ADDENDUM NO. 1 – March 8, 2024

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated February 16, 2024.

Acknowledge receipt of this Addendum in the space provided on the BID FORM. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of 7 pages and revised Specification Sections and Drawings as noted.

The following items clarify, modify, change, delete from or add to the Contract Documents. When any paragraph, subparagraph, or sub-subparagraph thereof is modified or deleted by this Addendum, the unaltered provisions of that paragraph, subparagraph, sub-subparagraph shall remain in effect.

NOTE: THE FOLLOWING SPECIFICATION SECTIONS HAVE BEEN MODIFIED IN THIS ADDENDUM #1 AS LISTED BELOW:

CHANGES TO SPECIFICATIONS:

1. Section 012300 - ALTERNATES

    - Add 3.1.C Alternate No. 3: General contractor performance and payment bonds.
    - Add 3.1 D Alternate No. 4: Provide Builders Risk Insurance

2. Section 064113 – WOOD-VENEER-FACED ARCHITECTURAL CABINETS

    - Delete section 1.4.B.5
    - Delete section 1.5.B
    - Delete the portion of section 1.6.A – Shop is a certified participant in AWI's Quality Certification Program.
    - Delete section 1.6.B
    - Delete section 2.2.A.1

3. Section 102213 – WIRE MESH PARTITIONS

    - Delete sections 2.3.B, 2.3.C, 2.3.D, 2.3.E, 2.3.F
    - Delete sections 2.4.B, 2.4.C, 2.4.D, 2.4.E, 2.4.F, 2.4.G, 2.4.H, 2.4.I, 2.4.J, 2.4.K, 2.4.L

4. Section 113100 – RESIDENTIAL APPLIANCES

    - Delete section 1.3 ALLOWANCES in its entirety. Appliances should be part of the base bid.

5. Section 284621.11 – ADDRESSABLE FIRE-ALARM SYSTEMS:

    - Add section in its entirety.

NOTE: ALL DRAWING SHEETS AS LISTED BELOW WILL BE DELETED AND REPLACED IN THEIR ENTIRETY PER THIS ADDENDUM.

CHANGES TO DRAWINGS:

Civil:

1. C1.0 – Demolition Plan

    a. Provided additional demolition notes for along NW Moore Street related to the sanitary sewer relocation.

    b. Revised or added notes 26, 28, and 29.

2. C1.1 – Parking Lot Demolition Plan (Bid Alternate 2)

    a. Provided additional demolition notes 10-13.

    b. Provided notes for removal of sidewalk southwest of new parking area for proposed ADA stalls.

3. C2.0 – Site Plan

    a. Added callout for sidewalk curb detail 017.

    b. Added note and detail callouts for the reconstruction work along NW Moore Street related to the sanitary sewer relocation.

    c. Added detail 701 for integral sidewalk and retaining wall, only to be included with Bid Alternate 1 for dog park.

4. C2.1 – Parking Lot Site Plan (Bid Alternate 2)

    a. Added notes for construction of sidewalk curb ramps southwest of new parking area.

    b. Provided additional hatching for various curb types.

5. C3.0 – Dimension Plan

    a. Provided additional dimensions for clarity.

6. C4.1 – Detailed Grading Plan

    a. Provided some additional points and notes for clarity.

    b. Added spot grades along north retaining wall.

7. C4.2 – ADA Grading Plan

    a. Provided some additional points and notes for clarity.

8. C4.3 – Dog Park Detailed Grading Plan (Bid Alternate 1)

    a. Provided some additional points for clarity.

9. C4.4 – Parking Lot Detailed Grading Plan (Bid Alternate 2)

    a. Provided some additional points for clarity.

10. C5.0 – Pre-Construction Erosion Control Plan

    a. Provided additional inlet protection on west side.

11. C6.0 – Utility Plan

    a. Added note W20 for adjustment of water valve lid on east side.

    b. Provided additional notes related to site lighting.

    c. Removed backflow vault callouts. Backflow preventer to be installed on interior of building now.

    d. Adjusted location of domestic water service line.

