.
20
21 C. A trouble condition on an external power supply shall not interfere with normal operation of the
22 remainder of the system.
23
24 D. In the event of a trouble condition, each power supply shall provide location annotated
25 individual point supervisory incident reporting to the main fire alarm control panel. This may
26 be accomplished using one addressable module per power supply or via power supplies with
27 multiplexed system bus communication or an integrated addressable interface.
28
29 E. Provide sufficient battery capacity for operation without AC power for twenty-four hours of
30 normal supervision and fifteen minutes alarm operation at the end of this period; include a
31 20% safety factor in battery calculations to ensure adequate performance for the service life
32 of batteries.
33
34 F. Each signal power expander shall be labeled in a visible area indicating the power circuit
35 feeding the unit (Panel:xxxx Circuit:xxxx) and if intelligent the device address (XX:xxxx),
36 utilizing self-laminating, white flexible vinyl film, non-smear, machine printed labels. The print
37 shall be black, bold, and not less than ¼" in height and legible from the floor.
38
39 G. Conduit shall enter the equipment backbox only where conduit entry is specified by the
40 manufacturer.
41
42 2.14 EMERGENCY VOICE/ALARM SYSTEM (VOICE EVACUATION) STROBES, SPEAKERS, AND
43 SPEAKER/STROBES
44
45 A. Provide where indicated on the drawings and as required per NFPA, local, state, and federal
46 codes and ADA standards, notification appliances to include strobes, speakers and
47 speaker/strobes that alert the building occupants to an emergency.
48
49 B. Signal housings and grilles shall be white in color. Audible signals (strobes and strobe
50 speakers) shall be imprinted 'FIRE' and the strobe lens shall be clear. All interior strobe
51 flashing shall be synchronized.
52
53 C. Provide strobes, speakers and speaker/strobes as follows:
54 1. Ceiling Mount Strobe Only:
55 a. Wheelock model STWC.
56 b. System Sensor model SCWL.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 c. Approved equivalent.
- 2 2. Wall Mount Strobe Only:
- 3 a. Wheelock model STW.
- 4 b. System Sensor model SWL.
- 5 c. Approved equivalent.
- 6 3. Ceiling Mount Speaker Strobe:
- 7 a. Wheelock model E90H-24MCC-FW.
- 8 b. System Sensor model SPSCWL.
- 9 c. Approved equivalent.
- 10 4. Wall Mount Speaker Strobe:
- 11 a. Wheelock model E70H-24MCW-FW.
- 12 b. System Sensor model SPSWL.
- 13 c. Approved equivalent.
- 14 5. Ceiling Mount Speaker Only provide:
- 15 a. System Sensor model SPCW8.
- 16 b. Approved equivalent.
- 17 6. Wall Mount Speaker Only provide:
- 18 a. Wheelock model E70H.
- 19 b. System Sensor model SPWL.
- 20 c. Approved equivalent.
- 21 7. Ceiling mount, outdoor, speaker/strobe provide System Sensor SPSCWK with
- 22 weatherproof backbox or approved equivalent.
- 23 8. Waterflow speaker/strobe shall be wall mounted above the fire department connection
- 24 (Siamese Port) and shall be non-silenceable while water is flowing through the fire
- 25 sprinkler system. The outdoor rated speaker/strobe shall be Wheelock model ET70WP-
- 26 2475-FW, System Sensor SPSRK, or approved equivalent. Flush mount exterior devices
- 27 when possible. For surface mount applications provide manufacturer furnished backbox.
- 28 9. For waterflow speaker/strobe provide a weatherproof sign approximately 12" wide x 6"
- 29 high, white with red letters reading, "WATERFLOW FIRE ALARM SIGNAL". Configure
- 30 fire alarm system to activate this strobe signal on waterflow alarm only. Center signal and
- 31 sign directly over Fire Department Connection (Siamese Port).
- 32
- 33 D. Notification appliance circuits serving employee work areas shall be initially installed with a
- 34 minimum of 20% spare capacity for visible notification appliances to facilitate future
- 35 accommodation of hearing-impaired employees.
- 36
- 37 E. Audible signals shall be tapped to provide at least 15 dB above ambient sound levels
- 38 measured at 5 feet above the floor in the occupied area.
- 39
- 40 F. Strobe intensity (candela output) and audible decibel level shall be sized for the room size and
- 41 area of coverage per ADA and NFPA/ANSI standards.
- 42
- 43 G. Provide where indicated on plans or as required protective polycarbonate or wire Device
- 44 Guards. Minimum of 1/8" thick clear polycarbonate or 10-gauge welded steel wire constriction
- 45 with a corrosion resistant finish. To be Space Age Electronics, Inc. models: SSU03503 HSG
- 46 Wall Mount Device Guard, SSU03504 FDG Flush Wall Mount Device Guard, or SSU03500
- 47 Ceiling Mount Device Guard as required or equivalent.
- 48
- 49 2.15 MANUAL PULL STATIONS
- 50
- 51 A. Manual Fire Alarm Pull Stations shall be provided where indicated on the drawings and shall
- 52 be Silent Knight model SK-PULL-DA.
- 53
- 54 B. Each manual station shall be labeled in a visible area with its device hardware address.
- 55 Indicate SLC circuit and device number (XX:xxx), utilizing self-laminating, white flexible vinyl

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

film, non-smear, machine printed labels. The print shall be black, bold, and not less than ¼" in height and legible from the floor.

- C. Manual stations shall be double action and provide a visible indication they have been operated. Manual stations shall require a key to be returned to normal condition, key alike to FACP. It is the responsibility of the Fire Alarm System Contractor to ensure that the pull stations provided allow key reset with the station protector frame/spacer in place.
- D. Provide a tamper proof clear Lexan cover with horn over each pull station. The protector shall be a Stopper II Manual Station Protector with horn as manufactured by Safety Technology International, Inc. Waterford, Michigan, part number STI 1100 flush mount or STI 1130 for surface mount backboxes as required. For potentially wet areas, provide a similar cover with weather gasket, part number STI 1150 flush mount or STI 1155 for surface mount backboxes.

2.16 SMOKE DETECTORS

- A. Analog spot type Photoelectric Smoke Detectors shall be provided where indicated on the drawings and shall be Silent Knight model SK-PHOTO-W with B300-6 mounting base.
- B. Each detector head shall be labeled in a visible area with its device hardware address. Indicate SLC circuit and device number (XX:xxxx), utilizing self-laminating, white flexible vinyl film, non-smear, machine printed labels. The print shall be black, bold, and not less than ¼" in height and legible from the floor.
- C. Except for temporary testing, smoke detectors shall not be installed until the building is ready for occupancy and cleaned as dust free as possible.

