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November 27, 2012

**ADDENDUM # 5**

**RFQ # 7458181**

**TITLE: STUDENT DEVELOPMENT ATHLETIC CENTER AT  
TOOTELL AND KEANEY**

**OPENING DATE AND TIME: 12/10/2012 (EST) AT 11:00 AM**

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**Notice to Vendors:**

The following Addendum Number 5 forms a part of the Contract Documents and modifies the original specifications and drawings dated July 20, 2012

*Thomas Bovis*  
**Interdepartmental Project Manager**

*Interested parties should monitor this website, on a regular basis, for any additional information that may be posted.*

**Student Athletic Development Center  
University of Rhode Island  
Kingston Campus**

**ADDENDUM NUMBER 5**

**November 27, 2012**

The following Addendum Number 5 forms a part of the Contract Documents and modifies the original specifications and drawings dated July 20, 2012, for the Student Athletic Development Center at the University of Rhode Island, Kingston Campus.

This Addendum Number 5 consists of 1 page, plus 13 sheets of attachments, totaling 14 sheets.

SPECIFICATIONS

Item 1

SECTION 00010 – TABLE OF CONTENTS: **CHANGE** Section 283100 to read “Fire Alarm System Specifications”.

Item 2

SECTION 283100 – FIRE ALARM SYSTEM:

- a. **DELETE** Section 283100 “Fire Alarm System” in its entirety.
- b. **ADD** new Section 283100 Fire Alarm System Specifications dated November 27, 2012, consisting of 13 pages attached herewith to the Project Manual.

DRAWINGS

Item 3

DRAWING ES2.1 – SPECIAL SYSTEMS DETAILS: At General Notes – Fire Detection System:

- a. **CHANGE** note 1 to read “F.A. signaling line circuits (loops) shall be Style 6 (Class A). Initiation circuits from non-intelligent devices with normally open contacts shall be Class A. Booster power supplies shall be connected Style 7 (Class A).”
- b. **CHANGE** note 2 to read “F.A. notification circuits shall be Style Z (Class A).”

LIST OF ATTACHMENTS

- Specification Section 283100 Fire Alarm System Specifications

END OF ADDENDUM NUMBER 5

## SECTION 283100- FIRE ALARM SYSTEM SPECIFICATIONS

### PART 1: GENERAL

The system(s) shall be municipally connected system(s) per. RIUFC 13.8.10.4.

#### 1.01 - WORK INCLUDED

(A) Perform all electrical work, complete, in accordance with the specifications and drawings.

(B) All wiring for the fire alarm system shall be subject to the State of Rhode Island Uniform Fire Safety Code 13.8.10.6.2, and raceways containing conductors identified as "Fire Protective Alarm System" shall not contain any other conductors, and A.C. current carrying conductors will not be allowed in the same raceway with the D.C. fire alarm detection and signaling conductors.

#### 1.02 - GENERAL REQUIREMENTS

(A) The contractor shall provide modifications the existing FCI E3 fire alarm systems in the Keaney and Tootell buildings as indicated on the plans.

(B) All fire alarm devices and equipment shall be provided in the same manufacture as the existing building standard and shall be fully compatible with the existing building systems. If equipment of listed equivalent Manufacturer is submitted for approval, the contractor shall state how much is to be deducted from his base bid for the substitution, and also shall state what, if any, specific points of system operation differ from the specified points of the system operation. This differentiation report must reference every paragraph of this specification. This submittal and detailed report shall be provided to the University of Rhode Island's Coordinator of Alarms no less than five (5) days following award of contracts.

The system shall include, but not be limited to, all control panels, power supplies, Initiating devices, audible and visual alarm devices, conduit, conduit fittings, and outlet Boxes and fittings, conduit hangers, clamps and supports, pull boxes, locked terminal Boxes, wire and cables, disconnect Switches and fuses, circuit breakers, pilot devices, connectors, identification name Plates, tags, wireway and accessories, and all other equipment and accessories Necessary, implied or specified herein or indicated on the drawings and schedules, Including all necessary anchors, sleeves, hangers and such other items as may be Needed for attaching or connecting this work to the work of others.