12. C7.1 – Construction Details 2

    a. Removed detail 800.

    b. Added sidewalk curb detail 017.

    c. Detail 022 was moved to this sheet.

13. C7.2 – Construction Details 3

    a. Added integral sidewalk and wall detail 701.

    b. Detail 022 was removed from this sheet.

14. C7.3 – Construction Details 4

    a. Added concrete driveway entrance detail.

    b. Removed backflow vault detail.

<u>Architectural:</u>

1. A1.8 – FIRST AND SECOND FLOOR PLANS - ATRIUM

    a. Detail 1 – Added chase to hide plumbing drainpipe.

2. A1.9 – THIRD, FOURTH AND ROOF FLOOR PLANS - ATRIUM

    a. Detail 2 – Added missing low roof information.

3. A4.1 – DOOR SCHEDULE

    a. Added screen door information at apartment swing balcony door.

4. A6.3 – WALL SECTIONS

a. Detail 3 – Added Resilient Tile Flooring System for use during customization.

5. A7.1 – INTERIOR ELEVATIONS

a. Revised the quantity of pullout trays from 2 to 3 in every pantry.

Interior:

1. I0.0 – GENERAL NOTES, FINISH KEY, AND ABBREVIATIONS

a. Revised note 19 to include resident rooms.

Structural:

1. S0.1- GENERAL NOTES AND TYPICAL DETAILS

a. Updated 4/S0.1 to coordinate with Geotechnical report.

2. S1.6- FOUNDATION PLAN- ATRIUM

a. Added foundation wall where grade is above finished floor.

3. S2.1- FOUNDATION SECTIONS AND DETAILS

a. Added section 11/S2.1.

Electrical:

1. E0.0 – ELECTRICAL SYMBOL LEGEND & ABBREVIATIONS

a. Update Code Summary

2. E0.1 – ELECTRICAL DETAILS

a. Deleted detail numbers 95 and 96.

3. E0.4 – ELECTRICAL SITE PLAN

a. Revised Generator Monitor/Control Wiring Diagram.

b. Revised Equipment Elevation Details Plan Note #4 & #5.

4. E2.1 – FIRST FLOOR PLAN - POWER

a. Added GFIC receptacles in elevator pits.

b. Added junction box for power for automatic door opener.

c. Added Remote Generator Annunciator Panel to Vestibule E104.

d. Deleted General Note “A”.

5. E2.2– SECOND FLOOR PLAN - POWER

a. Deleted General Note “A”.

6. E2.3– THIRD FLOOR PLAN - POWER

    a. Deleted General Note “A”.

    b. Added power for Smoke Evac Damper actuator in Atrium E301.

    c. Added plan note #5.

7. E2.4– FOURTH FLOOR PLAN - POWER

    a. Deleted General Note “A”.

    b. Added power for Smoke Evac Damper actuator in Atrium E301

    c. Added plan note #7.

    d. Added disconnect switches in both elevator shafts for power for elevator lighting.

    e. Added plan note #8.

8. E2.5– ROOF PLAN - POWER

    a. Revise all General Notes.

    b. Add Plan notes #2 & #3.

    c. Added wire and conduit sizes for SEVF units.

    d. Added receptacle on roof next to SEVF-2.

9. E4.1– ELECTRICAL ONE-LINE DIAGRAM

    a. Increase size of circuit breaker in Generator.

    b. Increase ATS to 150A.

    c. Increased feeders to and from ATS to 150A.

    d. The circuit breaker in Distribution Board NLDPA to the ATS is a 150A adjustable LSI.

    e. Change (3) 600A circuit breakers in Distribution Board NLDPA from 600A to 400A.

    f. Change feeder sizes to panels NLDP1, NLDP2 and NLDP3 to 400A.

    g. Change feeders to all LC-D1 and LC-D2 panels to 125A.

    h. Change feeder to Elevator #1 to 80A.

    i. Added (3) RTUs to one-line to show feeder sizes.

    j. Revised Pan Notes #5, #7 & #8.

    k. Added Plan Note #9

l. Changed AIC ratings of panels NLP2, NLP3 & NLP4 to 10,000 AIC.

m. Added feeder 125-SE to Feeder Schedule.