2.17 COMBINATION CARBON MONOXIDE/SMOKE DETECTORS

- A. Provide in each space that is conditioned by a gas fired appliance, an analog spot type intelligent addressable combination carbon monoxide (CO)/smoke detector with integral sounder base. This device shall be provided as shown on the contract drawings and as required by current adopted edition of the International Fire Code by the Authority Having Jurisdiction. Combination carbon monoxide/smoke detector shall be Silent Knight model SK-FIRE-CO with B200S sounder base.
- B. The CO detector shall be ANSI/UL 2075 Third Edition Listed and installed in accordance with IBC/IFC Section 915 and NFPA 720 requirements.
- C. Each carbon monoxide and smoke detector shall be attached to a SLC and set to a distinct address and internal identification code, which the control panel shall use to identify the location, status, and type of device.
- D. The detectors shall provide dual alarm and power/status LEDs. Status LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel.
- E. The CO sounder base shall share the address of the addressable CO detector and shall function as a single station local audible alert only when CO is detected. The audible CO alert signal shall be a Code-4/TC4 (temporal-four) audible pattern as designated by the NFPA for CO warning.
- F. Each sounder base requires 24VDC resettable power and shall be resettable from the FACP.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 G. The detector shall also provide a maintenance alert feature whereby the detector shall initiate
2 a trouble condition should the units' sensitivity approach the outside limits of the normal
3 sensitivity window.
4
- 5 H. Except for temporary testing, detectors shall not be installed until the building is ready for
6 occupancy and cleaned as dust free as possible.
7
- 8 I. Each detector head shall be labeled in a visible area with its device hardware address utilizing
9 self-laminating, flexible vinyl film, non-smear, machine printed labels.
10
- 11 2.18 HEAT (THERMAL) DETECTORS FIXED TEMPERATURE
12
- 13 A. Analog fixed temperature heat detector shall be rated at 135° Fahrenheit for areas where
14 ambient temperatures do not exceed 100° Fahrenheit and shall be Silent Knight model SK-
15 HEAT-W with B300-6 base.
16
- 17 B. In areas where the ambient temperature does not exceed 150° Fahrenheit the analog fixed
18 temperature heat detector shall be rated at 190° Fahrenheit and shall be Silent Knight model
19 SK-HEAT-W-HT with B300-6 base.
20
- 21 C. Each detector head shall be labeled in a visible area with its device hardware address. Indicate
22 SLC circuit and device number (XX:xxxx), utilizing self-laminating, white flexible vinyl film, non-
23 smear, machine printed labels. The print shall be black, bold, and not less than ¼" in height
24 and legible from the floor.
25
- 26 D. Rate-of-rise heat detectors are not acceptable.
27
- 28 2.19 ISOLATOR MODULE
29
- 30 A. Provide isolator modules in each SLC Class A circuit placed between every 25 or less devices.
31 Isolator modules shall be Silent Knight model SK-ISO line isolation module or the B224B-WH
32 intelligent isolator base.
33
- 34 B. The isolation module or the isolator base shall be labeled in a visible area with its adopted
35 device hardware address. Indicate SLC circuit and device number (XX:xxxx), utilizing self-
36 laminating, white flexible vinyl film, non-smear, machine printed labels. The print shall be black,
37 bold, and not less than ¼" in height and legible from the floor.
38
- 39 2.20 MONITOR MODULE
40
- 41 A. Addressable Monitor Modules shall be provided where an interface is required to supervise
42 wiring and monitor contact alarm devices. Monitor modules shall be mounted in a 4-inch
43 square electrical box with factory cover plate and shall be Silent Knight model SK-MONITOR.
44 Mini-monitor modules concealed in an electrical box with a blank cover plate are prohibited.
45
- 46 B. Each monitor module shall be labeled in a visible area with its device hardware address.
47 Indicate SLC circuit and device number (XX:xxxx), utilizing self-laminating, white flexible vinyl
48 film, non-smear, machine printed labels. The print shall be black, bold, and not less than ¼" in
49 height and legible from the floor.
50
- 51 2.21 CONTROL MODULE
52
- 53 A. Addressable Signal Control Modules shall be provided where required to provide a NAC
54 control interface for fire alarm signal functions and shall be an SK-CONTROL. Control Modules
55 shall be mounted in a 4-inch square electrical box with a factory cover plate.
56

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 B. Each control module shall be labeled in a visible area with its device hardware address.
2 Indicate SLC circuit and device number (XX:xxxx), utilizing self-laminating, white flexible vinyl
3 film, non-smear, machine printed labels. The print shall be black, bold and not less than ¼" in
4 height and legible from the floor.
5
- 6 2.22 CONTROL RELAY
7
- 8 A. Addressable Control Relays shall be provided where required to provide a contact closure
9 control interface for fire alarm system functions and shall be SK-RELAY. Control relays shall
10 be mounted in a 4-inch square electrical box with a factory cover plate.
11
- 12 B. Each control relay shall be labeled in a visible area with its device hardware address. Indicate
13 SLC circuit and device number (XX:xxxx), utilizing self-laminating, white flexible vinyl film, non-
14 smear, machine printed labels. The print shall be black, bold and not less than ¼" in height
15 and legible from the floor.
16
- 17 C. Addressable Control Relays shall be located within three feet of the controlled device or unit
18 and the relay output (load) wiring shall be configured a fail-safe Fire Safety Control Function
19 circuit.
20
- 21 D. Each Fire Safety Control Function circuit-controlled device shall be configured such that when
22 the fire alarm system safety control function circuit is re-energized, by the fire alarm control
23 panel, the device shall return to normal operation (e.g., re-start or be ready to re-start) without
24 a need for manual or environmental control system intervention.
25
- 26 E. Addressable Control Relays shall be used to directly control only pilot duty loads, those not
27 exceeding 0.5 amps, up to 120 volts, and without transient voltage spikes. For all applications
28 exceeding these parameters also provide with an Auxiliary Relay to handle the load.
29
- 30 2.23 AUXILIARY RELAY
31
- 32 A. Provide a hardwired Auxiliary Relay paired with the addressable Control Relay for all fire safety
33 control function applications in which the load exceeds 0.5 amps, 120 volts, or with high
34 transient voltage spikes.
35
- 36 B. Each relay shall be mounted in a surface mount red metal enclosure with conduit knockouts.
37 Relays shall be UL recognized and rated for ten million mechanical operations.
38
- 39 C. Auxiliary relays shall be labeled in a visible area as a "Fire Alarm System Relay" and function
40 such as (example = "Damper Control") utilizing self-laminating, white flexible vinyl film, non-
41 smear, machine printed labels. The print shall be black, bold and not less than ¼" in height
42 and legible from the floor.
43
- 44 D. Single pole standard duty Auxiliary Relays shall be operated by a multi-voltage coil (24 VDC,
45 24 VAC, 120 VAC, or 230 VAC), feature SPDT dry Form C contacts rated 10 Amps @ 120
46 VAC, and a status LED to indicate that the relay is energized. Provide Air Products & Controls
47 model MR-101/C/R, multi-voltage coil, control relay with red metal enclosure or approved
48 equivalent.
49
- 50 E. Double pole standard duty Auxiliary Relays shall be operated by a multi-voltage coil (24 VDC,
51 24 VAC, 120 VAC, or 230 VAC), feature DPDT dry Form C contacts rated 10 Amps @ 120
52 VAC, and a status LED to indicate that the relay is energized. Provide Air Products & Controls
53 model MR-201/C/R, multi-voltage coil, control relay with red metal enclosure or approved
54 equivalent.
55

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- F. Double pole heavy duty Auxiliary Relays shall be operated by a 24 VDC or a 120 VAC coil and feature DPDT dry Form C contacts rated at 30A @ 240VAC; 20A @ 277VAC; 2HP @ 240VAC / 1.5HP @ 120VAC. Provide Air Products & Controls model MR-199X-13/C/R (24VDC coil) or MR-199X-14/C/R (120 VAC coil) as required, heavy duty relay with red metal enclosure or approved equivalent.