(C) All material shall be new, unless otherwise indicated, and shall conform to the standards of the Underwriters Laboratories and approved by Factory Mutual or as accepted by the coordinator of alarms, of the University of Rhode Island. This fire alarm shall be supplied by a single source; accessory components as required should be catalogued by the manufacturer and U.L. and F.M. listed to operate with the manufacturer's control panel.

(D) Laws and Regulations

The installation shall comply with all state and local laws and regulations applying to;  
Electrical installations in the State of Rhode Island, with all applicable requirements of  
The National Electrical Code and its latest revisions, and the University of Rhode Island Fire  
Alarm Specifications without exception.

1.03 - SUBMITTALS

The Coordinator of Alarms U.R.I. will approve all equipment submittals. General requirements are as follows:

(A) A riser diagram of the complete fire alarm system point to point. (Typical riser diagrams are not acceptable.)

(B) A complete point-to-point installation diagram. (Typical diagrams are not acceptable.)

(C) A complete list of current drain requirements during normal supervisory, trouble and alarm condition.

(D) Battery standby calculations showing total standby power required meeting the specified system requirements.

(E) Manufacturer's original catalog data and description information shall be supplied for all major components of the equipment to be supplied.

(F) Supplier's qualifications indicating years in business, service policies, warranty definitions, and a list of similar installations.

(G) Contractor's qualifications indicating years in business, prior experience with installations that include the type of equipment that is to be supplied, Rhode Island License # and type of license.

(H) All pertinent information regarding the reliability and operation of the equipment to be installed.

(I) Delivery dates of the equipment to be supplied.

(J) Installation and final test/acceptance dates of the equipment to be supplied.

(K) Sufficient information shall be supplied so that the exact function is known of each installed device.

(L) Submittal of shop drawings shall contain original manufacturer's specification sheets. All equipment and devices on the shop drawing to be furnished under this contract shall be clearly marked in the specification sheets. If any equipment and/or devices required in the systems are not so marked, the engineer shall mark the sheet and this equipment and/or devices shall be made part

of the system and shall be provided. Equipment other than specified will not be considered for approval:

Deviations from the specified item(s) shall be at the risk of the contractor until the date of final acceptance by the Coordinator of Alarms U.R.I., and all costs from removal, relocation or replacement of a substituted item(s) shall be at the risk of the contractor.

(M) In addition to any bid related closeout documents required, a hard copy fire alarm as-built drawing shall be provided to the Coordinator of Alarms, URI. This drawing shall show all system components, and wire routing, as built and shall be no smaller than 1/8" = 1' scale. This drawing shall be provided to the Coordinator of Alarms, URI prior to the final fire alarm acceptance test.

#### 1.04 - CODES AND STANDARDS

The installation shall comply with all state and local codes applying to electrical and fire alarm installations and the State Fire Code Fire Alarm Chapter 13 in its entirety.

The installation shall comply with the following:

Rhode Island Fire Safety Code (RIFSC).

Rhode Island Uniform Fire Code of the RIFSC – NFPA 1 Uniform Fire Code 2003 and Rhode Island Amendments.

Rhode Island Life Safety Code of the RIFSC – NFPA 101 Life safety Code 2003 and Rhode Island Amendment.

#### 1.05 - DRAWINGS

The drawings shall show the layout of the system and indicate the approximate locations of outlets, apparatus and equipment. The runs of wiring as shown on the drawings are schematic only. The exact routing of conduit shall be determined by the structural conditions and other obstructions. This shall not be construed to mean that the design of the system may be changed, but refers only to exact runs of conduit between given points.