10. E5.1– PANELBOARD SCHEDULES

    a. See revisions to panels NLDP1, NLDP2, NLDP3, NLDP4 & EMLP1

11. E5.2– PANELBOARD SCHEDULES

    a. See revisions to panels NLP1, NLP2, NLP3 & NLP4.

12. E5.3– PANELBOARD SCHEDULES

    a. See revisions to panels LC-B & LC-C

13. E6.1– FIRST FLOOR PLAN – FIRE ALARM

    a. Added TS connection to stairwell.

    b. Added smoke detector in Mailroom/Lounge E106.

    c. Added pull station in Vestibule E108.

    d. Added FS and (3) TS to Water Heaters room E136.

    e. Added TS to ramp in Atrium.

14. E6.2– SECOND FLOOR PLAN – FIRE ALARM

    a. Added FA Horn in Corridor E200.

    b. Added smoke detector in Corridor E200.

    c. Added (2) smoke detectors in Atrium E201.

    d. Added smoke detector in Lounge E206.

15. E6.3– THIRD FLOOR PLAN – FIRE ALARM

    a. Added smoke detector in Lounge E306.

    b. Added (2) FA Horns in Corridor E300.

    c. Added smoke detector in Corridor E300.

    d. Added (2) smoke detectors in Atrium E301

    e. Added (2) smoke detectors in Atrium E201

16. E6.4– FOURTH FLOOR PLAN – FIRE ALARM

    a. Added smoke detector in Lounge E406.

b. Added smoke duct detector in Res. Closet E402.

c. Added (2) smoke detectors in Atrium E301

d. Added (2) smoke detectors in Atrium E201

e. Added Plan Notes #12 & #13

17. E6.5–FIRE ALARM RISER

a. Modified Riser Diagram

b. Added Atrium Smoke Evacuation System Interface notes

c. Revised System Sequence of Operations for Smoke Detector in Atrium

d. Revised Plan Notes #5, #6, #7, #8 & #10.

18. E6.6– FIRE ALARM DETAILS

a. Revise Detail #4

b. Revise Detail #5.

Low Voltage:

1. LV0.0 – SYMBOLS LEGEND & DETAILS

a. Revised notes and added symbol to legend.

2. LV0.1 – LOW VOLTAGE DETAILS

a. Revised riser details and notes.

3. LV1.1 – FIRST FLOOR PLAN – LOW VOLTAGE

a. Revised card reader location at main Vestibule.

END OF ADDENDUM NO. 1

SECTION 284621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Addressable fire-alarm system.
2. Fire-alarm control unit (FACU).
3. Manual fire-alarm boxes.
4. System smoke detectors.
5. Duct smoke detectors.
6. Carbon monoxide detectors.
7. Heat detectors.
8. Fire-alarm notification appliances.
9. Emergency responder radio coverage system.
10. Fire-alarm remote annunciators.
11. Fire-alarm addressable interface devices.
12. Digital alarm communicator transmitters (DACTs).

B. Related Requirements:

1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" or Section 260523 "Control Voltage Electrical Power Cables" for cables and conductors for fire-alarm systems.

1.3 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. EMT: Electrical metallic tubing.

C. FACU: Fire-alarm control unit.

D. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

E. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the 2007 Energy Independence and Security Act (EISA).

F. NICET: National Institute for Certification in Engineering Technologies.

G. PC: Personal computer.

H. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.4 ACTION SUBMITTALS

A. Approved Permit Submittal: Submittals must be approved by authorities having jurisdiction prior to submitting them to Architect.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, and details, including details of attachments to other Work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Annunciatorpanel details as required by authorities having jurisdiction.
5. Detail assembly and support requirements.
6. Include voltage drop calculations for notification-appliance circuits.
7. Include battery-size calculations.
8. Include input/output matrix.
9. Include written statement from manufacturer that equipment and components have been tested as a system and comply with requirements in this Section and in NFPA 72.
10. Include performance parameters and installation details for each detector.
11. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
12. Provide control wiring diagrams for fire-alarm interface to HVAC; coordinate location of duct smoke detectors and access to them.

a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.

b. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' smoke-evacuation system.
c. Locate detectors in accordance with manufacturer's written instructions.

