

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK
CITY OF PORTLAND

Please Read
Application And
Notes, If Any,
Attached

BU...TION

PERMIT

Permit Number: 090742

This is to certify that Westbrook Seminary & Junior Bureau E
has permission to Install Fire Alarm System
AT 714 Stevens Ave C... 145 A003001

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of buildings and structures, and of the application on file in this department.

Apply to Public Works for street line and grade if nature of work requires such information.

Notification of inspection must be given and written permission procured before this building or part thereof is...
H... PERMITS ISSUED.

A certificate of occupancy must be procured by owner before this building or part thereof is occupied.

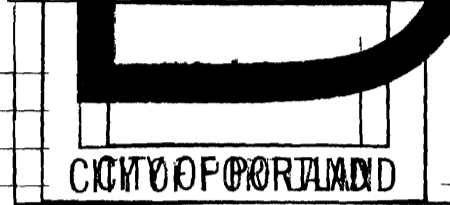
OTHER REQUIRED APPROVALS

Fire Dept. CAPT. R. Goulet

Health Dept. _____

Appeal Board _____

Other _____
Department Name



[Handwritten Signature]
Director - Building & Inspection Services

PENALTY FOR REMOVING THIS CARD

City of Portland, Maine - Building or Use Permit Application
 389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 09-0742	Issue Date: 7/31/09	CBL: 145 A003001
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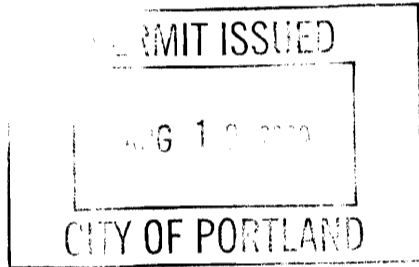
Location of Construction: 714 Stevens Ave	Owner Name: Westbrook Seminary & Junior	Owner Address: 716 Stevens Ave	Phone:
Business Name:	Contractor Name: Favreau Electric Inc	Contractor Address: Portland	Phone:
Lessee/Buyer's Name	Phone:	Permit Type: Fire Alarm System	Zone: R-5

Past Use: University of New England	Proposed Use: Install Fire Alarm System	Permit Fee: \$420.00	Cost of Work: \$39,850.00	CEO District: 5
Proposed Project Description: Install Fire Alarm System		FIRE DEPT: <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied * See Conditions	INSPECTION: Use Group: A-3/B Type: 5B IBC-2003 NFPA-72	
		Signature: (KG)	Signature:	
PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)				
Action: <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied				
Signature: _____ Date: _____				

Permit Taken By: tmm	Date Applied For: 07/16/2009	Zoning Approval
-------------------------	---------------------------------	------------------------

- This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
- Building permits do not include plumbing, septic or electrical work.
- Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work..

Special Zone or Reviews	Zoning Appeal	Historic Preservation
<input type="checkbox"/> Shoreland	<input type="checkbox"/> Variance	<input type="checkbox"/> Not in District or Landmark
<input type="checkbox"/> Wetland	<input type="checkbox"/> Miscellaneous	<input type="checkbox"/> Does Not Require Review
<input type="checkbox"/> Flood Zone	<input type="checkbox"/> Conditional Use	<input type="checkbox"/> Requires Review
<input type="checkbox"/> Subdivision	<input type="checkbox"/> Interpretation	<input type="checkbox"/> Approved
<input type="checkbox"/> Site Plan <i>OK</i>	<input type="checkbox"/> Approved	<input type="checkbox"/> Approved w/Conditions
Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/>	<input type="checkbox"/> Denied	<input type="checkbox"/> Denied
Date: <i>cl</i>	Date:	Date: <i>Requires A</i>



*Any exterior work requires A
 Separate Review and Approval*

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE		DATE	PHONE

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

to schedule your inspections as agreed upon

Permits expire in 6 months, if the project is not started or ceases for 6 months.

The Owner or their designee is required to notify the inspections office for the following inspections and provide adequate notice. Notice must be called in 48-72 hours in advance in order to schedule an inspection:

By initializing at each inspection time, you are agreeing that you understand the inspection procedure and additional fees from a "Stop Work Order" and "Stop Work Order Release" will be incurred if the procedure is not followed as stated below.

A Pre-construction Meeting will take place upon receipt of your building permit.

 X **Final inspection of barriers or alarm systems**

Certificate of Occupancy is not required for certain projects. Your inspector can advise you if your project requires a Certificate of Occupancy. All projects DO require a final inspection.

If any of the inspections do not occur, the project cannot go on to the next phase, REGARDLESS OF THE NOTICE OR CIRCUMSTANCES.

CERIFICATE OF OCCUPANICES MUST BE ISSUED AND PAID FOR, BEFORE THE SPACE MAY BE OCCUPIED.

Signature of Applicant/Designee

Date

Signature of Inspections Official

Date

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 09-0742	Date Applied For: 07/16/2009	CBL: 145 A003001
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Location of Construction: 714 Stevens Ave	Owner Name: Westbrook Seminary & Junior	Owner Address: 716 Stevens Ave	Phone:
Business Name:	Contractor Name: Favreau Electric Inc	Contractor Address: Portland	Phone:
Lessee/Buyer's Name	Phone:	Permit Type: Fire Alarm System	

Proposed Use: Install Fire Alarm System	Proposed Project Description: Install Fire Alarm System
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Dept: Zoning **Status:** Approved with Conditions **Reviewer:** Marge Schmuckal **Approval Date:** 07/17/2009

Note: **Ok to Issue:**

- 1) This permit is being approved on the basis of plans submitted. Any deviations shall require a separate approval before starting that work.

Dept: Building **Status:** Approved with Conditions **Reviewer:** Chris Hanson **Approval Date:** 07/31/2009

Note: **Ok to Issue:**

- 1) Alarm system must meet section 907 of the IBC 2003.