2.24 DUCT MOUNTED SMOKE DETECTORS

- A. Duct mounted detector housings with intelligent photoelectric detector heads shall be provided where noted on the drawings and as required. It shall be the responsibility of the Fire Alarm System Contractor to determine the locations and quantities of addressable duct smoke detectors and addressable modules required to monitor and/or control HVAC units, dampers, smoke control systems, etc. that are required by the code and the AHJ for the mechanical systems.
- B. The duct smoke detector shall be Silent Knight model SK-DUCT with pre-installed S-PHOTOR photoelectric detector head. For each SK-DUCT provide an SK-RELAY module that mounts in the detector housing. Furnish sample tubes as required per duct size to include DST1 for duct size up to 1', DST3 for duct size up to 3', DST5 for duct size up to 5', DST10 for duct size up to 10'.
- C. Install duct smoke detector in the supply or return duct of units supplying greater than 2000 cfm per local AHJ requirements. Install duct smoke detectors in the supply and return duct of units supplying greater than 15,000 cfm.
- D. Each duct mounted detector housing shall be labeled in a visible area with its device hardware address. Indicate SLC circuit, device number and AHU designator (XX:xxxx/AHJ#XX), utilizing self-laminating, white flexible vinyl film, non-smear, machine printed labels. The print shall be black, bold and not less than 1/4" in height and legible from the floor.
- E. When smoke is detected by a duct mounted smoke detector it shall activate a supervisory fire alarm condition at the fire alarm control panel. The activation of any duct mounted smoke detector shall actuate all related fire safety control functions: air handler shut down relays, smoke fire damper motors, fire door release devices, et cetera.
- F. Each HVAC unit for which a duct mounted smoke detector is installed shall also have a blower shutdown relay. Actuation of a duct smoke detector to the alarm mode shall shut down the unit blower fan. The fan shall only be restored to normal condition when the duct smoke detector is reset to a normal operating condition.
- G. Duct smoke detectors shall be installed inside of buildings where at all possible. If not possible to be installed inside, the device shall be protected within a NEMA 4 enclosure. The enclosure, conduits, fittings and supports shall be rated for wet locations.

2.25 DUCT SMOKE DETECTOR REMOTE ANNUNCIATOR AND TEST SWITCH

- A. Each duct smoke detector shall be provided with a remote annunciator with testing capability. The remote annunciator shall be installed on the wall closest to the duct smoke detector at 96" above the finished floor (AFF) unless otherwise directed. The status LED on the remote annunciator shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. The LED shall be placed into steady illumination when the duct smoke detector senses smoke and communicates a supervisory condition to the fire alarm control panel. Provide RTS151KEY remote test switch.
- B. Each remote annunciator faceplate shall be labeled in a visible area with its duct smoke detector device hardware address. Indicate SLC circuit and device number (XX:xxxx), utilizing

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

self-laminating, white flexible vinyl film, non-smear, machine printed labels. The print shall be black, bold and not less than 1/4" in height and legible from the floor.

2.26 HVAC UNIT BLOWER SHUT-DOWN AND SMOKE DAMPER OR FIRE/SMOKE DAMPER OPERATION

- A. It shall be the sole responsibility of the Fire Alarm System Contractor to furnish and install all of the fire alarm system devices that are required by the code and the AHJ for the mechanical systems.
- B. Provide an addressable control relay to control air handler shutdown of each unit without smoke dampers or fire/smoke dampers located in that unit's duct.
- C. Provide an addressable control relay, a double pole auxiliary relay, and a line voltage 120 VAC, fire safety control function circuit to control air handler shutdown of each unit with smoke dampers or fire/smoke dampers located in that unit's duct system.

2.27 AUTOMATIC FIRE SUPPRESSION SYSTEMS

- A. All automatic fire suppression systems shall be monitored by the fire alarm system. The activation of any automatic fire suppression system shall produce an alarm condition.
- B. The kitchen ventilation hood suppression system shall provide contacts to monitor activation of the system. Coordinate with existing conditions. Provide SK-MONITOR monitor modules as required for alarm functions.

2.28 BUILDING LIGHTING CONTROL SYSTEM

- A. Provide a fire alarm addressable control relay, located at the FACP, configured to activate on general alarm building illumination per NFPA 101 Section 7.8 Illumination of Means of Egress. The lighting control system contractor shall provide all associated hardware and wiring from this single fire alarm output to the lighting control system.

2.29 PRODUCTION SOUND SYSTEM AND HOUSE LIGHTING CONTROLS

- A. When required, provide a fire alarm addressable control relay, located at the sound system head end equipment location, to activate on general alarm that shall override the stage and theater production sound and lighting equipment. Configure one set of contacts to provide a dry contact input to the sound system to shut down the theater sound, and the second set of contacts to provide an input to override the theatrical lighting and to turn on or turn up the house lighting to normal levels. The theatrical equipment system contractor shall provide all associated hardware and wiring from the fire alarm addressable control relay output to the sound and lighting system equipment.

2.30 ELECTROMAGNETIC DOOR HOLD OPEN AND RELEASE

- A. Provide electromagnetic door hold back and release devices as shown on the project plans or as required. Unless otherwise provided with door assembly, furnish Edwards model DH150A or 1504-AQN5 series door holders; 24 VDC, mounting style, single or double, as required, or equivalent.
- B. Provide required devices and connections for holdbacks integrated into door systems when supplied.
- C. The Fire Alarm System Contractor shall verify voltages, exact style, and quantity required with architectural plans and door schedules.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 D. Secure hardware to door drilled through with "Chicago Bolts" (barrel nut/mating screw with a
2 low-profile head on each side to prevent pull out.
3
4 E. Provide adequate blocking in wall for the magnet installation. The backbox and magnet
5 installation shall withstand the force of the door being separated from the magnet while
6 energized.
7
8 F. Operating power shall be 24VDC and power shall be from a fire alarm power supply panel.
9 Program an output circuit on the fire alarm power supply panel as a "door holder power" circuit.
10
11 G. A "door holder power" circuit shall provide a constant 24VDC to the electromagnetic door hold
12 open devices in a system "normal" state. On any alarm the "door holder power" circuit shall
13 discontinue power to the electromagnetic door hold open devices allowing the doors to close.
14 The 24VDC will be restored to the circuit on a fire alarm system reset.
15
16 H. When AC power to the fire alarm power supply panel is off for more than 15 seconds the "door
17 holder power" will be discontinued to conserve the battery backup power.
18
19 I. Renovation and replacement projects ensure the device backbox is securely installed and
20 stable. For locations where the backbox is not holding the installed device securely or is loose
21 in the wall correct the installation to provide a solid installation to hold the door in place.
22
23 2.31 AUXILIARY CONTROL AND MONITORING FUNCTIONS
24
25 A. Provide monitor and control modules as required for fire alarm, supervisory alarm, trouble,
26 and control functions. When present the following systems shall be controlled and/or
27 monitored by the fire alarm system:
28 Fire pump and related systems.
29 Emergency power and generator systems.
30 Smoke vents.
31 Smoke control related fan systems.
32 Remote manual and automatic control of elevators.
33 Building security-controlled access system override.
34 Knox box door tamper switch.
35
36 2.32 CABLING (PLENUM RATED)
37
38 A. The Fire Alarm System Contractor shall provide and install new and unused ASTM bare solid
39 or stranded copper conductor cable per ANSI/NEMA and NFPA codes. Follow the
40 manufacturer's instructions. All cable shall be UL listed for fire protective, power limited
41 applications. All cable exposed in plenum attic spaces shall comply with UL 910, UL 1424, and
42 UL 1581 vertical tray flame test.
43
44 B. Cabling shall be in accordance with local, state, and national codes (e.g., NEC Article 760)
45 and as recommended by the manufacturer of the fire alarm system. Number and size of
46 conductors shall be as recommended by the fire alarm system manufacturer, but not less than
47 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63
48 mm) for notification appliance circuits.
49
50 C. Cable not installed in conduit in shall have a fire resistance rating suitable for the installation
51 as indicated in NFPA 70 (e.g., FPLP).
52
53 D. All fire alarm cable in open areas shall be enclosed in conduit or raceway regardless of height,
54 no exceptions.
55