D. Delegated Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1. Drawings showing location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of device.
2. Design Calculations: Calculate requirements for selecting spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:

a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Record copy of site-specific software.
g. Provide "Inspection and Testing Form" in accordance with "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

h. Manufacturer's required maintenance related to system warranty requirements.
i. Abbreviated operating instructions for mounting at FACU and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media and approved online or cloud solution.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Smoke Detectors, Fire Detectors, : Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
5. Keys and Tools: One extra set for access to locked or tamperproofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in system. Provide in box or cabinet with compartments marked with fuse types and sizes.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Personnel must be trained and certified by manufacturer for installation of units required for this Project.
2. Installation must be by personnel certified by NICET as fire-alarm Level III technician.
3. Obtain certification by NRTL in accordance with NFPA 72.
4. Licensed or certified by authorities having jurisdiction.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:

1. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn-and-strobe notification for evacuation.

B. Performance Criteria:

1. Regulatory Requirements:

a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.

2. General Characteristics:

a. Automatic sensitivity control of certain smoke detectors.
b. Fire-alarm signal initiation must be by one or more of the following devices and systems:

1) Manual stations.
2) Heat detectors.
3) Flame detectors.
4) Smoke detectors.
5) Duct smoke detectors.
6) Carbon monoxide detectors.
7) Combustible gas detectors.
8) Automatic sprinkler system water flow.
9) Preaction system.
10) Fire-extinguishing system operation.
11) Fire standpipe system.
12) Dry system pressure flow switch.

c. Fire-alarm signal must initiate the following actions:

1) Continuously operate alarm notification appliances.
2) Identify alarm and specific initiating device at FACU, connected network control panels, off-premises network control panels,and remote annunciators.
3) Transmit alarm signal to remote alarm receiving station.
4) Unlock electric door locks in designated egress paths.
5) Release fire and smoke doors held open by magnetic door holders.
6) Activate voice/alarm communication system.
7) Switch HVAC equipment controls to fire-alarm mode.
8) Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
9) Close smoke dampers in air ducts of designated air-conditioning duct systems.
10) Recall elevators to primary or alternate recall floors.
11) Activate elevator power shunt trip.
12) Activate emergency lighting control.

13) Activate emergency shutoffs for gas and fuel supplies, except for shutoffs serving legally required life-safety systems such as emergency generators and fire pumps.
14) Record events in system memory.
15) Record events by system printer.

d. Supervisory signal initiation must be by one or more of the following devices and actions:

1) Valve supervisory switch.
2) High- or low-air-pressure switch of dry-pipe or preaction sprinkler system.
3) Elevator shunt-trip supervision.
4) Independent fire-detection and -suppression systems.
5) Zones or individual devices have been disabled.
6) FACU has lost communication with network.

e. System trouble signal initiation must be by one or more of the following devices and actions:

1) Open circuits, shorts, and grounds in designated circuits.
2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4) Loss of primary power at FACU.
5) Ground or single break in internal circuits of FACU.
6) Abnormal ac voltage at FACU.
7) Break in standby battery circuitry.
8) Failure of battery charging.
9) Abnormal position of switch at FACU or annunciator.
10) Voice signal amplifier failure.
11) Hose cabinet door open.

f. System Supervisory Signal Actions:

1) Initiate notification appliances.
2) Identify specific device initiating event at FACU, connected network control panels, off-premises network control panels,and remote annunciators.
3) Record event on system printer.
4) After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
5) Transmit system status to building management system.
6) Display system status on graphic annunciator.

g. Network Communications:

1) Provide network communications for fire-alarm system in accordance with fire-alarm manufacturer's written instructions.
2) Provide network communications pathway per manufacturer's written instructions and requirements in NFPA 72 and NFPA 70.