Dept: Fire **Status:** Approved with Conditions **Reviewer:** Capt Keith Gautreau **Approval Date:** 07/22/2009

Note: **Ok to Issue:**

- 1) Fire Alarm system shall be maintained.
If system is to be off line over 4 hours a fire watch shall be in place.
Dispatch notification required 874-8576.
- 2) Fire alarm system requires a Masterbox connection per city ordinance.
Masterbox design and installation shall be as approved by City Electrical Division.
- 3) The Fire alarm and Sprinkler systems shall be reviewed by a licensed contractor[s] for code compliance.
Compliance letters are required.
- 4) The fire alarm system shall comply with NFPA 72 and Fire Department Technical Standard. A compliance letter is required.
- 5) Installation of a Fire Alarm system requires a Knox Box to be installed per city ordinance
- 6) System acceptance and commissioning must be co-ordinated with alarm and suppression system contractors and the Fire Department. Call 874-8703 to schedule.
- 7) All fire alarm records required by NFPA 72 should be stored in an approved cabinet located at the FACP and keyed alike, labeled "FIRE ALARM RECORDS".

Comments:

7/22/2009-gautreauk: Did a pre - C of O Inspection on 7/21/09 with Mike Collins and Mike Menario. Everything looked in order. I have the compliance letter from RB Allen dated 7/16/09. The system will have to be tested at the final inspection next week. KG



Fire Alarm Permit

JUL 16 2009

If you or the property owner owes real estate or property taxes or user charges on any property within the city, payment arrangements must be made before permits of any kind are accepted.

Installation address: 716 STEVENS AVE. CBL: _____

Exact location: (within structure) TOTAL BUILDING

Type of occupancy(s) (NFPA & ICC): _____

Building owner: UNIVERSITY OF NEW ENGLAND

System Designer: RB ALLEN INC.

Designer phone: 657-2457 E-mail: TIM BIRON@rballen.com

Installing contractor: FAVREAU ELECTRIC, INC. License No: MC 60015869

Contractor phone: 725-2005 E-mail: FAVREAU-ELECTRIC.COM

This is a new application: YES NO

This is an amendment to an existing permit: YES NO Permit no: _____

The following documents have been provided with this application:

- Floor plans: YES NO
- Wiring diagram: YES NO
- Annunciator details: YES NO
- Bid specifications: YES NO
- Equipment data sheets: YES NO
- Battery & voltage drop calculations: YES NO
- Sequence of operations: YES NO
- Designer/ personnel qualifications: YES NO

COST OF WORK:	\$ 39,850.00
PERMIT FEE:	
(\$10 PER \$1,000 + \$30 FOR THE FIRST \$1,000)	
\$ 1000	- \$ 30
38850	- 388.50
	<u>\$ 418.50</u>

Please submit all of the information outlined on the checklist to the Building Inspections Department, 389 Congress Street, Room 315, Portland, Maine 04101.

Prior to acceptance of any fire alarm system, a complete commissioning and acceptance test must be coordinated with all fire system contractors and the Fire Department, and proper documentation of such test(s) provided.

All installation(s) must comply with NFPA 70, NFPA 72, and Fire Department Technical Standard(s).

Applicant signature: [Signature] Date: 7/16/09

690742

FAVREAU ELECTRIC, INC.

37 Jordan Avenue
P.O. Box 598
BRUNSWICK, MAINE 04011

LETTER OF TRANSMITTAL

DATE	7/16/09	PROJECT	3181
ATTENTION			
NO.	UNE -		
	COLLEGE OF		
	PHARMACY		
	FIRE ALARM		

(2 7) 725-2005

TO CITY OF PORTLAND
ATTN: CAPT. GATREAU

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:

Shop drawings Prints Plans Samples Specifications

Copy of letter Change order

1 SET	CAD DRAWINGS
1 SET	BLEPRINTS
1 SET	BID SPECIFICATIONS & SEQ. OF OPERATIONS
1 SET	PRODUCT SUBMITTALS
1 SET	TEST & CERTIFICATION REPORTS

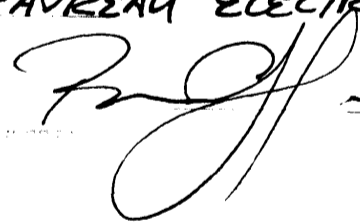
REVISIONS TO BE INDICATED BELOW

<input checked="" type="checkbox"/> For your use	<input type="checkbox"/> Approved as noted	<input type="checkbox"/> Submit	<input type="checkbox"/> Copies for distribution
<input type="checkbox"/> For review and comment			

REMARKS

PLEASE FIND THE REQUIRED DOCUMENTATION
SPECIFIED BY THE FIRE ALARM PERMIT
APPLICATION. ANY QUESTIONS, PLEASE CALL ME
@ 751-5804

BRIAN COFFIN
PROJECT SUPERVISOR
FAVREAU ELECTRIC, INC.



JUL 16 2009

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SECTION 283111 - DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 REFERENCES

- A. This Section covers the specification of fire detection and alarm systems.
- B. Refer to SECTION 260010, SECTION 260500, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS and applicable parts of DIVISION 1 for other general requirements.
- C. The system and all associated operations shall be in accordance with the following:
 - 1. Guidelines of the following Building Code: 2003 International Building Code
 - 2. NFPA 72; National Fire Alarm Code
 - 3. NFPA 70; National Electrical Code
 - 4. NFPA 101; Life Safety Code
 - 5. NFPA 90A; Standard for the Installation of Air Conditioning and Ventilating Systems
 - 6. Other applicable NFPA standards
 - 7. Local Jurisdiction Adopted Codes and Standards
 - 8. ADA Accessibility Guidelines

1.02 SCOPE

- A. Provide labor, materials, equipment, services and transportation necessary for complete and operational fire alarm systems as shown on Contract Drawings and specified herein, including but not limited to following:
- B. A new intelligent reporting microprocessor controlled addressable fire alarm and detection system, shall be provided in accordance with the project specifications and drawings, to include, but not be limited to:
 - 1. Heat and smoke detectors.
 - 2. Duct smoke detectors.
 - 3. Speakers/strobes.
 - 4. Horns/strobes.
 - 5. Magnetic door holders.
 - 6. Fire fighter's phones.
 - 7. Sprinkler flow/tamper tie-ins.
 - 8. Manual pull stations.
 - 9. Elevator re-call system tie-in.
 - 10. Elevator main power disconnect tie-in
 - 11. Smoke damper tie-ins.
 - 12. Status command center (annunciator).
 - 13. Main command center and battery cabinet.
 - 14. Addressable interface modules (monitor and control).
 - 15. Device identification.
 - 16. Testing.