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 E. Signaling Line Circuit (SLC): Use shielded, or unshielded cabling as recommended by the
2 FACP manufacturer, red in color. When recommended, shielded cable should be utilized to
3 minimize electrical noise interference with data transmission. All wiring for
4 intelligent/addressable data circuits shall be shielded twisted pair, red in color, low
5 capacitance, NEC type FPLP, overall shield 100% aluminum polyester foil, data cable, one
6 twisted pair. Shield drain wire to be grounded at one end only. Equivalent by Atlas, Belden,
7 BSCC, or Remece.
8
9 F. Between Building Signaling Line Circuit (SLC) or Network Node Circuits: Cabling between
10 buildings shall be enclosed in conduit, including underground and over canopy installations.
11 SLC circuits installed underground in conduit between buildings shall be rated for direct burial
12 Cable shall be moisture, abrasion, and crush resistant. Use shielded or unshielded cabling as
13 recommended by the FACP manufacturer. When recommended, shielded cable should be
14 utilized to minimize electrical noise interference with data transmission. All between building
15 wiring for intelligent / addressable data or network node circuits shall be shielded twisted pair,
16 low capacitance, NEC type FPL Direct Burial, Aquaseal, overall shield 100% aluminum
17 polyester foil, data cable, one twisted pair. With water blocked construction and overall 105°
18 C sunlight and moisture resistant PVC jacket. Shield drain wire to be grounded at one end
19 only. Equivalent by Atlas, Belden, BSCC, or Remece.
20
21 G. Voice Evacuation Notification Appliance Circuits (Voice NAC): Cabling shall be shielded
22 twisted pair, yellow in color, NEC type FPLP, overall shield 100% aluminum polyester foil,
23 audio cable, one twisted pair with 20 AWG stranded tinned copper drain wire. Shield drain wire
24 to be grounded at one end only. Equivalent by Atlas, Belden, BSCC, or Remece.
25
26 H. Visual Notification Appliance Circuit (NAC): All visual signaling circuits shall be NEC type
27 FPLP, yellow in color, two conductor signaling cable. Equivalent by Atlas, Belden, BSCC, or
28 Remece.
29
30 I. Initiating Device Circuits (IDC): All conventional contact alarm circuits and low voltage control
31 circuits shall be NEC type FPLP, red in color, two conductor signaling cable. Equivalent by
32 Atlas, Belden, BSCC, or Remece.
33
34 2.33 VELCRO CABLE TIE WRAPS (PLENUM RATED)
35
36 A. Plenum rated Velcro hook cable ties shall be furnished and installed to attach wire bundles to
37 supports and for appropriate wire management as required. Provide and install Panduit TAK-
38 TY HLTP series cable ties with UL 94-V2 flammability rating, or equivalent.
39
40 B. Tie wraps made of hard plastic or metal will not be allowed on this project.
41
42 2.34 CABLE ROUTING, INSTALLATION, AND SUPPORT
43
44 A. System wiring and equipment installation shall be in accordance with good engineering
45 practices as established by the NFPA and the Texas Insurance Code. Wiring shall meet all
46 state and local electrical code requirements.
47
48 B. Power-limited fire alarm conductors and cables shall be installed per the NEC Article 760.
49 Devices shall be installed in accordance with NEC Section 110.3(B), 300.11(A), and 300.15.
50
51 C. All cable shall be installed parallel to the building lines. Cables shall not cross diagonally
52 across any corridors or rooms.
53
54 D. Cable pathways, conduit, and cable support systems shall be complete with bushings, de-
55 burred, cleaned, and secure prior to installation of cable.
56

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 E. All wiring shall test free from opens, grounds, or shorts. All fire alarm cable shall be supported
2 from the building structure and bundled. Do not attach any supports to joist bridging or other
3 lightweight members. The support system shall provide a protective pathway to eliminate
4 stress that could damage the cabling. The cable shall not be crushed, deformed, skinned,
5 crimped, twisted, or formed into tight radius bends that could compromise the integrity of the
6 cabling.
7
- 8 F. Fire alarm cable must not be fastened to electrical conduits, mechanical ductwork/piping,
9 sprinkler pipes, suspended ceiling support wires, threaded rod, strut racks that support other
10 equipment or routed to obstruct access to hatches, doors, utility access panels, or service
11 work areas. Do not route cables through fire doors, ventilation shafts, grates, or parallel for
12 more than four-feet with line voltage electrical conductors. Fire alarm cables shall not be run
13 loose on ceiling grid or ceiling tiles.
14
- 15 G. In all exposed areas such as gymnasiums, shops, field houses, janitors' closets, elevator hoist
16 ways, and mechanical / electrical rooms all fire alarm cable shall be fully enclosed in conduit
17 regardless of height.
18
- 19 H. Fire alarm cables shall be run in conduit stubs from wall boxes to accessible areas above
20 finished ceilings and supported within 3' of the point of entry into the wall. Conduit shall be
21 required only within walls and concealed spaces to provide access. Provide bushings to
22 protect the cable from damage for conduit ends, box openings, and passage through metal
23 studs.
24
- 25 I. Fire alarm cables shall be run in bundles above accessible ceilings and supported from
26 building structure by j-hooks, in conduit, or cable tray. Only cables from a specific system may
27 be bundled together. Cabling shall be loosely bundled with cable ties randomly spaced at 30
28 to 48 inches on center, cable ties shall not be tight enough to deform cabling and shall not be
29 used to support the cabling. Do not bundle cable with electrical tape. This bundling of cable
30 shall not be allowed as a means of support.
31
- 32 J. Support shall be provided by mounting appropriate fasteners that may be loaded with multiple
33 cables. Cable support shall be by D-rings, J-hooks, or other similar cable support system. This
34 support system applies to cables passing through red iron trusses or bar joists.
35
- 36 K. Provided that the weight load is carried by the support rod or wire, the support assembly may
37 attach to the ceiling grid for lateral stabilization. The required support wires for the ceiling grid
38 or light fixtures shall not be utilized. Any fastener attached to the ceiling grid shall not interfere
39 with inserting or removing ceiling tiles. The cable pathway of supports must be positioned at
40 least 12 inches above the ceiling grid.
41
- 42 L. Where a device is installed in a lay-in ceiling tile it shall be supported by a bar hanger, all
43 cables serving the device will be attached to the bar hanger with a cable tie. A loop of cable
44 not less than 12" in length, or more than 16" in length will be provided at each bar hanger
45 supported device.
46
- 47 M. All conduit, ducts, track, and raceways shall be supported from the structure at no less than
48 eight feet intervals utilizing proper anchoring devices. Cable fill may not exceed the
49 manufacturers' instructions for each type of support.
50
- 51 N. Each cable run shall include a three-foot service loop with wire tie located in the ceiling above
52 the control unit panel and at each wall device. This is to allow for future re-termination or repair.
53
- 54 O. Cable entering backboxes, junction boxes and top plate of wall shall be supported within three
55 feet of the box or wall entry.
56