3) Provide integration gateway using BACnet for connection to building automation system.

h. System Printer:

1) Printer must be listed and labeled as integral part of fire-alarm system.

i. Device Guards:

1) Description: Welded wire mesh of size and shape for manual station, smoke detector, gong, or other device requiring protection.

a) Factory fabricated and furnished by device manufacturer.
b) Finish: Paint of color to match protected device.

j. Document Storage Box:

1) Description: Enclosure to accommodate standard 8-1/2-by-11 inch manuals and loose document records. Legend sheet will be permanently attached to door for system required documentation, key contacts, and system information. Provide two key ring holders with location to mount standard business cards for key contact personnel.
2) Material and Finish: 18-gauge cold-rolled steel; four mounting holes.
3) Color: Red powder-coat epoxy finish.
4) Labeling: Permanently screened with 1 inch high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink.
5) Security: Locked with 3/4 inch barrel lock. Provide solid 12 inch stainless steel piano hinge.

2.2 FIRE-ALARM CONTROL UNIT (FACU)

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Tyco International (Johnson Controls - SimplexGrinnell).

B. Description: Field-programmable, microprocessor-based, modular, power-limited design with electronic modules.

C. Performance Criteria:

1. Regulatory Requirements: Comply with NFPA 72 and UL 864.
2. General Characteristics:

a. System software and programs must be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining information through failure of primary and secondary power supplies.
b. Include real-time clock for time annotation of events on event recorder and printer.
c. Provide communication between FACU and remote circuit interface panels, annunciators, and displays.
d. FACU must be listed for connection to central-station signaling system service.

e. Provide nonvolatile memory for system database, logic, and operating system and event history. System must require no manual input to initialize in the event of complete power down condition. FACU must provide minimum 500-event history log.

f. Addressable Initiation Device Circuits: FACU must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.

1) Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: FACU must be listed for releasing service.

g. Fire-Alarm Annunciator: Arranged for interface between human operator at FACU and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and programming and control menu.

1) Annunciator and Display: LCD, 80 characters, minimum.
2) Keypad: Arranged to permit entry and execution of programming, display, and control commands.

h. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1) Pathway Class Designations: NFPA 72, Class A.
2) Pathway Survivability: Level 1.
3) Install no more than 100 addressable devices on each signaling-line circuit.
4) Install fault circuit isolators to comply with circuit performance requirements of NFPA 72 or with manufacturer's written instructions, whichever is more conservative.

i. Serial Interfaces:

1) One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
2) One USB port for PC configuration.

j. Smoke-Alarm Verification:

1) Initiate audible and visible indication of "alarm-verification" signal at FACU.
2) Activate approved "alarm-verification" sequence at FACU and detector.
3) Record events by system printer.
4) Sound general alarm if alarm is verified.
5) Cancel FACU indication and system reset if alarm is not verified.

k. Notification-Appliance Circuit:

1) Audible appliances must sound in three-pulse temporal pattern, as defined in NFPA 72.

2) Where notification appliances provide signals to sleeping areas, alarm signal must be 520 Hz square wave with intensity 15 dB above average ambient sound level or 5 dB above maximum sound level, or at least 75 dB(A-weighted), whichever is greater, measured at pillow.
3) Visual alarm appliances must flash in synchronization where multiple appliances are in same field of view, as defined in NFPA 72.

l. Elevator Recall: Initiate by one of the following alarm-initiating devices:

1) Elevator lobby detectors except lobby detector on designated floor.
2) Smoke detectors in elevator machine room.
3) Smoke detectors in elevator hoistway.

m. Elevator controller must be programmed to move cars to alternate recall floor if lobby detectors located on designated recall floors are activated.
n. Water-flow alarm connected to sprinkler in elevator shaft and elevator machine room must shut down elevators associated with location without time delay.

1) Water-flow switch associated with sprinkler in elevator pit may have delay to allow elevators to move to designated floor.

o. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls must be connected to fire-alarm system.
p. Remote Smoke-Detector Sensitivity Adjustment: Controls must select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change 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 print out final adjusted values on system printer.
q. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to remote alarm station.
r. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of central-control microphone. Amplifiers must comply with UL 1711.