(A) This contractor shall consult all contact drawings that may affect the location of any outlets/devices and equipment to avoid possible interference's and permit full coordination of all work. The right to make any reasonable change in location of outlets/devices, apparatus and equipment up to the time of roughing in is reserved by the Coordinator of Alarms and such change shall be made without additional expense to the owner.

(B) It shall be the responsibility of this contractor to see that all equipment such as junction and pull boxes, controls and such other apparatus as may require maintenance and operation from time to time is made easily accessible. Although the equipment may be shown on the drawings in certain locations, the construction may disclose the fact that such locations do not make its position readily accessible. In such cases this contractor shall call the attention of the Coordinator of Alarms to the condition before advancing the construction.

(C) Equipment and Scaffolding

This contractor performing work under this section shall be responsible for furnishing all tools and equipment, scaffolding and other temporary construction required for the execution of work.

(D) Inspection

Inspections will be made of routine work before any wiring is pulled, after wiring is pulled and before any devices are installed and before any connections to the control panel. The Coordinator of Alarms will make these inspections before the final inspection and it is the contractor's responsibility to contact the Coordinator of Alarms to arrange these inspections.

If work proceeds without these inspections it will be the contractor's risk and expense to have construction removed to perform the inspections.

1.06 - RACEWAY SYSTEMS

All conductors for fire alarm systems shall be installed in raceways as herein specified and as indicated. Raceways shall be of the sizes indicated or for maximum number of wires required by system design and as stated in the N.E.C. #70 and shall bear the label of Underwriters Laboratories. Raceways shall include rigid steel threaded conduit, electrical metallic conduit (EMT). M/C cable shall be allowed in concealed construction only with the prior permission of the Coordinator of Alarms, URI.

(A) Couplings and connectors for electrical metallic tubing shall be steel setscrew type.

(B) Wireways shall be complete with all necessary fittings, accessories, covers and connectors and shall be hot dip galvanized.

The wireways shall be of the sizes indicated with hinged lockable cover and Knockouts shall bear the Underwriters Laboratories or FM label and be securely supported by approved methods.

(C) Surface metal raceways shall be furnished and installed, only with permission, for exposed work in finished dry areas as required. Raceways shall be furnished complete with all necessary fittings, boxes, accessories and connectors.

(D) Supports shall be provided, in accordance with the NEC, at a minimum every 5 feet for all conduits wherever possible, the points of support to be determined in the field. The supports shall consist of approved types of clamps or straps secured by screws, bolts or expansion bolts on wood or steel framework and decking, concrete or brickwork. In no instance shall supporting bolts or screws protrude to the outside of building walls or roof.

(E) The complete raceway system shall become metallically continuous throughout its entire length and the entire system shall be electrically continuous and shall be thoroughly grounded in

accordance with the requirements of the Rhode Island State Fire Code Alarm Section and the National Electrical Code and its latest revisions.

(F) Boxes and Fittings

Provide junction boxes; pull boxes; outlets; and terminal boxes (13.8.10.6.5.1) and conduit fittings as indicated specified herein or wherever they shall be necessary to facilitate the pulling or termination of wires and cables.

(G) Junction boxes shall be constructed of code gauge sheet galvanized steel with lockable covers, keyed to the fire alarm panel or C346A for municipal terminations, and painted red. Boxes shall be secured in position independently of conduits entering them. Boxes shall be installed so they are accessible. All terminations shall be made on screw terminals and labeled to the satisfaction of the Coordinator of Alarms, URI.

(H) Outlet boxes for the fire alarm system shall be galvanized steel at least 1- 1/2 inches deep and of sufficient size to accommodate the devices at the outlet location with the exception of the horn light boxes which shall be 4" square x 2 1/2" deep. All boxes shall have mounting lugs or ears for covers and knockouts for conduit terminations.

1.07 - Wire and cable work shall be in strict accordance with the requirements of the State of Rhode Island Fire Safety Code Fire Alarm Section and the National Electrical Code and its latest revisions, both with respect to material and workmanship, except where insulation thickness and covering are required by these specifications in excess of code requirements. Color-coding shall be in strict accordance with the Rhode Island State Fire Code and the latest edition of the URI Fire Alarm Specifications.