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 P. Cables shall not be draped or installed over ductwork, conduits, sprinkler pipes, plumbing
2 pipes or any other above ceiling fixture. Mechanical ducts shall not be a means of cable
3 support. Cable shall not pass beneath ductwork with the exception of connecting to a device
4 that is beneath the ductwork.
5
6 Q. Cables shall not be fastened to or come into contact with threaded rod, HVAC and electrical
7 support racks and Unistrut. Cables shall not lay on ceiling tiles.
8
9 R. Do not route any fire alarm cable within two feet of any light fixture, HVAC unit, service access
10 area, electric panel, or any device containing a motor or transformer.
11
12 S. Fire alarm cable will not be installed in the same raceway, tray, duct, or track with line voltage
13 electrical cable without a metallic barrier meeting NEC requirements.
14
15 T. Where cable passes through a wall, regardless of the fire rating, the cable shall be run through
16 a sleeve of no smaller than 3/4" EMT with both ends protected with a plastic bushing.
17
18 U. Maximum cable pulling tension should not exceed 25 pound-force (110 N) or the manufactures
19 recommendation, whichever is less.
20
21 V. Any pulling compounds utilized must be approved by the cable manufacturer and shall not
22 degrade the strength or electrical characteristics of the cable.
23
24 W. No terminations or splices shall be installed in or above ceilings.
25
26 X. Cable bends shall not be tighter than the manufacturers' suggested bend radius.
27
28 Y. Mount all equipment firmly in place such that vibration or jarring will not activate an alarm,
29 supervisory, or trouble signal. Route cable in a professional, neat, and orderly installation.
30
31 Z. All cable shall have a label on both ends utilizing self-laminating, flexible vinyl film, non-smear,
32 machine printed labels.
33
34 AA. Provide underground conduit as outlined on drawings as required. Underground conduit
35 installation includes the trenching, bedding, backfilling as required by codes and the finish
36 ground soils and/or roadway type finishes. Boring under roadways, as required per code
37 conduit depth is acceptable.
38
39 BB. Provide overhead arial wireway with lead messenger cable, supports, UV resistant and
40 weatherproof cable, and electrical wall boxes and weatherproof sealants. Installed to industry
41 standards in a professional manner.
42
43 2.35 TERMINATION PRACTICES
44
45 A. Strip back only as much cable jacket as required to terminate.
46
47 B. Do not "loop" over wiring terminals, the cable could come loose and the condition not be
48 detected as an open circuit or disconnected device.
49
50 C. Preserve wire twists as closely as possible to point of termination (0.5" maximum) to keep
51 signal impairment to a minimum.
52
53 D. Avoid twisting cable jacket during installation.
54

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

2.36 BUSHINGS

- A. Provide a plastic snap in bushing at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves prior to cable installation to protect the cabling from damage:
1. Box openings - Thomas & Betts Knockout Bushing Series 3210, or equivalent.
 2. Metal stud passage - Thomas & Betts Twist It Bushing Catalog Number SB1218-SC, or equivalent.
 3. Conduit ends - Thomas & Betts Anti-Short Bushing Series 390 or Tite-Bite Combination Coupling Series 442, or equivalent.

2.37 CEILING MOUNTED DEVICE BOX HANGERS

- A. All ceiling mounted devices including smoke detectors and heat detectors when mounted in a drop ceiling shall be supported by an electrical box hanger (Caddy #512 or #512A for deep boxes - 24" span), or equivalent. Box hangers shall be attached to the ceiling grid only for lateral stabilization, separate support wires shall be provided. The required support wires for the ceiling grid or light fixtures shall not be utilized. The backbox shall be flush and level with the bottom of the ceiling tile and the hole neatly cut for a finished appearance when the device is installed. Attach cable to the bar hanger in an acceptable manner and leave a service loop of 12" to 16". Cable entries into the ceiling mounted box will be secured with a clamping connector.
- B. Device and box hanger assemblies shall not be supported solely by suspended ceilings. Fasteners and supports shall be adequate to support the required load.

2.38 J-HOOKS

- A. Attachments for cabling support shall be spaced at approximately 48 to 60 inches on center. The cable bundle shall not be allowed to sag more than 12 inches mid-span between attachments. Attachments shall be sized as follows:

Single cables or bundles up to four cables may be supported directly by the building structure.

| | |
|---|---|
| Bundles up to 1/2" diameter (Ten 1/4" cables) | 2" bridle ring, Caddy #4BRT32 or equivalent |
|---|---|

| | |
|---|---|
| Bundles up to 3/4" diameter (Sixteen 1/4" cables) | 3/4" J-Hook, Caddy #CAT12 or equivalent |
|---|---|

| | |
|--|--|
| Bundles up to 1-5/16" diameter (Fifty 1/4" cables) | 1-5/16" J-Hook, Caddy #CAT21 or equivalent |
|--|--|

| | |
|--|---------------------------------------|
| Bundles up to 2" diameter (Eighty 1/4" cables) | 2" J-Hook, Caddy #CAT32 or equivalent |
|--|---------------------------------------|

Split bundles greater than 2" diameter or provide cable tray.

- B. Do not mix different signal strength cables on the same J-Hook (i.e. fire alarm with telephone/data cable). Multiple J-Hooks can be placed on the same attachment point, up to the rated weight load of the attachment device.

2.39 SURGE PROTECTION FOR FIRE ALARM CONTROL UNITS

- A. In addition to the built-in panel surge protection, each incoming 120VAC power circuit shall be provided with an electrical surge protection module. Provide one for each fire alarm control unit, this shall include every fire alarm control panel, digital communicator, signal power expander and any other 120VAC powered fire alarm control units. Each power circuit surge protector module shall be mounted in a standard metallic electric box that is grounded. Module shall be hardwired in the incoming power circuit and 20 amp rated. Units shall provide surge

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

protection (UL 1449 3rd edition listed), noise filtering (UL 1283 listed), and nanosecond reaction three-stage MOV line protection. Shall be Ditek DTK-120SRD or equivalent.