1) Allow application of, and evacuation signal to, indicated number of zones and simultaneously allow voice paging to other zones selectively or in combination.
2) Programmable tone and message sequence selection.
3) Standard digitally recorded messages for "Evacuation" and "All Clear."
4) Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of FACU.

s. Status Annunciator: Indicate status of various voice/alarm speaker zones and status of firefighters' two-way telephone communication zones.
t. Preamplifiers, amplifiers, and tone generators must automatically transfer to backup units, on primary equipment failure.

u. 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 other printed indications. Also, print system reset event, including same information for device, location, date, and time. Commands initiate printing of list of existing alarm, supervisory, and trouble conditions in system and historical log of events.
v. Primary Power: 24 V(dc) obtained from 120 V(ac) service and power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and DACT and digital alarm radio transmitters must be powered by 24 V(dc) source.
w. Alarm current draw of entire fire-alarm system must not exceed 80 percent of power-supply module rating.
x. Secondary Power: 24 V(dc) supply system with batteries, automatic battery charger, and automatic transfer switch.
y. Batteries: Sealed, valve-regulated, recombinant lead acid.

D. Accessories:

1. Instructions: Computer printout or typewritten instruction card mounted behind plastic or glass cover in stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe functional operation of system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE-ALARM BOXES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Tyco International (Johnson Controls - SimplexGrinnell).

B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes must be finished in red with molded, raised-letter operating instructions in contrasting color; must show visible indication of operation; and must be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate alarm, breaking-glass or plastic-rod type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to FACU.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at top to permit lifting for access to initiate alarm. Lifting cover actuates integral battery-powered audible horn intended to discourage false-alarm operation.
4. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at top to permit lifting for access to initiate alarm.

2.4 SYSTEM SMOKE DETECTORS

A. Photoelectric Smoke Detectors:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Tyco International (Johnson Controls - SimplexGrinnell).

2. Performance Criteria:

    a. Regulatory Requirements:

        1) NFPA 72.
        2) UL 268.

    b. General Characteristics:

        1) Detectors must be four-wire type.
        2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
        3) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
        4) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
        5) Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
        6) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
        7) Operator at FACU, having designated access level, must be able to manually access the following for each detector:

            a) Primary status.
            b) Device type.
            c) Present average value.
            d) Present sensitivity selected.
            e) Sensor range (normal, dirty, etc.).

        8) Remote Control: Unless otherwise indicated, detectors must be digital-addressable type, individually monitored at FACU for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by FACU.
        9) Rate-of-rise temperature characteristic of combination smoke- and heat-detection units must be selectable at FACU for 15 or 20 deg F per minute.
        10) Sensitivity levels based on time of day.

2.5 DUCT SMOKE DETECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Tyco International (Johnson Controls - SimplexGrinnell).

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Detectors must be four-wire type.
b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
c. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
d. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
e. Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
f. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

1) Primary status.
2) Device type.
3) Present average value.
4) Present sensitivity selected.
5) Sensor range (normal, dirty, etc.).

g. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with supplied detector for smoke detection in HVAC system ducts.
h. Each sensor must have multiple levels of detection sensitivity.
i. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 CARBON MONOXIDE DETECTORS

A. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72
b. NFPA 720.
c. UL 2075.

2. General Characteristics:

a. Mounting: Adapter plate for outlet box mounting.
b. Testable by introducing test carbon monoxide into sensing cell.
c. Detector must provide alarm contacts and trouble contacts.
d. Detector must send trouble alarm when nearing end-of-life, power supply problems, or internal faults.

e. Locate, mount, and wire in accordance with manufacturer's written instructions.
f. Provide means for addressable connection to fire-alarm system.
g. Test button simulates alarm condition.

2.7 HEAT DETECTORS

A. Combination-Type Heat Detectors:

1. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 521.

b. General Characteristics:

1) Temperature sensors must test for and communicate sensitivity range of device.
2) Actuated by fixed temperature of 135 deg F or rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
3) Mounting: Twist-lock base interchangeable with smoke-detector bases.
4) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
5) Detector must have functional humidity range of 10 to 90 percent relative humidity.

2.8 FIRE-ALARM NOTIFICATION APPLIANCES

A. Fire-Alarm Audible Notification Appliances:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Tyco International (Johnson Controls - SimplexGrinnell).