17. Warrantee.
18. Manual controls for smoke control.
19. Interface to building HVAC Building Management System (BAS) to initiate mode control functions.
20. Provide monitoring of automatic transfer switches and generator system. Provide programming so that a contact closure will cause a trouble alarm to show up on FACP and secondary reporting location, i.e., security, fire command center, fire department entrance, 24-hour manned location. Locate addressable monitoring modules adjacent to the item monitored.
21. Monitoring of fire pump status
22. Interface with existing fire alarm system.

C. Systems Commissioning

D. Related Work Under Other Divisions

1. Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks and release devices that interface with the fire alarm system.
2. This Contractor shall coordinate work in this section with all related trades. Work and/or equipment provided in other sections and related to the fire alarm system shall include, but not be limited to:
 - a. Duct smoke detectors to be installed by the Mechanical Contractor. See Division 23. They shall be furnished, wired and connected to the fire alarm system by this Contractor.
 - b. Air handling system, smoke exhaust fan and smoke damper control circuits and fan status contacts to be provided by the fan systems control equipment. See Division 23. They shall be wired and connected to the fire alarm system by this Contractor.
 - c. Stairwell smoke hatch/vent control circuits to be provided by each hatch/vent. They shall be wired and connected to the fire alarm system by this Contractor.
 - d. Sprinkler water flow alarm and valve tamper switches to be provided and installed by the Fire Protection Sprinkler Contractor. See Division 23. They shall be wired and connected to the fire alarm system by this Contractor.
 - e. Elevator communications circuit wiring (trail cables) and installation of alarm notification devices to be provided by the Elevator Contractor. See Division 14.
 - f. Elevator recall control circuits to be provided by the elevator control equipment. See Division 14. They shall be wired and connected to the fire alarm system by this Contractor.
 - g. Elevator shaft smoke hatch/vent control circuits to be provided with by hatch/vent. See Division 14. They shall be wired and connected to the fire alarm system by this Contractor.
 - h. Coordinate with all other trade contractors for the mounting of and/or interfacing with any and all other fire alarm system related devices.

1.03 DEFINITIONS

- A. FACP: Fire alarm control panel.
- B. LED: Light-emitting diode.

- C. NICET: National Institute for Certification in Engineering Technologies.
- D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated to include, but not be limited to:

- 1. Heat and smoke detectors
- 2. Audio and visual units
- 3. Fire alarm pull stations
- 4. Control panels
- 5. Battery unit
- 6. Charger
- 7. Wiring, conduit and accessories
- 8. Hangers and supports
- 9. Addressable monitor and control interface modules
- 10. Door holders
- 11. Remote LCD annunciator/Voice Command Center for fire alarm system devices
- 12. Fire Fighter's telephone handset, cabinet and jacks

- B. Shop Drawings:

- 1. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire alarm system design.
 - b. Fire alarm certified by NICET, minimum Level III.
- 2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
- 3. Device Address List: Coordinate with final system programming.
- 4. System riser diagram in AutoCad compatible format with device addresses, conduit sizes, and cable and wire types and sizes.
- 5. Wiring Diagrams in AutoCad compatible format: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code. Indicate final outlet locations on floor plans showing address of each addressable device. Show size and route of cable and conduits.
- 6. Batteries: Size calculations.
- 7. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
- 8. Voice/Alarm Signaling Service: Equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
- 9. Include manufacturer's name(s), model numbers, ratings, power requirements, and device arrangement.
- 10. Show annunciator layout, configurations and terminations.
- 11. Submit samples as requested.

- C. Qualification Data: For Installer.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP. Manuals shall include the following:
 - 1. Manufacturer's name(s), including technical data sheets.
 - 2. Wiring diagrams that indicate internal wiring for each device and the interconnections between the items of equipment.
 - 3. Clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.
 - 4. Manufacturer's roughing-in diagrams and written product specifications and instructions for installation, operation and maintenance, suitable for inclusion in maintenance manuals.
 - 5. Copies of manufacturer's published product warranties. Include standard or typical riser and wiring diagrams.
- F. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 1 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review.
- G. Documentation:
 - 1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.
- H. Certifications:
 - 1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.
- I. The Contractor also shall include the following information in the equipment submittal:
 - 1. Power Calculations
 - 2. Voltage drop calculations demonstrating worst-case condition.
 - 3. Complete manufacturer's catalog data including technical data, physical dimensions, finish and mounting requirements. Data describing more than one type of item shall be clearly marked to indicate the type the Contractor intends to provide for a given application.
 - 4. Statements shall be included, with copies of required licensing, verifying the qualifications of the installer as specified.

1.05 RECORD DRAWINGS

- A. Prior to final inspection and instruction period, deliver the following items in duplicate to the Architect:
1. Certificate by manufacturer of fire alarm system, which states that system has been properly installed, adjusted and tested.
 2. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replacement parts.
 3. "As-Built" riser diagrams in AutoCad compatible format that indicates each piece of equipment and interconnecting wiring; and complete diagrams of internal wiring for each piece of equipment, including "as-built" revisions. Diagrams shall identify wiring terminals and wiring sequences to facilitate installation, operation and maintenance.

1.06 APPLICABLE STANDARDS AND APPROVALS

- A. The specifications and standards listed below form a part of this specification. The system and its components shall fully comply with the latest accepted edition of these standards.
1. National Fire Protection Association (NFPA):
 - a. NFPA 12 CO₂ Extinguishing System
 - b. NFPA 13 Fire Prevention Code
 - c. NFPA 15 Water Spray Systems
 - d. NFPA 16 Foam/Water Deluge and Spray Systems
 - e. NFPA 72 National Fire Alarm Code
 - f. NFPA 101 Life Safety Code
 2. Underwriters Laboratories Inc. (UL):
 - a. UL 268 Smoke Detectors for Fire Protective Signaling Systems
 - b. UL 864 Control Units for Fire Protective Signaling Systems
 - c. UL 268A Smoke Detectors for Duct Applications
 - d. UL 521 Heat Detectors for Fire Protective Signaling Systems
 - e. UL 464 Audible Signaling Appliances
 - f. UL 38 Manually Actuated Signaling Boxes
 - g. UL 346 Waterflow Indicators for Fire Protective Signaling Systems
 - h. UL 1076 Control Units for Burglar Alarm Proprietary Protective Signaling Systems
 - i. UL 1971 Visual Notification Appliances
 3. Factory Mutual (FM)
 4. State and Local Building Codes.
 5. All requirements of the Authority Having Jurisdiction (AHJ).
 6. Distributor of fire alarm to be approved UUIS certified company.
- B. The system shall have proper listing and/or approval from the following nationally recognized agencies:
1. UL – Underwriters Laboratories, Inc.

