26 51 00.00 - LIGHTING

All recessed luminaires shall be equipped with necessary plaster frames and surface trim. All recessed fluorescent luminaires shall be equipped and suitably constructed to operate with "P" rated ballasts. All recess mounted incandescent and H.I.D. luminaires shall have UL approved thermal protection per latest edition of NFPA. All junction boxes and serviceable components (ballasts, thermal protection devices, fuses, etc.) for recessed luminaires shall be readily accessible for service or replacement from below the ceiling, without removing any ceiling components (other than tiles)

All luminaires utilized for emergency and/or egress lighting shall be connected ahead of switching. All ballasts of the same type shall be of the same manufacturer and catalog number. All lamps of the same type shall be of the same manufacturer and catalog number.

Light Emitting Diode (LED) Systems: Provide factory installed LED modules that are specifically designed for, and matched and mated to, the respective luminaire in which they are used. Provide LED modules that can easily be replaced in the field and are readily accessible for replacement. Provide color temperature as indicated in Luminaire Schedule. Provide factory installed driver(s) for the LED source utilized that are specifically coordinated to the LED source and luminaire in which they are used. Provide driver(s) having specific operating characteristics defined in the Luminaire Schedule. Provide driver(s) that can easily be replaced in the field and are readily accessible for replacement. Provide specification sheet for the specific driver as part of the Luminaire Submittal. Provide Total Harmonic Distortion (THD) rating of less than 20 percent. Provide factory-installed integral filtering system to ensure THD does not exceed 20 percent regardless of quantities and/or mixes with other manufactured LED systems.

Incandescent lamps shall be G.E., Sylvania or Philips, long life type (3000 hours). All incandescent lamps shall be inside frosted unless specifically directed otherwise. Provide socket adapters/extenders if required for accommodating the specified lamp.

Fluorescent lamps shall be programmed rapid start, energy saving type, minimum 75 CRI, minimum 20,000 hours rated. Lamps shall be G.E., Sylvania, Osram or Philips. Fluorescent lamp color temperature shall be as indicated on drawings or as directed in field. Provide low energy solid state rapid start electronic fluorescent lamp ballasts specifically designed for operating lamp types indicated. Fluorescent ballasts shall be equal to Motorola or Advance equal (less than or equal to 20% THD). All luminaires shown on drawings with multi-level switching shall be provided with multiple ballasts to accommodate same. All other luminaires may contain either single ballasts or multiple ballasts as required to fulfill required function and as required to comply with construction schedule.

All surface and recessed ceiling luminaires installed on grid or tile ceilings shall be installed to agree with module of ceiling either displacing a tile, or unit on center of tile, or centered on grid lines.

Provide luminaires and/or luminaire outlet boxes with hangers to properly support luminaire weight. All luminaires installed in or on suspended ceiling systems shall be anchored directly to the building structural system above (anchored per NFPA 70). Such anchoring shall be independent of the ceiling support system. All luminaires shall be installed plumb and level. Support surface mounted luminaires greater than 2 feet in length at a point in addition to the outlet box luminaire stud.

28 46 21.25 - FIRE ALARM SYSTEM EXTENSION

General:

Refer to Division 26 sections for requirements associated with all electrical work not specifically defined in this section, which shall be considered additional and concurrent scope of work that is associated with work of this section. Provide all work in strict compliance with all prevailing codes, standards and ordinances, including NFPA 70 and NFPA 72.

Qualifications of system designers, installers, programming personnel, inspection personnel, testing personnel and maintenance personnel shall be trained and certified by manufacturer for installation of units required for this Project, and shall be qualified in compliance with requirements of NFPA, including Chapter 10.5 of NFPA 72. Provide all materials, labor and services to provide fully operational modifications to and extensions of existing facility fire alarm system(s).

Provide submittals for equipment, materials and systems specified in this section. Include cuts, descriptive information, technical data, wiring diagrams, system battery calculations, plan-view layouts, legend, point-to-point wiring, etc. Identify all information that is specific to this project.

The fire alarm system supplier shall provide to the electrical contractor a complete set of floor plan drawings showing conduit sizes and number of conductors required to all components plus detailed wiring connections required at each type of device.

It shall be the responsibility of the Fire Alarm System Manufacturer to furnish submittals to the authority having jurisdiction for approval. This action shall be taken during the shop drawing procedure. The system must be approved by this authority and a copy submitted to the Engineer with the shop drawing submittal. All fire alarm system working drawings shall be provided by manufacturer.