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.

b. General Characteristics:

1) Individually addressed, connected to signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
2) Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

3) Horns: Electric-vibrating-polarized type, 24 V(dc); with provision for housing operating mechanism behind grille. Comply with UL 464. Horns must produce sound-pressure level of 90 dB(A-weighted), measured 10 ft. from horn, using coded signal prescribed in UL 464 test protocol.
4) Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Fire-Alarm Voice/Tone Notification Appliances:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Tyco International (Johnson Controls - SimplexGrinnell).

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 1480.

b. General Characteristics:

1) High-Range Units: Rated 2 to 15 W.
2) Low-Range Units: Rated 1 to 2 W.
3) Matching Transformers: Tap range matched to acoustical environment of speaker location.
4) Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

C. Fire-Alarm Visible Notification Appliances:

1. Manufacturers: Subject to compliance with requirements, provide products by the following only:

a. Tyco International (Johnson Controls - SimplexGrinnell).

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 1971.

b. General Characteristics:

1) Rated Light Output:

a) 15/30/75/110 cd, selectable in field.

2) Clear or nominal white polycarbonate lens mounted on aluminum faceplate.
3) Mounting: Wall mounted unless otherwise indicated.
4) Flashing must be in temporal pattern, synchronized with other units.
5) Strobe Leads: Factory connected to screw terminals.

2.9 EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

A. Description: Emergency responder radio coverage systems use a combination of bidirectional amplifiers and distributed antenna systems to boost signals for sustaining two-way radio communications throughout a facility, including stairwells, underground tunnels, parking garages, and other challenging areas.

B. Performance Criteria:

1. Regulatory Requirements:

a. In accordance with NFPA 72, emergency responder radio coverage systems must be designed, installed, and maintained in accordance with NFPA 1221.

2. General Characteristics:

a. Where emergency responder radio coverage system is used in lieu of two-way in-building wired emergency communications system, it must have pathway survivability of Level 1, 2, or 3 as defined in NFPA 72.
b. Where leaky feeder cable is used as antenna, it must neither be required to be installed in metal raceway nor meet survivability requirements.
c. Feeder and riser coaxial cables must be rated as plenum cables.
d. Feeder coaxial cables must be connected to riser coaxial cables using hybrid coupler devices of value determined by overall design.
e. Where emergency responder radio coverage system is used in lieu of two-way in-building wired emergency communications system, design of system must be approved by authorities having jurisdiction. Riser coaxial cables must be rated as riser cables and routed through 2-hour-rated enclosure.
f. Connection between riser and feeder coaxial cables must be made within 2-hour-rated enclosure, and passage of feeder cable in and out of 2-hour-rated enclosure must be firestopped to 2-hour ratings.

2.10 FIRE-ALARM REMOTE ANNUNCIATORS

A. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Annunciator functions must match those of FACU for alarm, supervisory, and trouble indications. Manual switching functions must match those of FACU, including acknowledging, silencing, resetting, and testing.

1) Mounting: Flush cabinet, NEMA 250, Type 1.

b. Display Type and Functional Performance: Alphanumeric display and LED indicating lights must match those of FACU. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.11 FIRE-ALARM ADDRESSABLE INTERFACE DEVICES

A. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Include address-setting means on module.
b. Store internal identifying code for control panel use to identify module type.
c. Listed for controlling HVAC fan motor controllers.
d. Monitor Module: Microelectronic module providing system address for alarm-initiating devices for wired applications with normally open contacts.
e. Integral Relay: Capable of providing direct signal to circuit-breaker shunt trip for power shutdown.

1) Allow control panel to switch relay contacts on command.
2) Have minimum of two normally open and two normally closed contacts available for field wiring.

f. Control Module:

1) Operate notification devices.
2) Operate solenoids for use in sprinkler service.