2. FM – Factory Mutual

1.07 GUARANTEE

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.
 - 1. Control panel shall carry a minimum of a 2-year warranty
 - 2. Initiating devices shall carry a minimum of a 3-year warranty.

1.08 SYSTEM INSTRUCTION AND SERVICE

- A. Furnish services of competent, factory-trained engineer to instruct Owner's maintenance personnel in operation and maintenance of system.
- B. Furnish one-year contract with equipment manufacturer, for maintenance and inspection service with minimum of two inspections during contract year. Contract shall be effective from date of acceptance testing approval and shall be at no additional cost to the Owner, i.e., included in bid price.

1.09 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Personnel certified by NICET as Fire Alarm Level III.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. System and equipment shall meet NFPA, UL, NEMA and related Code requirements.
- E. Complete system shall be furnished by single factory-authorized vendor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide complete fire alarm system by Gamewell.

2.02 FIRE ALARM SYSTEM – GENERAL

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

- B. The system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001.
- C. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer or division thereof.
- D. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and shall be in compliance with the UL listing.

2.03 FIRE ALARM SYSTEM - PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 72, current accepted Edition.
- B. Fire alarm signal initiation shall be by one or more of the following devices:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Flame detectors.
 - 4. Smoke detectors.
 - 5. Verified automatic alarm operation of smoke detectors.
 - 6. Automatic sprinkler system water flow.
 - 7. Fire extinguishing system operation.
- C. Fire alarm signal shall initiate the following actions:
 - 1. Alarm notification appliances shall operate continuously.
 - 2. Identify alarm at the FACP and remote annunciators.
 - 3. De-energize electromagnetic door holders.
 - 4. Transmit an alarm signal to the remote alarm receiving station.
 - 5. Unlock electric door locks in designated egress paths.
 - 6. Release fire and smoke doors held open by magnetic door holders.
 - 7. Activate voice/alarm communication system.
 - 8. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
 - 9. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
 - 10. Record events in the system memory.
 - 11. Record events by the system printer.
- D. Supervisory signal initiation shall be by one or more of the following devices or actions:
 - 1. Operation of a fire-protection system valve tamper.
- E. System trouble signal initiation shall be by one or more of the following devices or actions:
 - 1. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
 - 2. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of primary power at the FACP, remote control panel or remote annunciator panel.
 - 4. Ground or a single break in FACP internal circuits.

5. Abnormal ac voltage at the FACP.
6. A break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at the FACP or annunciator.
9. Fire-pump power failure, including a dead-phase or phase-reversal condition.
10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.

F. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP and remote annunciators. Record the event on system printer.

2.04 FIRE ALARM SYSTEM - OPERATION

A. Activation of any manual fire alarm station, heat or smoke detector or waterflow switch shall cause all of the following to occur throughout the building.

1. All system audible alarm devices sound continuously until the alarm condition has been manually acknowledged and reset.
2. All system visual alarm devices to flash until the alarm condition has been acknowledged and reset.
3. All door holdback devices to de-energize to cause all associated fire doors to close.
4. Shut down HVAC units as indicated.
5. LCD displays on main fire alarm control and all secondary panels with LCD displays shall display alarm condition, device initiating the alarm and location of device.
6. Signal fire shutters to close without delay. Coordinate with architectural hardware schedule.
7. Transmit alarm condition to local Fire Department and on campus monitoring station via leased telephone line. Coordinate with local authorities and Owner for exact requirements and provisions necessary for a complete interface.
8. Activation of two or more smoke detectors located on stage is to send a signal to the fusible link and release the smoke hatches.
9. If any (2) smoke detectors in an atrium zone or any (1) fire protection system flow switch in an atrium zone are in alarm, the BMS shall be signaled to initiate atrium smoke exhaust sequence.

B. Activation of a smoke detector shall cause all of the above to occur, plus it shall cause its integral alarm lamp to be energized until the alarm condition of the detector has been reset.

C. Activation of AHU duct smoke detectors shall cause the same sequence as space smoke detectors and shall shut down associated AHU fans.

D. Alarm activation of any (2) cross zoned elevator lobby smoke detectors, elevator machine room smoke detectors or any single elevator shaft smoke detector shall cause the same sequence as space smoke detector and shall cause the following:

1. Shall cause the recall of that bank of elevators to the terminal floor and the lockout of controls. In the event of recall initiation by detector(s) in the terminal floor, the recall shall be to the alternate floor.
2. Elevator recall activation shall also cause activation of all required hoistway vents to open and mechanical ventilation fans to operate in fire emergency smoke evacuation mode.

- E. Alarm activation of a preaction system control panel due to preaction system detector initiation shall cause the same sequence as a space detector.
 - F. Activation of any initiating device shall cause all of the following to occur in the areas designated for voice evacuation only:
 - 1. All system emergency evacuation speakers to sound a pre-signal "slow whoop" tone for a period of six (6) seconds.
 - 2. All system visual alarm devices to flash until the alarm condition has been acknowledged and reset.
 - 3. "Slow whoop" tone shall again sound for six (6) seconds followed by another round of the emergency evacuation message.
 - 4. "Slow whoop" tone shall then sound continuously until the alarm condition has been acknowledged and reset.
 - 5. Signal dimming system(s) to bring lighting to full intensity.
 - G. The emergency voice evacuation message shall be recorded in a female voice and shall be approved by the Authority Having Jurisdiction.
 - H. Sprinkler Supervisory Devices
 - 1. The activation of any sprinkler supervisory tamper switch shall activate the system supervisory service audible signal and cause a discrete LCD readout to indicate supervisory condition at the control panel. Differentiation between valve tamper activation and opens and/or grounds on the initiation circuit shall be provided.
 - 2. Pressing the supervisory service acknowledge key shall silence the supervisory audible signal while maintaining the supervisory discrete LCD display indication condition.
 - 3. Restoring the valve to the normal position shall cause restoration of the fire alarm system to normal.
 - I. Any alarms shall be displayed on an 80 character LCD display. The top line of 40 characters shall be the point label and the second line shall be the device type identifier. The system alarm LED shall flash on the control panel until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the control panel. The LCD display shall show the alarm information.
 - J. The remote status panel shall mimic the control panel operation.
 - K. All alarms shall be displayed on an LCD style annunciator. Annunciator shall list all alarm zones and be located next to or integrated into the Main Control Panel.
 - L. Visual Signals: All visual signals shall be synchronized to flash in unison. Visual signals shall be wired on a separate signal circuit from audible devices.
- 2.05 FIRE ALARM SYSTEM - SUPERVISION
- A. Sprinkler valve and low pressure supervisory devices shall be wired through an addressable module on the addressable loop. Device activation shall cause a supervisory alarm at the control panel.