2.40 FIRE ALARM CIRCUIT SURGE PROTECTION

- A. Provide surge protection shall be provided for all exterior devices, communications service, or antenna entrance connections, and for each circuit that connects one building to another (i.e., any other portion of a building complex not under one continuous roof) at both entry/exit points to prevent damage to equipment.
- B. Each surge protector shall be mounted in a standard grounded metallic electric box or equipment backboard with a separate ground wire ran directly to the ground bus bar or equipment panel ground stud, do not daisy chain ground wires.
- C. Surge protectors for low voltage communications signal and control circuits with a data rate from 200kbps to 2Mbps, nominal voltage as listed below AC or DC. Each module shall protect up to two pairs using hybrid design multi-stage SAD technology, shall be Ditek 2MHLP series field replaceable modules with MB Series mounting bases for one to five modules, or equivalent, model numbers as follows:
 - 1. 70 to 75 Volt circuit, 4 wire protector with base DTK-2MHLP75BWB.
 - 2. 48 to 50 Volt circuit, 4 wire protector with base DTK-2MHLP48BWB.
 - 3. 36 Volt circuit, 4 wire protector with base DTK-2MHLP36BWB.
 - 4. 24 Volt circuit, 4 wire protector with base DTK-2MHLP24BWB.
 - 5. 12 Volt circuit, 4 wire protector with base DTK-2MHLP12BWB.
 - 6. 0 to 6 Volt circuits, 4 wire protector with base DTK-2MHLP5BWB.
- D. Surge protectors for low voltage communications high data rate voice, data and signaling data and loop circuits, or serial communication, nominal voltage as listed below AC or DC. Each module shall provide Line-Ground (All) protection modes, maximum surge current: 2,000 Amps per pair (6V-50V) or 9,000 Amps per pair (75V-130V), and maximum continuous current: 5 Amps to 0.15 Amps, shall be Ditek LVLP series or equivalent, model numbers as follows:
 - 1. 115 to 130-Volt circuit, 2-pair protector, 10-12 AWG, DTK-2LVLAWGGRUV.
 - 2. 95-Volt circuit, 2-pair protector, 10-12 AWG, DTK-2LVLAWGSGR.
 - 3. 75-Volt circuit, 2-pair protector, 10-12 AWG, DTK-2LVLAWGSPK.
 - 4. 48 to 50-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPPOPX.
 - 5. 24 to 30-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPPLV.
 - 6. 12 to 14-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPX.
 - 7. 0 to 6-Volt circuit, 2-pair protector, 16-22 AWG, DTK-2LVLPD.
 - 8. 0 to 6-Volt circuit, 8-pair protector (RS-485, RS-232), 16-22 AWG, DTK-8LVLPPLVD.

2.41 FIRE STOPPING, DRAFT/NOISE STOPPING, PENETRATIONS, AND CORING

- A. UL Listed fire stopping methods that match the fire rating of the wall or floor being penetrated are to be used at all fire barrier penetrations. Seal the interior of the conduit sleeve around the cables and around the outside of the sleeve on each side of the penetration with fire-stop caulk or putty, install per the manufacturers' instructions.
- B. All penetrations through fire rated walls or floors shall feature a suitable length of metal conduit not less than ¾" in diameter and with bushings on both ends. Hole diameter shall not exceed ½" larger than the conduit or sleeve to be installed. The hole shall be neatly cut, not oversize or irregular. Do not share wall/floor penetrations with ductwork, piping, line voltage electrical conduits, etc.
- C. All gypsum board or plaster penetrations shall tool cut using an appropriate hole saw / mandrel or manufactured assembly.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 D. Draft/Noise Stopping - All penetrations through non-rated walls shall include draft/noise
2 stopping to minimize the transfer of air and sound between enclosed areas. This shall include
3 but not limited to:
4 1. Neatly cutting all non-rated wall penetrations with a 1" maximum clearance around
5 conduit sleeves. All gypsum board or plaster penetrations shall be tool cut using an
6 appropriate hole saw / mandrel or manufactured assembly. The hole shall be neatly cut
7 and not oversize or irregular. Do not share wall penetrations with other types of ductwork,
8 piping, line voltage electrical conduits, communications cabling, etc.
9 2. Provide and install non-combustible mineral wool, fiberglass, cellulose insulation, caulk,
10 and/or sealant as required. Seal the interior of conduit sleeves around the cables and
11 around the outside of the sleeve on each side of the penetration with caulk or putty, install
12 materials per the manufacturers' instructions.
13
14 E. Upon approval, the Fire Alarm System Contractor shall be required to supply all labor,
15 equipment, tools, and materials to create any additional penetrations, and shall provide the
16 sleeve, temporary and final fire stopping. Special care shall be taken not to stress, overheat,
17 or penetrate any building support member. Coring shall be made with equipment appropriate
18 for the dry penetration of concrete and block materials. Under no circumstances shall
19 penetrations be made utilizing a chisel or percussion type equipment. Concrete, block, or
20 plaster cores shall be made by dry saw/core methods only.
21
22

23 **PART 3 – EXECUTION**

24
25 **3.1 DEMOLITION OF THE EXISTING FIRE ALARM SYSTEM FOR REPLACEMENT**

- 26
27 A. The Fire Alarm System Contractor shall be responsible for removal of existing fire alarm
28 systems. This shall also include demolition of any devices and cable previously abandoned.
29 Demolition shall include disconnection and removal of all devices and off-site disposal, in a
30 legal manner, of all materials not requested to be turned over to the Owner. Comply with
31 government regulations pertaining to environmental protection, and disposal of materials and
32 equipment. Do not burn any materials on the site.
33

34 **3.2 EXAMINATION**

- 35
36 A. Verify existing field conditions, circuiting arrangements, cabling, and devices served in areas
37 as shown on the drawings. Adjust all circuiting, cabling, and materials to be provided as
38 required by job conditions.
39
40 B. Identify and verify abandoned equipment, wiring, and devices. All visible disconnected or
41 abandoned devices and cabling shall be removed i.e. non-functional fire pulls, bells, speakers,
42 signals, et cetera.
43
44 C. Drawings are based on casual field observation and existing record documents. Report
45 discrepancies to the Owner before disturbing existing installation.
46
47 D. The Fire Alarm System Contractor accepts the existing conditions when beginning demolition.
48

49 **3.3 PREPARATION**

- 50
51 A. Disconnect fire alarm devices in walls, floors, and ceilings as shown or required.
52
53 B. Provide temporary wiring and connections as required to maintain the operation of existing
54 systems during construction.
55

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

- 1 C. When work must be performed on energized equipment or circuits, use personnel experienced
2 in such operations. Verify phasing on existing equipment and coordinate new phasing before
3 energizing revised service.
- 4
- 5 D. Remove, relocate, and extend existing installations to accommodate new construction as
6 required.
- 7
- 8 E. Remove abandoned wiring to the source of the supply.
- 9
- 10 F. Remove exposed abandoned conduit, including abandoned conduit, brackets, stems,
11 hangers, and other accessories above accessible ceiling finishes. Cut conduit flush with walls,
12 floors, and patch surfaces.
- 13
- 14 G. Disconnect and remove abandoned devices. Remove abandoned devices if conduit servicing
15 them is abandoned and removed. Provide blank cover for abandoned devices that are
16 removed in masonry construction.
- 17
- 18 H. Disconnect and remove fire alarm devices and equipment serving equipment that has been
19 removed.
- 20
- 21 I. Repair adjacent construction and finishes damaged during demolition and extension work.
- 22
- 23 J. Confirm with Owner regarding the handling and disposal/reuse of removed material,
24 equipment, devices, et cetera.

25
26 **3.4 OPERATION PRIOR TO COMPLETION**

- 27
- 28 A. When the phasing of a project requires that fire alarm systems are operable in certain areas
29 and the Owner needs to operate the equipment, such provisions shall be made by the Fire
30 Alarm System Contractor. The warranty period shall commence when the equipment is
31 operated for the beneficial use of the Owner. Regardless of whether or not the equipment has
32 or has not been operated, the Fire Alarm System Contractor shall properly clean the
33 equipment, properly adjust, and complete all punch list items before final acceptance by the
34 Owner. The date of acceptance and the start of the warranty may not be the same date.