(A) The minimum size wiring shall be #16 AWG THHN solid 600 volt. Municipal loop wiring shall be sized per. the Coordinator of Alarms, URI.

(B) "Y ER EAS" or an approved equal shall be used as a lubricant where necessary when pulling wire or cable. No wire or cable shall be pulled into the conduit system until all work that could cause injury to the wiring has been completed and the Coordinator of Alarms has been notified and an inspection of conduit system has been approved. All wires and cable shall, insofar as practicable, be continuous from origin to termination without running splices. The installation of wires and cables shall include the provisions of all hangers, racks, cable cleats and supports necessary to make a neat and substantial installation.

(C) The contractor shall use feeding tubes where cables pass into mouth of conduits. To avoid injury to sheathing, cable shall not be subject to bending less than 6 times its overall diameter.

(D) Gutter Wiring

All gutter wiring in cabinets, panel, and such other equipment shall be neatly formed and tied with cable ties and straps.

(E) Nameplates

Engraved bakelike nameplates with engraving through to white core shall be provided on the fire alarm equipment as specified by the Coordinator of Alarms.

(F) Disconnect Safety Switch or Circuit Breakers

Provide circuit breakers with locks if disconnect safety switch is to be used. A fusible disconnect switch with provision for padlocking handles in on or off position shall be provided. Fire alarm disconnects shall be painted with red enamel and shall be provided with suitable nameplates.

(G) Patching and Painting

This contractor shall restore to their original condition any areas disturbed by his/her work or negligence including wall, ceiling and floors. This shall include plastering, carpentry, metal work and painting. This restoration shall be done to the satisfaction of the owner.

**PART II: FIRE ALARM SYSTEM OPERATION**

2.01 (A) The operation of a manual station or automatic activation of any smoke detector, heat detector, sprinkler device, or extinguishing device shall cause:

1. All evacuation horns to sound and lamps to flash in a synchronized, 3 temporal fashion.
2. Shut down all air handling units as specified later herein and shown on the plans.
3. Indicate the zone in alarm on the control panel.
4. Indicate the zone in alarm on the remote annunciator
5. Automatically release all magnetically held doors.
6. Perform any additional function as specified herein or as shown on the plans.
7. Summon the fire department via Gamewell three fold local energy master box with a blank door.

Until

- (B)
1. The operated device is returned to normal and the control panel is manually reset except that the alarms may be silenced or acknowledged in accordance with RI State code.
  2. An alarm may be silenced by a switch on the zone card in the control panel. When silenced, this shall not prevent the resounding of subsequent alarms if another zone should alarm.
  3. When alarms are silenced the zone indicating red LED's on the control panel

and the remote annunciator shall remain on until the operated device is returned to normal and the control panel is manually reset.

4. Control panel zone cards shall be one zone per card.

(C) A green pilot LED shall normally be on, indicating that the system is receiving normal 120 VAC powers. A failure of normal power shall cause the LED to extinguish, sound a trouble condition, and the panel to transfer to battery.

(D) An amber trouble LED and sonalert, operating together, shall signal any trouble condition. Failure of normal power, opens, short circuits, and grounded conductors shall cause a trouble condition.

## 2.1 FIRE ALARM CONTROL PANEL

(A) The existing fire alarm control panels in the Keaney and Tootell buildings are FCI E3. Provide all new expansion cards, power supplies, and batteries for these panels as required by the systems modifications.

## 2.2 MULTIPLE ADDRESSABLE PERIPHERAL NETWORK

(A) Communication with addressable devices. The system must provide communication with initiating and control devices individually. All of these devices will be individually annunciated at the control panel and remote annunciator. Annunciation shall include the following conditions for each point:

- A.1 Alarm
- A.2 Trouble
- A.3 Open
- A.4 Short
- A.5 Device missing/failed

(B) All addressable devices shall have the capability of being disabled or enabled individually.