- B. Disarrangement of conditions of any circuit shall not affect the operation of other circuits.
- C. Each independently supervised circuit shall include a discrete LCD readout to indicate disarrangement conditions per circuit.
- D. Each addressable device shall have a discrete LCD readout to indicate status (alarm or trouble condition).
- E. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel. A green "power" LED shall be displayed continuously while incoming power is present.
- F. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated on the control panel.
- G. The system modules shall be electrically supervised for module placement. Should a module become disconnected, the system trouble indicator shall illuminate and the audible trouble signal shall sound.
- H. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.
- I. Wiring to annunciator and serial status panel shall be supervised for open and ground conditions. A separate annunciator trouble LCD readout shall be provided. It shall illuminate an audible trouble signal shall sound at the control panel upon the detection of an open or ground condition.

2.06 FIRE ALARM CONTROL PANEL (FACP)

- A. General Description:
 - 1. Modular, microprocessor-based Central Processing Unit (CPU), power-limited design with electronic modules, UL 864 listed.
 - 2. System shall be provided with 250 addressable initiating points at a minimum.
 - 3. Addressable initiation devices that communicate device identity and status.
 - a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at the FACP.
 - b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
 - 4. Addressable control circuits for operation of mechanical equipment.
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, three lines of 80 characters, minimum.

2. Keypad: Arranged to permit entry and execution of programming, display, and control commands; and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

C. Circuits:

1. Signaling Line Circuits: NFPA 72, Class B, Style 4.
 - a. System Layout: Install no more than **100 50** addressable devices on each signaling line circuit. Provide a minimum of two line circuits per floor. SLC circuits shall be arranged such that if one-half of a floor becomes inoperable it will not inhibit the operation of the other half.
2. Notification-Appliance Circuits: NFPA 72, Class B, Style Y.
3. A single ground or open on the system signaling line circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
4. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage until the alarm signal is processed and recorded.
5. Notification Appliance Circuit speaker circuits shall be arranged such that there is a minimum of **one two** speaker circuits per floor of the building or smoke zone whichever is greater.
6. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.
7. Notification Appliance Circuit horn circuits and control equipment shall be arranged such that loss of any one (1) horn circuit will not cause the loss of any other horn circuit in the system.
8. Actuation of alarm notification appliances, annunciation, smoke control, elevator recall, and actuation of suppression systems shall occur within 10 seconds after the activation of an initiating device.
9. Audible Notification Circuits shall be provided with 20% spare capacity per circuit for future expansion.
 - a. Speaker circuit capacity shall be based on all speakers set at a minimum of 1 watt per speaker unless higher wattage speakers are specified on drawings.
10. Visual Notification Circuits shall be provided with 20% capacity per circuit for future expansion.
 - a. Visual circuit capacity shall be based on each visual unit having a light output of 15/75 candelas.
11. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.

- D. Smoke-Alarm Verification for Space Smoke Detectors:
1. Initiate audible and visible indication of an "alarm verification" signal at the FACP.
 2. Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
 3. Record events by the system printer.
 4. Sound general alarm if the alarm is verified.
 5. Cancel FACP indication and system reset if the alarm is not verified.
- E. Notification-Appliance Circuit: Operation shall sound in a temporal pattern, complying with ANSI S3.41.
- F. Elevator Controls: Heat detector operation shuts down elevator power by operating a shunt trip in a circuit breaker feeding the elevator.
1. A field-mounted relay actuated by the fire detector or the FACP closes the shunt trip circuit and operates building notification appliances and annunciator.
- G. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.
- H. Acknowledge Switch:
1. Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition.
 2. Depression of the Acknowledge Switch shall also silence all remote annunciator piezo sounders.
- I. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP and remote annunciators after initiating devices are restored to normal.
1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
 2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
 3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.
 4. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
- J. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

- K. System Reset Switch:
 - 1. Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
- L. Lamp Test:
 - 1. The Lamp Test switch shall activate all system LEDs and light each segment of the liquid crystal display.
- M. The remote annunciator panel at the fire fighter building entrance shall have an externally mounted "on-off-auto" switch for fire department manual control of atrium smoke exhaust system.
- N. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and control of changes in those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and make a print-out of the final adjusted values on the system printer.
- O. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a DACT and telephone lines.
- P. Service Modem: Ports shall be RS-232 for system printer and for connection to a dial-in terminal unit.
 - 1. The dial-in port shall allow remote access to the FACP for programming changes and system diagnostic routines. Access by a remote terminal shall be by encrypted password algorithm.
- Q. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble), and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including the same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.
- R. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal shall be powered by the 24-V dc source.
 - 1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
 - 2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM SYSTEM POWER."