Program detailed device and room descriptions so that any trouble, supervisory or alarm condition clearly annunciates floor level, room number, room name, device, and indication of normal, alarm, trouble and supervisory status at fire alarm control panel(s), at fire alarm annunciator panel(s) and at the supervising central station.

Initiating Device, Notification Appliance and Signaling Line Circuits: Class A or Class A and B (provide Class A for circuits that provide isolation for zone protection for zones). Provide power-limited cables that have a temperature rating of at least 60 degrees C; provide additional marking for conductor size and temperature ratings for cables rated in excess of 60 °C (140°F).

Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless owner and others have been notified with at least two-day notice and approval.

Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service.

Added Devices and Extension of Existing System:

Verify that existing fire-alarm system is operational without troubles before making changes or connections. Connect new equipment to existing control panel in existing part of the building.

Connect new equipment to existing monitoring equipment at the supervising station.

Expand, modify, and supplement existing control/monitoring equipment as necessary to extend existing control/monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class A, B, or A and B as required to match existing conditions.

Provide materials and labor as required to result in a fully operational extension and modification to the existing fire alarm system.

Where indicated on drawings, remove existing fire alarm devices in affected areas and protect during demolition and construction phases. Clean and reinstall these existing devices as indicated on drawings. Relocate devices as indicated on drawings and extend conduit and wiring as required. Modify and/or extend related existing wiring using code-compliant and landlord-compliant methods as required for a complete operational system.

Provide fire alarm system devices of the same manufacturer as, compatible with, and UL Listed and labeled for use on, the existing building fire alarm system.

Provide auxiliary contacts if required for special applications. All strobe alarms shall be compliant with NFPA and ADA.

Install wall-mounted devices at the following heights above finished floor:
Fire Alarm Manual Pull Stations: 46" to top of operating handle.
Fire Alarm Visual-Only and A/V Annunciators: 80" to bottom of outlet box.

All new wiring shall be installed in strict accordance with manufacturer's requirements.

The installation shall include a complete system test of the equipment by the local representative of the system installed. This test shall be performed in the presence of representatives of the Owner, and local fire department and other Authority/Authorities Having Jurisdiction (AHJ) if/as applicable.

Provide all required modifications (cards, power supplies, hardware, firmware, software, etc.) to the existing Fire Alarm system as required to render the entire extension fully operable.

The audio/visual and visual-only alarm indicating devices shall be red ADA-compliant units wall mounted at 6'8" to bottom of outlet box as shown on plans. Synchronize strobe units wherever required by any authority having jurisdiction, including ADAAG. Additionally, where required by local authority, the strobes shall meet ANSI S3.41 temporal code.

Provide isolation modules as/if required to isolate wire to wire shorts on a data loop to limit the number of other modules or detectors that are incapacitated by the short circuit fault and/or grounds. Isolation modules shall be part of the smoke detector base. The isolation modules shall permit the entire system to operate independently of the area disconnected by the isolation module due to wiring faults. Provide isolation modules and wiring configurations using Class A, or Class A and B, pathways for fault isolation so that any one fault will not cause any part of the system to go down other than the zone of the fault; provide zoning compliant with prevailing codes, including NFPA 72, with at least one zone per floor (more if areas are subdivided into multiple zones by fire and/or smoke barriers).

Provide monitor modules in quantities as required to interface all "non-intelligent" devices into the system. Application examples include fire alarm system remotes panels, remote power supplies, Sprinkler Flow Switches, etc. as applicable. Refer to documents of all trades since some such devices may not be specifically shown on electrical drawings. Review fire suppression system submittals and installation drawings to determine exact quantities and locations for devices that require monitor modules, as project drawings may not include all devices that require monitoring; provide monitor modules, wiring, connections, programming, etc. accordingly

Provide control modules for all auxiliary devices and all supervised control functions such as air handler shutdowns.

Provide ceiling mounted smoke detector located above each control/power unit (all types, including those for associated systems), and above all remote annunciators.
Provide ceiling mounted photoelectric smoke detector located above each Fire Alarm Control Unit (FACU), if not already existing.

Provide all required 120VAC power as required to energize all new fire alarm related components. This requirement applies whether or not such power work is shown on the drawings. Branch circuits serving fire alarm related equipment shall be dedicated to fire alarm related equipment only.