35
36 **3.5 SIGNAL TYPES (SYSTEM STATUS)**

- 37
- 38 A. General: The Fire Alarm Control Panel shall indicate various conditions or signals depending
39 on system inputs. In all instances, a more severe signal shall override all less severe signals.
40 All events are to be recorded with time and date in an electronic event history log maintained
41 by the fire alarm control panel. The following is a short description of conditions that the Fire
42 Alarm Control Panel is required to indicate in order of severity:
 - 43 1. FIRE ALARM: This alarm signal is indicative of fire. Such a signal indicates an emergency
44 requiring immediate action. All premises audible and visual notification appliances shall
45 operate, and the protected premises evacuated. A local audible alert shall sound, the
46 alarm LED illuminate, and descriptive message appear on the LCD display at the panel
47 and any remote annunciators until the panel is reset. The digital communicator transmits
48 a fire alarm signal.
 - 49 2. SUPERVISORY ALARM: A supervisory signal indicates the need for action concerning a
50 duct mounted smoke detector, monitored fire suppression system, or the maintenance of
51 related systems. The tamper switch on a sprinkler riser is a supervisory condition because
52 the system cannot function with a closed valve. An audible alert shall sound, the
53 supervisory LED illuminate, and descriptive message appear on the LCD display at the
54 panel and any remote annunciators until silenced. The digital communicator transmits a
55 supervisory signal.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

3. DRILL: The fire alarm drill function shall be programmed to initiate visual and audible outputs only. The fire drill function shall not shutdown the HVAC equipment or release smoke doors or control any other ancillary function.
4. TROUBLE: A trouble signal indicates a fault in a monitored circuit or component of the fire alarm system. This could be a short, open, or ground in a supervised circuit. It could also indicate a device or battery failure. A local audible alert shall sound, the trouble LED illuminate, and descriptive message appear on the LCD display at the panel and any remote annunciators until silenced. The digital communicator transmits a trouble signal.
5. MAINTENANCE ALERT: A maintenance alert is an early warning of a condition before a device becomes inoperable. This is often a smoke detector that needs cleaning or another normal maintenance item. The maintenance alert shall display on the panel and any remote annunciator LCD display until acknowledged. No audible alert shall sound and no signal transmitted, in order that this condition not be confused with a supervisory or trouble condition.
6. NORMAL: All systems and supervised circuits functioning normally.

3.6 SEQUENCE OF OPERATION

- A. Alarm Condition: When a fire alarm condition is indicated by any manual pull station, area smoke detector, heat detector, sprinkler system waterflow indicating device, or by any automatic fire suppression system monitored this shall cause the following actions or effects to take place:
 1. At the panel, and any remote annunciators, a system alarm LED shall flash, and a local sounding device shall activate.
 2. The 80-character LCD display shall indicate all pertinent information associated with the alarm condition and its location.
 3. The digital communicator shall activate and transmit a ADDRESSABLE POINT DEVICE DESIGNATION signal to the monitoring company.
 4. All audible and visual signal devices shall activate and operate until silenced manually, or until automatically silenced, by the control panel. Any subsequent alarm from another device shall automatically reactivate all audible and visual signal devices. Once a waterflow alarm (when applicable) has been activated in shall not be possible to manually silence the audible and visual signal devices until the flow indication from the waterflow switch has ceased.
 5. Fire safety control functions related to providing free egress from the facility shall be activated on general alarm, including the automatic opening of any controlled motorized security grills and automatic unlocking for egress of any controlled non-fire rated security doors or gates.
 6. Fire safety control functions conditional on the detection of an alarm condition in one or more designated adjacent area smoke detectors shall be activated independently on a one-for-one basis, these functions may include air handler shutdown of units without a duct mounted smoke detector, electromagnetic door hold back release, release of overhead coiling or hinged fire or smoke rated doors or shutters (those designed to close in order to control the spread of fire or smoke), high volume low speed (HVLS) fan shut down, and any other conditional operations such as elevator recall.
 7. Each Fire Safety Control Function circuit-controlled device shall be configured such that when the fire alarm system safety control function circuit is re-energized, by the fire alarm control panel, the device shall return to normal operation (e.g., be ready to re-start) without a need for manual or environmental control system intervention.
 8. The FACP event history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
- B. The detection of any system internal or external trouble condition or the actuation of any supervisory alarm condition, as applicable, including any duct mounted smoke detector, sprinkler system valve tamper switch, sprinkler system low pressure switch, et cetera, shall automatically cause the following actions to take place:

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1. At the panel and any remote annunciators, a system supervisory alarm LED or trouble LED shall flash as appropriate, and a local sounding device shall activate. Audible supervisory or trouble alerts that have been silenced shall automatically resound every twenty-four hours or less until repairs are made.
2. The 80-character LCD display shall indicate all pertinent information associated with the trouble or supervisory condition and its location; however, unacknowledged alarm messages shall have priority over trouble messages.
3. The digital communicator shall activate and transmit a SUPERVISORY or TROUBLE signal to the monitoring company.
4. Detection of a supervisory alarm in a duct mounted smoke detector shall initiate shutdown of the associated air handler and closing of any smoke dampers or fire/smoke dampers located in that unit's duct system, on a conditional one-for-one basis.

3.7 BASIC SETUP AND TESTING

- A. The completed system is to be tested for compliance with the specifications.
- B. The System Fire Alarm System Contractor shall make a thorough inspection of the complete installation to ensure the following:
 1. Complete and functional system.
 2. Installed in accordance with manufacturer's instructions.
- C. Prior to the testing, ensure that the system is free of short circuits, ground loops, excessive system noise beyond published specifications of the equipment, hum, RF interference, or instability of any form.
- D. The testing work shall be performed after installation has been completed, but prior to any use of the system.
- E. All audio inputs, including live microphone, automated evacuation messages, temporary testing signal, and any additional low priority inputs such as an intercom/public address, telephone system paging, and background music (if approved by the AHJ), shall be adjusted and matched to the produce proper effective volume output from the system.
- F. Always operate audio amplifiers and speakers within their specified ratings. Excessive input may distort sound quality and may damage audio equipment. Do not exceed +130% of speaker input voltage per UL 1480. Improper input voltage can damage speaker. If distortion is heard, check for clipping of the audio appliance with an oscilloscope and reduce the amplifier input level or gain level to eliminate any clipping.
- G. Check the installation instructions of the manufacturers of other equipment used in the system for any guidelines or restrictions on wiring and/or locating Voice Notification Appliance Circuits (Voice NAC) and notification appliances. Some system communication circuits and/or audio circuits, for example, may require special precautions to assure electrical noise immunity (e.g. audio crosstalk).
- H. The system shall be set up for a general occupancy and at no point in the testing or operation of the system shall output be allowed to exceed 95 dB at any occupiable position to prevent possible hearing damage, and system damage. It is prohibited at any time to "ring out" the system by turning it up until it distorts.
- I. The installer shall maximize the gain structure and balance each system component to provide the least possible variation in sound level and frequency response in each area as required. The testing shall be performed with a minimum of the following equipment:

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

1. Professional 1/3 octave Real Time Analyzer (RTA) and Type One sound pressure level (SPL) meter- Ivie IE-30A or PC-40 with calibrated microphone or equivalent by Crown or White Instruments.
2. Pink Noise Generator – Ivie IE-20B or equivalent by Crown or White Instruments.