- S. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.
 - 1. Batteries: Sealed lead acid.
 - 2. Batteries shall provide 24 hours of standby and 15 minutes of alarm notification without recharging.
 - 3. Battery capacity shall be a minimum of 125% of calculated requirement.
- T. Surge Protection:
 - 1. Provide surge protectors as recommended by the FACP on all system wiring external to the building housing the FACP.
 - 2. Transient voltage surge suppressor manufacturer nameplate to be visible without mechanically removing panels, equipment, etc. If nameplate cannot be readily visible, provide manufacturer, model number and surge rating on exterior of enclosure.
- U. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.07 NOTIFICATION APPLIANCE CIRCUIT POWER EXTENDER

- A. The power extender panel shall be stand-alone capable of powering a minimum of four (4) notification appliance circuits. Notification appliance circuits shall be Class B, Style Y rated at 2 Amp each. Panel shall provide capability to be expanded to eight (8) notification appliance circuits.
- B. The internal power supply and battery charger shall be capable of charging up necessary Amp/hour batteries internally or externally mounted.
- C. The power extender panel may be mounted close to the host control panel or can be remotely located. The addressable extender panel, when connected to an addressable panel, shall connect to the host panel via a communications channel. Via the channel, each output can be individually controlled for general alarm or selective area notification.
- D. For network connected power extender panels, up to five panels may be connected on a single (Class A wired) channel.
- E. When connected to a conventional (non-addressable panel) one or two standard notification appliance circuits from the main control panel may be used to activate all the circuits on the power extender panel.
- F. Alarms from the host fire panel shall signal the power extender panel to activate. The panel shall monitor itself and each of its notification appliance circuits for trouble conditions and shall report trouble conditions to the host panel.

2.08 MANUAL FIRE ALARM BOXES

- A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.
1. Single-action mechanism, with integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
 2. Double-action mechanism requiring two actions to initiate an alarm with integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
 3. Station Reset: Key- or wrench-operated switch.
 4. Indoor Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 5. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm.

2.09 SYSTEM SMOKE DETECTORS

- A. General Description:
1. UL 268 listed, operating at 24-V dc, nominal.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 3. Multipurpose type, containing the following:
 - a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 - b. Piezoelectric sounder rated at 88 dBA at 10 feet (3 m) according to UL 464.
 - c. Heat sensor, combination rate-of-rise and fixed temperature.
 4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
 7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
 - a. Rate-of-rise temperature characteristic shall be selectable at the FACP for 15 or 20 deg F (8 or 11 deg C) per minute.
 - b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at the FACP to operate at 135 or 155 deg F (57 or 68 deg C).
 - c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

C. Ionization Smoke Detector:

1. Sensor: Responsive to both visible and invisible products of combustion. Self-compensating for changes in environmental conditions.
2. Detector Sensitivity: Between 0.5 and 1.7 percent/foot (0.0016 and 0.0056 percent/mm) smoke obscuration when tested according to UL 268A.

D. Beam-Type Smoke Detector: Each detector shall consist of a separate transmitter and receiver, and shall have the following features:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Adjustable Sensitivity: At least six sensitivity levels, settable at the receiver, measured as percent of obscuration.
3. Two selectable alarm delay settings, allowing each to be associated with a corresponding sensitivity.
4. Trouble signal delay, fixed at 20 seconds.
5. Separate Color-Coded LEDs: Indicate normal, alarm, and trouble status with remote indicator panels.

E. Remote Air-Sampling Detector System: Includes air-sampling pipe network, a laser-based photoelectric detector, a sample transport fan, and a control unit.

1. UL 268 listed, operating at 24-V dc, nominal.
2. Pipe Network: Electrical metallic tubing connects control unit with designated sampling holes.
3. Smoke Detector: Particle-counting type with continuous laser beam. Sensitivity adjustable to a minimum of three preset values.
4. Sample Transport Fan: Centrifugal type, creating a minimum static pressure of 0.05-inch wg (12.5 Pa) at all sampling ports.
5. Control Unit: Single or multi-zone unit as indicated. Provides same system power supply, supervision, and alarm features as specified for the central FACP plus separate trouble indication for airflow and detector problems.
6. Signals to the Central FACP: Any type of local system trouble is reported to the central FACP as a composite "trouble" signal. Alarms on each system zone are individually reported to the central FACP as separately identified zones.

F. Duct Smoke Detectors:

1. Photoelectric Smoke Detectors:
 - a. Sensor: LED or infrared light source with matching silicon-cell receiver.
 - b. Verify detector sensitivity below with manufacturers selected. Increased and decreased sensitivities are available to meet special environmental requirements.

- c. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.
2. Ionization Smoke Detectors:
 - a. Sensor: Responsive to both visible and invisible products of combustion. Self-compensating for changes in environmental conditions.
 - b. Verify detector sensitivity below with manufacturers selected. Increased and decreased sensitivities are available to meet special environmental requirements.
 - c. Detector Sensitivity: Between 0.5 and 1.7 percent/foot (0.0016 and 0.0056 percent/mm) smoke obscuration when tested according to UL 268A.
 3. UL 268A listed, operating at 24-V dc, nominal.
 4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 5. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.
 - a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.
 6. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
 7. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where indicated.
 8. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
 9. Each sensor shall have multiple levels of detection sensitivity.
 10. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
 11. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.10 SYSTEM HEAT DETECTORS

- A. General: UL 521 listed.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.
 1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
 - 1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

2.11 NOTIFICATION APPLIANCES

- A. Description: Equipped for mounting as indicated and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
- B. Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing the operating mechanism behind the bell. Bells shall produce a sound-pressure level of 94 dBA, measured 10 feet (3 m) from the bell. 10-inch (254-mm) size, unless otherwise indicated. Bells are weatherproof where indicated.
- C. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
- D. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
- E. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn. Horns are weatherproof where indicated.
- F. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 - 1. Rated Light Output: 75 candela, unless otherwise noted on drawings.
 - 2. Strobe Leads: Factory connected to screw terminals.
 - 3. All strobe flashes to be synchronized.
 - 4. Strobes are weatherproof where indicated.
- ~~G. Audible alarm in animal holding areas: Silentone Alarm as manufactured by ViewPoint Life Sciences Inc. Animal holding areas include Animal Holding Rooms, Procedure Rooms, Quarantine Rooms, and Hallways 022, 023, 025, 031, and 039.~~

2.12 SPRINKLER SYSTEM REMOTE INDICATORS

- A. Remote status and alarm indicator and test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single-gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.13 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.
 - 1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
 - 2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.
 - 3. Rating: 24-V ac or dc.
 - 4. Rating: 120-V ac.
- B. Material and Finish: Match door hardware.

2.14 REMOTE ANNUNCIATOR

- A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Flush cabinet, NEMA 250, Class 1.
- B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.15 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.
- B. Integral Relay: Control module capable of providing a direct signal.