2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTERS (DACTs)

A. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. DACT must be acceptable to remote central station and must be listed for fire-alarm use.

b. Functional Performance: Unit must receive alarm, supervisory, or trouble signal from FACU and automatically capture one telephone line(s) and dial preset number for remote central station. When contact is made with central station(s), signals must be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter must initiate local trouble signal and transmit signal indicating loss of telephone line to remote alarm receiving station over remaining line. Transmitter must automatically report telephone service restoration to central station. If service is lost on both telephone lines, transmitter must initiate local trouble signal.

c. Local functions and display at DACT must include the following:

1) Verification that both telephone lines are available.
2) Programming device.
3) LED display.
4) Manual test report function and manual transmission clear indication.
5) Communications failure with central station or FACU.

d. Digital data transmission must include the following:

1) Address of alarm-initiating device.
2) Address of supervisory signal.
3) Address of trouble-initiating device.
4) Loss of ac supply.
5) Loss of power.
6) Low battery.
7) Abnormal test signal.
8) Communication bus failure.

e. Secondary Power: Integral rechargeable battery and automatic charger.

f. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Preinstallation Testing: Perform verification of functionality of installed components of existing system prior to starting work. Document equipment or components not functioning as designed.

B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service in accordance with requirements indicated:

1. Notify no fewer than seven days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Owner's written permission.

C. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.

3.3 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup must be replaced.
2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.

B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to existing monitoring equipment at supervising station.
2. Expand, modify, and supplement existing monitoring equipment as necessary to extend existing monitoring functions to new points. New components must be capable of merging with existing configuration without degrading performance of either system.

C. Equipment Floor and Wall Mounting: Install FACU on finished floor.

D. Install wall-mounted equipment, with tops of cabinets not more than 78 inch above finished floor.

E. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in normal path of egress within 60 inch of exit doorway.
2. Mount manual fire-alarm box on background of contrasting color.
3. Operable part of manual fire-alarm box must be between 42 and 48 inch above floor level. Devices must be mounted at same height unless otherwise indicated.

F. Smoke- and Heat-Detector Spacing:

1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with "Heat-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing must not exceed 30 ft..
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A in NFPA 72.
5. HVAC: Locate detectors not closer than 36 inch from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.

G. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

H. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend full width of duct. Tubes more than 36 inch long must be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

I. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

J. Remote Status and Alarm Indicators: Install in visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

K. Audible Alarm-Indicating Devices: Install not less than 6 inch below ceiling. Install bells and horns on flush-mounted back boxes with device-operating mechanism concealed behind grille. Install devices at same height unless otherwise indicated.

L. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inch below ceiling. Install devices at same height unless otherwise indicated.

M. Device Location-Indicating Lights: Locate in public space near device they monitor.

N. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that resists wind load of 100 mph with gust factor of 1.3 without damage.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

C. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.6 PATHWAYS

A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inch above floor must be installed in EMT.

B. Pathways must be installed in EMT.

C. Exposed EMT must be painted red enamel.

3.7 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.

1. Alarm-initiating connection to smoke-control system (smoke management) at firefighters' smoke-control system panel.
2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.

3. Smoke dampers in air ducts of designated HVAC duct systems.
4. Magnetically held-open doors.
5. Electronically locked doors and access gates.
6. Alarm-initiating connection to elevator recall system and components.
7. Alarm-initiating connection to activate emergency lighting control.
8. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
9. Supervisory connections at valve supervisory switches.
10. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
11. Supervisory connections at elevator shunt-trip breaker.
12. Data communication circuits for connection to building management system.
13. Data communication circuits for connection to mass notification system.
14. Supervisory connections at fire-extinguisher locations.
15. Supervisory connections at fire-pump power failure including dead-phase or phase-reversal condition.
16. Supervisory connections at fire-pump engine control panel.

3.8 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."

B. Install framed instructions in location visible from FACU.

3.9 GROUNDING

A. Ground FACU and associated circuits in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Ground shielded cables at control panel location only. Insulate shield at device location.

3.10 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
    b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.

2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for private operating mode in accordance with manufacturer's written instructions.

4. Test visible appliances for public operating mode in accordance with manufacturer's written instructions.
5. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.

B. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.

C. Fire-alarm system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. Provide video recording of training to Owner.

3.12 MAINTENANCE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service must include **12** months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections in accordance with "Visual Inspection Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in "Test Methods" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per "Testing Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.13 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement must include software support for two years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within **two** years from date of Substantial Completion. Upgrading software must include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least **30** days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

END OF SECTION