3.8 PERFORMANCE TESTING

- A. After basic setup and testing, the sound system shall meet or exceed the following specifications:
 1. System shall be free of short circuits, ground loops, parasitic oscillation, excessive system noise, hum, and instability of any form, including RF interference.
 2. Maximum SPL with band-limited pink noise input to the system shall be 95 dB before audible distortion occurs.
- B. Acoustic response of the system shall be plus or minus 1.5 dB along a line which is flat from 100 Hz to 1250 Hz, and which rolls off at 2 dB per octave to 8 kHz.

3.9 VOICE INTELLIGIBILITY TESTING

- A. Once the basic setup is complete and the performance testing as outlined above is completed, this Fire Alarm System Contractor shall conduct voice intelligibility testing as prescribed in the NFPA 72 and as required by the AHJ as follows:
 1. The building shall be divided into Acoustically Distinguishable Spaces for testing by basic areas of the building and single rooms.
 2. Final voice intelligibility testing shall be conducted in accordance with the test instrument manufactures written instructions and during normal hours of operation and under normal building occupancy conditions including all final room finishes, furnishings, and with a nominal number of occupants at their normal activity level, or as near as these conditions can be simulated. Simulation may include taking sample background noise measurements or "captured curves" for each designated ADS with stand in personnel for use in the testing process.
 3. From each designated fixed-point test location in each ADS, the technician shall calibrate the test instrument, measure, and record the STI value while the test signal is played through the entire building emergency communication system.
 4. Voice intelligibility test results for this emergency communication system will be acceptable if at least 90% of the measurement locations within each ADS has a measured STI of not less than 0.45 (CIS of not less than 0.65), and an average STI of not less than 0.50 (an average CIS of not less than 0.70). The Fire Alarm System Contractor shall make any system adjustments or modifications needed for each ADS to pass the intelligibility testing.
 5. If an ADS does not meet the above requirements due to low readings, the testing procedures shall be verified, and adjustments made that may include increasing the volume of individual speakers, changing types or adding additional speakers, or working with the Owner to provide acoustical treatments that will reduce inordinate background noise and/or reverberation.
 6. The final acceptance of the system by the Owner will be based upon the proper performance of the completed system.

3.10 WARRANTY, SERVICE

- A. A factory-trained representative of the manufacturer shall supervise the final connections and testing of the system and it shall be subject to the final acceptance of the Owner and local authorities. Testing shall include, but not be limited to, the following:
 1. Before energizing the system check all cables for correct connections and test for short circuits, ground faults, continuity, and insulation.

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

2. Close each sprinkler system valve with a tamper switch, when applicable, and verify proper supervisory alarm at the FACP.
 3. Verify alarm activation of waterflow switches by operation of the test port valve on each riser (when applicable).
 4. Open each initiating device circuit and verify that the trouble signal actuates.
 5. Open and short each signaling line circuit and verify that the trouble signal actuates.
 6. Open and short each notification appliance circuit and verify that trouble signal actuates.
 7. Individually ground each circuit and verify response of trouble signals.
 8. Check for presence of strobe signal and audibility of tone at all alarm notification devices.
 9. Check installation, supervision, and operation of all area detectors using the walk test.
 10. Check installation, configuration, and operation of all duct mounted smoke detectors. Verify that there is adequate airflow through the sample tubes and housing to activate the detector when smoke is present in the duct.
 11. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
 12. Verify proper operation of all fire safety control functions including when applicable fire door hold open/release, coiling fire door release, air handler shutdown, smoke damper or fire/smoke damper control, high volume low speed (HVLS) fan shut down, and the automatic opening of any controlled motorized security grills and automatic unlocking for egress of any controlled non-fire rated security doors or gates.
 13. Check operation of elevator recall and shunt-trip when applicable.
 14. Ensure that all dust covers are removed from smoke and heat detectors at substantial completion.
- B. The Fire Alarm System Contractor shall be ultimately responsible for safe and complete operation of the system. Any issues affecting proper operation of the system relating to the Electrical, Mechanical, Fire Protection, Fire Suppression or other contractors shall be resolved by the Fire Alarm System Contractor, at no additional cost to, and without requesting intervention by the Owner.
- C. The Fire Alarm System Contractor shall provide a complete, dated, installation certificate meeting state requirements for each installation including a System Record of Completion and an Emergency Communications Systems Supplementary Record of Completion. A Fire Alarm Installation Record sticker listing the; installation firm's name, address, and telephone number; signature of Licensee and license number; Fire Alarm Planning Superintendents name and license number; and the installation date, meeting state requirements shall be attached to the main fire alarm control panel. The Fire Alarm System Contractor shall submit a copy of the installation certificate, final testing forms with final results and speech intelligibility testing results to the Owner at the time of substantial completion.
- D. The Fire Alarm System Contractor shall provide a warranty of the installed system against defects in material or workmanship for a period of one (1) year from the date of substantial completion. Any equipment or cabling shown to be defective shall be replaced, repaired, or adjusted free of charge. All labor and materials shall be provided at no expense to the Owner. All equipment will carry a one-year warranty or manufacturer's warranty whichever is greater.
- E. Immediately prior to the end of the warranty period, the system shall be inspected and certified for the following year at no additional cost to the Owner.
- F. For all fire alarm systems that are modified after initial installation the Fire Alarm System Contractor shall revise the original record of completion to show all changes from the original information and indicate a revision date.
- G. The Fire Alarm System Contractor shall provide a warranty of all newly installed system devices and cabling against defects in material or workmanship for a period of one (1) year

**ERA FIRE ALARM RENOVATION
ERA INDEPENDENT SCHOOL DISTRICT**

from the date of substantial completion. Any new equipment or cabling shown to be defective shall be replaced, repaired, or adjusted free of charge. All labor and materials shall be provided at no expense to the Owner. All new equipment will carry a one-year warranty or manufacturer's warranty whichever is greater.

3.11 DRAWINGS, MANUALS, AND TRAINING

- A. As-built drawings and operating and maintenance (O&M) manuals may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.
- B. Upon completion of the installation, and prior to final inspection, the Fire Alarm System Contractor shall furnish as-built drawings.
- C. In addition, the Fire Alarm System Contractor shall furnish complete operating and maintenance (O&M) manuals listing the manufacturer's name(s), including technical data sheets. Manuals shall include wiring diagrams to indicate internal wiring for each device and the interconnections between the items of equipment. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system. Provide a parts list with manufacturer and model number for commonly replaced parts. Include complete instructions for the inspection, testing, and maintenance of the system.
- D. Provide the Owner a copy of the panel control software including the licensed program, site specific data file, and passwords that the Owner may require to maintain the system.
- E. The Fire Alarm System Contractor shall provide ERA ISD with licensing for the fire alarm control panel system software with the capability for use with a Windows based laptop computer at a remote location.
- F. The Fire Alarm System Contractor shall conduct formal on-site training sessions. It shall be the responsibility of the Fire Alarm System Contractor to coordinate time and location of training sessions with the Owner. Provide documented general instruction as follows:
 - 1. Provide instruction to the maintenance personnel to include the location, inspection, maintenance, testing, and operation of all system components. Provide a minimum of four (4) hours-two 2-hour sessions separated by a minimum of two weeks.
 - 2. Provide instruction to designated personnel on the functions and operation of the FIRE DETECTION AND ALARM SYSTEM including capabilities, limitations, monitoring, and the meaning of status messages. State the proper procedure for fire drills, routine maintenance, and request for service. Provide a minimum of four (4) hours-two 2-hour sessions separated by a minimum of two weeks.

END OF SECTION