Duct Smoke Detectors:

Provide intelligent duct-mounted photoelectric smoke detectors to match fire alarm system. Install the duct detector in an indoor accessible location, positioned in the duct per NFPA. Provide sampling tube, test station and all other required accessories.

Unless otherwise required by prevailing code(s), provide all duct smoke detectors in the return air duct/plenum of the respective air handling equipment, or in multiple locations of the return duct branches if necessary to meet the minimum straight distances that are required by manufacturer of smoke duct detectors. Refer to HVAC ductwork drawings, and to HVAC installer's coordination drawings, for configurations when determining actual locations and quantities of duct smoke detectors. Where more than one detector is already indicated associated with a particular piece of air handling equipment, there are special reasons for the additional detectors (i.e. split returns, return risers serving multiple floors, etc.); coordinate all locations for same with the HVAC installer.

In cases where multiple HVAC units serve a common space, provide interlocking functionality so that activation of any one duct smoke detector (or spot smoke detector where applicable) provides shutdown functions for all HVAC units that collectively serve the affected space.

Provide all required power and control wiring so that upon detection of smoke, the following sequence of operations occurs: Report as alarm or supervisory signal to the fire alarm system and monitoring central station based on prevailing codes and direction from AHJ – verify in field with AHJ); The respective HVAC unit shuts down (including applicable dampers); Associated smoke dampers close, if present (wired and configured to automatically re-open on duct detector reset).

If required by authority having jurisdiction, provide identified key-operated air handler reset station on the ceiling or wall (flush in finished areas) beneath the air handler at discreet but readily visible location as determined in field unless specific location is shown on drawings. Provide engraved (or approved equivalent method) plate at each reset station to read: "#### Reset Switch to reset #### after a duct smoke detection event has been cleared and the fire alarm system has been reset.", where #### is the equipment identification used on drawings. Coordinate with authority having jurisdiction for verification of, or required modification to, the language to be engraved.
Connect to fire alarm system.

Smoke Dampers and Fire/Smoke Dampers

Provide all related power and control wiring. Provide 120VAC power (on emergency power where available) with a local keyed switch at the damper for servicing the unit. Provide control module (and relay if necessary) to provide wired/programmed control of the damper.
Where a damper is installed within a duct, provide duct smoke detector within five feet of the damper with no air outlets or inlets between the detector and the damper.
In cases where a duct smoke detector is not practical due to position or post-construction access, a photoelectric smoke detector may be provided inside the duct instead of a duct detector, with no air outlets or inlets between the detector and the damper.
In cases where ductwork is open to a plenum or similar application, photoelectric smoke detectors may be provided instead of a duct detector if a duct smoke detector is not practical due to position or post-construction access. Install within 12 inches of the opening and provide in quantities and spacing as required to comply with Part A.17.7.5.4.2.2 of NFPA 72 (one detector centered in opening for up to 36-inch wide duct, 2 detectors at one-quarter points of the opening for ducts between 36 and 72 inches wide, and one additional detector for each full 24 inches of opening beyond 72 inches wide).
Provide detectors that are listed for the respective air velocities, temperatures and humidity anticipated at the point where it is installed.
Unless the damper is part of a mechanical smoke control system, program/wire so that dampers close upon respective fan shutdown where local smoke detectors require a minimum velocity to operate.
Install smoke detection in strict compliance with all prevailing codes and regulations, including Parts 17.7.5.4 and 17.7.5.5 of NFPA 72.
Where a damper is installed above smoke barrier doors in a smoke barrier, provide one ceiling photoelectric smoke detector (listed for releasing service) on each side of the respective smoke barrier door opening.
Where a damper is installed within an unducted opening in a wall, provide one ceiling photoelectric smoke detector (listed for releasing service) on each side of the respective damper, within five feet horizontally of the damper.
Provide all required power/control wiring and programming so that, upon detection of smoke by any of the smoke detectors related to the respective damper, the following sequence of operations occurs as applicable.
Damper automatically closes.
Related HVAC unit shuts down.
Report as alarm or supervisory signal to the fire alarm system and monitoring central station based on prevailing codes and direction from AHJ – verify in field with AHJ).
Damper automatically resets (opens) upon successful reset of the fire alarm system after the initiating condition has been cleared.

END OF SPECIFICATION

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ELECTRICAL SPECIFICATIONS

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CHECKED BY	LGF
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SHEET NAME	E5.3

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