2.16 DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT)

- A. Listed and labeled according to UL 632.
- B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP, and automatically captures one or two telephone lines and dials a preset number for a remote central station. When contact is made with the central station(s), the signal is transmitted. The unit supervises up to two telephone lines. Where supervising 2 lines, if service on either line is interrupted for longer than 45 seconds, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. When telephone service is restored, unit automatically reports that event to the central station. If service is lost on both telephone lines, the local trouble signal is initiated.
- C. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity is adequate to comply with NFPA 72 requirements.
- D. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.17 SYSTEM PRINTER

- A. Listed and labeled as an integral part of the fire alarm system.

2.18 GUARDS FOR PHYSICAL PROTECTION

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by manufacturer of the device.
 - 2. Finish: Paint of color to match the protected device.

2.19 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, but sized as recommended by system manufacturer not less than No. 18 AWG.
 - 1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 14 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
 - 3. Multi-conductor Armored Cable: NFPA 70 Type MC, copper conductors, TFN/THHN conductor insulation, copper drain wire, copper armor with red identifier stripe, UL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.
- D. Notification circuit wiring assembly from the point the notification circuit leaves the fire alarm system control panel or transponder to the point the circuit enters the notification zone it serves shall be listed with a 2-hour fire rating by a recognized testing agency.
- E. Wiring for networking cabling between fire alarm system control panels and transponders shall be listed with a 2-hour rating by a recognized testing agency. Acceptable 2-hour rated cabling systems are:
 - 1. Type "CI" cable in metal raceway.
 - 2. Type "MI" cable.

2.20 SMOKE CONTROL SYSTEM INTERFACE

- A. Provide a dry contact closure output to signal the BMS for each of the points shown below. Coordinate with Division 23. Contact outputs for the fans systems shall be located in each of

the mechanical rooms and output for general alarm and atrium alarm shall be located in the fire command center.

1. Any alarm condition
 2. Atrium alarm condition
 3. Duct smoke alarm condition for air handling units return fans as required
 4. Duct smoke alarm condition for other stair pressurization fans as required
- B. Provide six spare dry contact outputs and related programming for future needs.
- C. Provide all interface modules required for complete system interface.

~~2.21~~ ~~ADDITIONAL MATERIALS AND DEVICES~~

~~A. Include the following quantities of materials and devices that are in addition to that shown on the drawings. All materials and devices noted here shall be inspected for physical damage and missing parts. Materials and devices that have no physical damage and no missing parts shall be repackaged into original packaging and stored onsite where directed by the Agency's Representative for "Attic Stock". Any materials and devices that were damaged or have missing parts shall be replaced.~~

QUANTITY	DESCRIPTION
4	Magnetic door holder
4	Strobe only unit
8	Speaker/Strobe or Horn/Strobe
4	Pull station
12	Smoke Detector
2	Heat Detector
4	Fire alarm addressable interface module

PART 3 - EXECUTION

3.01 GENERAL

- A. General: Install system and materials in accordance with manufacturer's instructions, rough-in drawings and details on the drawings. Install electrical work and use electrical products complying with requirements of applicable Division 26 sections. Wiring types shall be included in shop drawings.
- B. Wiring: The term wiring is defined to include the providing of cable, wire, conduit and miscellaneous materials as required for mounting and connecting of electrical devices.
- C. Duct detector sampling tubes will be furnished by Division 26 and installed by Division 23. Flow and tamper switches will be furnished and installed by Division 23 and will be wired by Division 26. Coordinate with Division 23.

- D. Wet or damp locations shall require a NEMA rated enclosure suitable for the environment in which an addressable field device or module are to be installed. (i.e., monitoring of sprinkler water flow, tamper switches and OS&Y valves).
- E. Termination enclosures shall be, as a minimum, NEMA 12 rated. Termination junction boxes shall be of adequate size and room to facilitate ease of accessibility to work on wiring and to provide ample space for proper identification labeling. Enclosure design shall incorporate the use of a back plate within the enclosure to provide ease of installation. Terminal blocks shall be affixed to a secured mounting rail. Terminal enclosures shall be painted fire department red and stenciled "Interior Fire Alarm System".
- F. All conduits shall be bonded to the grounded electrode system by approved ground clamps with a conductor equal in size to the largest conductor used in the system; but in no case shall the ground conductor be smaller than No. 12 AWG.
- G. All openings in fire rated walls, floors or ceilings where conduits, cables or wiring trays pass through shall be fire-stopped with an approved fire-proofing material rated to meet or exceed the rating of the assembly penetrated.
- H. Structural steel fireproofing shall not be removed or degraded during the installation of fire protection conduits, conduit hangers, clamps, enclosures or cabling unless properly repaired or replaced with an approved compatible fireproofing material consisting of proper depth and density. Should the fireproofing repairs prove inadequate, the installing contractor shall be responsible for adhesion and cohesion testing by an independent testing company and repair as needed.
- I. Wire nuts or other solderless splicing devices shall not be used.
- J. All nominal voltage branch circuit power feeds (120 VAC) shall be identified (labeled) at both ends of the circuit to indicate its source and purpose.
- K. Splices in electrical conductors in vertical risers are prohibited except when the length of conductors exceeds 150 feet in vertical risers, an approved terminal cabinet shall be used.

3.02 EQUIPMENT INSTALLATION

- A. Smoke or Heat Detector Spacing:
 - 1. Smooth ceiling spacing shall not exceed 30 feet (9 m).
 - 2. Spacing of smoke and heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.
- B. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
- C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.
- D. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.