(C) All signal line circuits shall have a minimum of 3 isolation modules.

(D) The communication format must be a completely digital poll/response protocol. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.

(E) Identification of Addressable Devices

Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of

vibration and poor contact. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable.

(F) Wiring Type, Distances, Survivability and Configurations

Wiring types shall be approved by the Equipment Manufacturer, Engineer, and URI's Coordinator of Alarms.

(G) Class A Style 6 communications will be provided. Wire will be so routed to maintain sufficient distance between the forward and return loop as called for by the RIUFC. If additional NAC power supplies are required, they must be initiated Style 7 off the SLC or Style Z off the NAC circuit and wired class "A".

## 2.3 ADDRESSABLE DEVICE TYPES

(A) General

The system control panel must be capable of communicating with the types of addressable devices specified below. Addressable devices will be located as shown on the drawings. The location of addressable devices will be selected along with conventional devices to optimize the system layout in order to provide the level of protection, zone identification and control as shown on the drawings. Label all detectors with their address with an engraved tag for easy recognition. Labels shall be professionally fabricated and attached to the base of the detector.

(B) Addressable Detector Bases

All addressable smoke and heat detector heads as specified below will be pluggable into their bases. The base or head will contain electronics that communicate the detector status (normal, alarm, trouble) to the control panel over two wires and shall contain the address of that device. The same two wires shall also provide power to the base and detector. Different detector heads (smoke or heat) must be interchangeable. Upon removal of the head, a trouble signal will be transmitted to the control panel. Addressable detector bases shall contain the address of the detector, and shall be securely mounted to a standard electrical outlet box. Additional bases shall be available for local sound activation and/or auxiliary relay functions. Local sounder bases installed in sleeping rooms shall be programmed for self-restoration without the use of full system reset functions. The devices must allow the Owner to replace and repair associated detector heads without the need to readdress or verify addresses.

Those listed systems that do not comply with this section shall not be considered equal.

(C) Photoelectric Detector Head

1. The Photoelectric type detector shall be a plug-in unit that mounts to a twist-lock base, and shall be UL and FM approved.
2. The detectors shall be of the solid state photoelectric type and shall contain no radioactive material. They will use a refracted infrared LED light source and be sealed against rear airflow entry.

3. The detector shall fit into a base that is common with both the heat detector and ionization type detector, and shall be compatible with other addressable detectors, addressable manual stations, and addressable Zone Adapter Modules on the same circuit.

(D) Addressable Thermal Detector Head

Thermal detector heads must be UL and FM listed. Shall be a combination rate-of Rise and fixed temperature (135 F) type, 135 fixed, or 190 Fixed, as approved by the AHJ. These devices shall provide an integral alarm LED that shall illuminate on activation.

(E) Addressable Pull Stations

1. Addressable pull stations will contain electronics that communicate the station's status (alarm, normal) to the transponder over two wires, which also provide power to the pull station. The address will be set on the station. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common to all system locks. Pull stations will be double action.

2. Must be opened with a key to reset the station. The key shall be common with the control panels. Stations that use Allen wrenches or special tools to reset will not be accepted.

3. The addressable manual station shall be capable of field programming of its "address" location on an addressable initiating circuit. The address shall be permanently attached to the exterior of the device. The manual station shall be fitted with screw terminals for field wire attachment.

(F) Addressable Photoelectric Duct Detector

The detector shall be a non-polarized 24VDC type that is compatible with the Fire Alarm Panel. Detectors shall be of the solid-state photoelectric type and shall operate on the light scattering, photodiode principle. To minimize nuisance alarms, detectors shall have an insect screen and be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive material shall be used.

The detector head shall be directly interchangeable with an ionization detector type. The 24VDC detector must be reset by actuating the control panel reset switch.

Detector construction shall have a mounting base with a twist-lock detecting head that is lockable. The locking feature must be field removable when not required.