- E. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- F. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- G. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- H. Visible Alarm-Indicating Devices: ~~Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling, but no higher than 80 inches AFF in accordance with ADA requirements.~~
- I. Final locations of audio notification devices shall be coordinated with Architect. Final placement and audible levels selected shall ensure that any occupied space receives an audible alarm signal 15 dB higher than the average ambient noise level or 5 dB higher than the highest sound level having a minimum one minute duration. During testing, sound levels shall be measured and recorded to demonstrate compliance.
- J. Audible circuits shall be provided to allow every device in the circuit to operate at its highest sound output setting.
- K. Visual devices shall be installed and located in accordance with ANSI 117.A, NFPA 72, and manufacturer's recommendations. Where requirements conflict, the strictest of the three requirements shall be followed.
- L. Visual circuits shall be provided with sufficient capacity to allow every visual unit in the circuit to be rated for 110 candela.
- M. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage. Detectors installed prior to final trade cleanup shall be replaced at no cost to the Owner.
- N. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- O. Wiring shall be installed exposed or in EMT. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit. Wiring shall not be installed in plenum spaces unless permitted by the NEC.
- P. 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.
- Q. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

- R. Transposing or changing color coding of wires shall not be permitted. All conductors shall be labeled on each end and at all splices with "Brady type tags" identifying circuit type and number.
- S. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- T. FACP: Surface mount with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.
- U. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

3.03 RACEWAY INSTALLATION

- A. All conduits and junction boxes shall be painted red.
- B. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
- C. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Where conduit cannot be run concealed in finished areas, coordinate locations of surface-mounted metal raceway with Architect prior to installation.

3.04 WIRING INSTALLATION

- A. Install wiring according to the following:
 - 1. NECA 1.
 - 2. TIA/EIA 568-A.
- B. Where notification circuit wiring is installed in a smoke zone other than the smoke zone the circuit serves, the wiring shall be installed as a 2-hour fire-rated assembly from the point the wiring exits the source panel to the smoke zone being served.
- C. Network between control panels, transponders and fire command panels shall be installed as 2-hour fire-rated assembly.
- D. A minimum of two notification circuits shall be provided for each smoke zone.
- E. Wiring Method:
 - 1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 - 2. Fire-Rated Cables: Use of 2-hour fire-rated fire alarm cables, NFPA 70 Types MI and CI, is permitted. Type "MI" cable shall be bundled together with stainless steel straps 2'-0" on center.
 - 3. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

- F. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded. All controls, function switches, etc., shall be clearly labeled on all equipment panels. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
1. All terminations in FACP and other junction points shall have "Brady type tags" indicating circuit type, identifying number, and opposite end termination point.
- G. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- H. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- I. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum 1-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
- 3.05 IDENTIFICATION
- A. Identify system components, wiring, cabling, and terminals according to Division 26 Section "Basic Electrical Materials and Methods - Electrical."
 - B. Install instructions frame in a location visible from the FACP.
 - C. Paint power-supply disconnect switch red and label "FIRE ALARM."
- 3.06 GROUNDING
- A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.
- 3.07 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
 1. Provide manufacturer certified and trained technicians and representatives for testing, supervision and assistance in the installation of the fire alarm system. Connections and terminations shall be made under the direct supervision of the fire alarm manufacturer.

Equipment manufacturer shall be responsible for tests, programming, adjustment and calibration of the equipment.

B. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.
 - a. Include the existing system in tests and inspections.
3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72, and shall include, but not be limited to, the following:
 - a. Test every device and operation, including test by simulation of trouble, in presence of Owner and Architect. Notify Owner, Architect and interested parties of testing, 72 hours in advance.
 - b. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.
 - 1) Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity and insulation.
 - 2) Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
 - 3) Verify activation of all waterflow switches.
 - 4) Open initiating device circuits and verify that the trouble signal actuates.
 - 5) Open and short signaling line circuits and verify that the trouble signal actuates.
 - 6) Open and short notification appliance circuits and verify that trouble signal actuates.
 - 7) Ground all circuits and verify response of trouble signals.
 - 8) Check presence and audibility of tone at all alarm notification devices.
 - 9) Check installation, supervision and operation of all intelligent smoke detectors using the walk test.
 - 10) 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.

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

- c. Engineer/Architect shall be notified prior to test, and written documentation of successful test forwarded to the Architect and Engineer for record.

5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

3.08 ACCEPTANCE TESTING

- A. Pre-test the entire system and all functions to verify complete operation. After correct operation is verified, notify the Fire Department or Authority Having Jurisdiction, Owner and the Architect that system is complete and ready for acceptance testing. Provide testing at a time mutually agreeable to all parties. Provide a minimum one-week notice.
- B. Operate every building fire alarm device to ensure proper operation, correct annunciation at each remote annunciator and control panel. One-half of all tests shall be performed on standby power. Where applying heat would destroy any detector, they may be manually operated. The initiating circuit and signaling circuits shall be opened in at least two locations per zone to check to the presence of correct supervisory circuitry.
- C. The Contractor shall perform all electrical and mechanical tests required by the equipment manufacturer's certification form. All test and report costs shall be in the contract price. A checkout report shall be prepared by the installation technicians and submitted in triplicate, one copy of which will be registered with the equipment manufacturer. The report shall include, but not be limited to:
 1. A complete list of equipment installed and wired.
 2. Indication that all equipment is properly installed and functions and conforms to these specifications.
 3. Test of individual devices.
 4. Locations by zone address and model number for each installed devices.
 5. Voltage (sensitivity) settings for each photoelectric detector as measured in place with the HVAC system operating.
 6. Response time on the thermostats and flame detectors (if used).
 7. Technician's name, state license number and date.
- D. Manufacturer's representative shall provide written certificate from equipment supplier indicating his acceptance of the entire system. Certificate shall be addressed to the Architect, with a copy to the Engineer.
- E. Final approval of the completed system and the testing shall be by the Authority Having Jurisdiction.

3.09 FINAL INSPECTION

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

3.10 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.
- B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.
- C. Semiannual Test and Inspection: Six months after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- D. Annual Test and Inspection: One year after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, semiannual, and annual periods. Use forms developed for initial tests and inspections.

3.11 SYTEM INSTRUCTION, TRAINING AND SERVICE

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 1 Sections for Closeout Procedures and Demonstration and Training.
- B. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.
- C. Training
 - 1. Conduct two (2) training sessions of four (4) hours each to familiarize the Owner's personnel with the features, operation and maintenance of the new systems. Training sessions shall be scheduled with the Owner at a time mutually agreeable to the Contractor and the Owner.
- D. The Contractor and/or the systems manufacturer's representative shall provide a typewritten "Sequence of Operation" to the Owner.

3.12 COORDINATION WITH AUTHORITY HAVING JURISDICTION

- A. All programming and visual identification shall be approved by the local authority prior to installation.