It shall be configured to alarm the duct housing by using a test switch (installed at a location approved by the Coordinator of Alarms). For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housings front cover. To minimize false alarms, voltage and RF transient suppression techniques shall be employed as well as smoke signal verification circuit and an insect screen.

(G) Zone Adapter Module

Zone Adapter Modules shall be used for monitoring of waterflow, valve tamper, Releasing Control Panels, all Heat and Smoke detectors shall be individually addressed. Modules used for general alarm must be class "A".

(H) Addressable Device Supervision

All devices shall be supervised for trouble conditions. The system control panel will be capable of displaying the type of trouble condition (open, short, device missing/failed). Should a device fail it will not hinder the operation of other system devices.

#### 2.4 ALARM SIGNALS

##### (A) Audible/Visual Unit (Xenon Strobe)

Provide Horn/Strobe unit. Comprised of a 24 VDC Horn and Xenon Flash Tube entirely solid state. The unit to conform to ADA requirements.

##### (B) Visual Flashing Lamps (Xenon Strobe)

Visual indicating appliances shall be and comprised of a xenon flash tube and be entirely solid state. This unit shall mount to a single gang box and plate for surface mount. The unit to conform to conform to A.D.A.

##### (C) Mini-Horn

Provide VDC Red, Mini-Horn. The unit shall mount to a single gang box.

### PART 3: - EXECUTION

#### 3.1 INSTALLATION

(A) Provide and install the system devices and equipment in accordance with specifications, all applicable codes and the Manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 A and B. Upon completion, the contractor shall so certify in writing to the owner and general contractor. All junction boxes shall be sprayed red and labeled "Fire Alarm". Wiring color code shall be maintained throughout the installation.

(B) Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the University of Rhode Island Coordinator of Alarms,URI.

(C) The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.

(D) The Manufacturer's authorized representative shall provide onsite supervision of installation.

(E) Color code for wire as per Rhode Island State Fire Code

1. DETECTOR CIRCUIT and SLC shall be red and black. Red shall be positive and black shall be negative. (NFPA IDC)

2. HORN/STROBE CIRCUIT shall be blue and white. Blue shall be positive and white shall be negative. When bells, chimes or other audible/visual devices are used in lieu of horns, this color shall be followed. (NFPA IAC)
3. FLASHING STROBE CIRCUIT, if separate feed is required, shall be blue and white. Blue shall be positive and white shall be negative.
4. SPRINKLER/STANDPIPE CIRCUITS shall be red and black. Red shall be positive and black shall be negative.
5. SMOKE DETECTOR CIRCUITS, if a separate power feed is required, shall be brown and violet. Violet shall be positive and brown shall be negative.
6. ELECTRO-MAGNETIC DOOR HOLDERS - BACK CIRCUITS shall be gray and gray, or 120 volt door holders shall be black and white.
7. MUNICIPAL MASTER BOX TRIPPING CIRCUITS shall be orange and orange. Conductors for this circuit shall be installed in a separate raceway.
8. ELEVATOR CAPTURE CIRCUITS shall be brown and yellow.
9. FAN SHUT-DOWN CIRCUITS shall be orange and yellow.
10. REMOTE ANNUNCIATOR CIRCUITS shall be violet and numbered at each end.
11. BOND WIRES from the control panel to the master box ground rod, and all required bonding conductors shall be green.
12. MUNICIPAL FIRE ALARM LOOP from the master box to the municipal loop shall be black and white.
13. AC SUPPLY CIRCUIT to the main fire alarm control panel shall be white, black and red. The black wire shall be one phase and the red shall be the opposite phase, if required. The white shall be the neutral. If a separate feed is required for the battery charger, it shall be black and white unless the main fire alarm panel requires only one AC feed. In that case, the conductors to the battery charger shall be red and white.
14. Local smoke detector interconnect wire shall be violet.

### 3.2 TESTING

(A) A pretest will be held with the installer and the manufacturer's technical representative present. In addition to the requirements listed below, the pretest shall demonstrate that each smoke detector is operative and produces the intended response. Each smoke detector is tested in accordance with the manufacturer's recommendations to initiate an alarm at its installed location. After certification of a complete pretest, the installing contractor shall provide the authority having jurisdiction with written documentation, from the manufacturer's authorized representative of the outcome of the test and will re-inspect in the presence of the authority having jurisdiction and the manufacturer's authorized technical representative. A complete test shall be conducted as follows: the installing contractor, in the presence of a representative of the authority having jurisdiction and the Coordinator of Alarms URI, shall manually operate every manual fire alarm station, every rate of rise type thermo detector with heat, manually operate or electrically short out every fixed temperature thermo detector, open and short all zones, as instructed actuate every smoke detector with smoke in accordance with the manufacturer's recommendations to demonstrate that smoke can enter the chamber and initiate an alarm, activate all automatic extinguishing system switches and activate every water sprinkler/standpipe flow switch by a flow of water.

(B) The final test, the contractor shall prepare and submit a single line diagram of each installation indicating wiring between equipment and locations of panels, manual pull stations, detectors, and other devices to the Coordinator of Alarms and the authority having jurisdiction. Each manual fire alarm station, thermo detector, smoke detector, extinguishing system switching circuits, flow switch circuit and each alarm horn/strobe circuit shall be opened in at least two locations to test for the correctness of the supervisory circuitry.

All communications shall be tested completely. The fire alarm system shall be in one hundred percent (100%) operation prior to acceptance and/or issuance of a certificate of occupancy.

Testing shall include all new devices installed plus 10% of the existing devices in each building (Keaney and Tootell).

### 3.3 WARRANTY

The contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test.

### 3.4 TRAINING

(A) The electrical Contractor and Manufacturer shall provide a minimum of two (2) on-Site training sessions for the Owner's representatives. Each session shall be a minimum of 4 hours.

(B) Due to the critical nature of proper system operation, training must be conducted by personnel in the direct employ of the manufacturer of the fire alarm control panel. A third party instructor is not acceptable.

(C) A complete set of reproducible "as Built" drawings showing installed wiring, color coding, and wire tag notations for exact location of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of the system.

(D) Operating and instruction manuals shall be submitted prior to the testing of the system. Four complete sets of the operating and instruction manuals shall be delivered to the owner upon completion.

(E) Instructions complete and accurate, step by step testing instructions giving recommended and required testing frequency of all equipment, and a complete trouble-shooting manual explaining how to test the primary parts of each piece of equipment shall be delivered to the owner upon completion of the system. Also, any passwords and other proprietary information that the owner deems necessary for him to maintain and repair the equipment.

\* Instructions for replacing any components of the system, including internal parts.

\* Instructions for cleaning and adjustments of equipment with a schedule of these functions

\* A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item

\* User operating instructions shall be provided and displayed on a separate sheet located next to the control unit in accordance with UL Standard 864.

\* Spare Parts shall be provided at 5% or a minimum of as:

- 2 Manual Pull Stations
- 5 Analog Smoke Detectors
- 2 Analog Heat Detectors
- 2 Analog Smoke/Heat Bases
- 5 Monitor Modules
- 2 Horn Strobes
- 3 Analog Smoke Sounder Bases (if applicable)

The contractor shall supply and interconnect to the fire alarm system all the necessary water flow switches with retard, pressure switch and gate valve supervisory switches.

The entire fire alarm system shall be connected to a Gamewell local energy Master Box, in accordance with N.F.P.A. regulations and University specifications.

If any problems are found in the system, a date and time will have to be rescheduled with the Coordinator of Alarms to retest and system after the problems are corrected. Prior to the final test, the Coordinator of alarms must be notified within a reasonable time to test (at least 48 hours). The Contractor shall provide the necessary personnel and equipment to conduct the test.

**END OF SECTION 28 31 00**