SECTION 3 ED: ELECTRICAL DIVISION

Latest Update 7-14-11, See underlined text

PART III: FIRE ALARM AND SECURITY SYSTEMS DESIGN:

1. SCOPE:

1.1. This part outlines the minimum requirements for the design procedures for the fire alarm and security systems, for new buildings, and repair and alteration projects for existing buildings on the UM campus.

2. FIRE ALARM SYSTEM:

2.1. The Authority Having Jurisdiction for fire safety at UM is the Maryland State Fire Marshall and his representative on this campus, the Office of Environmental Health and Safety.

2.2. The University maintains a central fire alarm monitoring, control and mass notification system, Network Command Center at the UM Pine Street Police Station, Environmental Health and Safety Building, Pearl Street Garage and Biological Park Police Station. The Communications Officer on duty at the Pine Street Police Station on duty summons Baltimore City Fire Department in the event of a fire emergency. The central fire alarm system network command center(s) is manufactured by Notifier. All individual buildings on the campus are connected through the campus fiber optic network thru the communications duct banks and cabling hubs. The University maintains three (3) central hubs for network connections which are located at Howard Hall, School of Nursing and Pearl Street Garage.

2.3. All buildings on the campus are provided with infrastructure, i.e each building has a new fire alarm control panel installed and ready for full monitoring and control. Regardless of the building type the fire alarm control panels installed are Notifier Model NFS-640 or NFS -3030. Communications to the Network Command Center shall be through the campus fiber optic backbone and central hubs. All work for the existing buildings shall be coordinated with the UM OFM Project Manager and the Fire Marshal.

2.4. For new buildings on the campus, provide a Notifier Model NFS-3030 addressable fire alarm control panel with voice capability and mass notification. As directed by UM, provide fiber optic cabling for interface connection to the central hubs. The cables are typically routed in University-owned duct bank, though Baltimore city duct bank also has been utilized.

2.5. Provide distributed system architecture by employing transponder panels for every block of three (3) floors. The transponder panel will serve as the distribution point for dedicated signaling line circuits (SLC) and Notification Appliance Circuits (NAC) to each of the three (3) floors. Do not use centralized amplifier systems or local booster panels for the NAC's. Provide a minimum of five (5) line isolation modules for each Class "A" SLC.

2.6. Regardless of building height, provide a voice-activated system with public address and selective paging capability. Horn-based notification appliances are only required in mechanical equipment spaces with high ambient noise levels that need to be overcome.

2.7. **High-Rise Building Fire Command Center (FCC) Requirements:** For those buildings defined as being high-rise, in addition to the fire alarm control panel (FACP) and fire alarm graphic annunciator panel (GAP) provide the following monitoring and control panels in the FCC:

a. **Smoke Control Panel:** Provided and installed by the local building automation system vendor. The panel should depict the major heating, ventilating, and air conditioning (HVAC) systems in the building and the spaces they serve along with their run status and an "auto-off" control switch (i.e. no hand position) for each HVAC system.

b. **Generator Status and Alarm Monitoring Panel:** Provided by the building genset vendor.

c. **Building Elevator System Status Panels:** Provided by the building elevator system vendor.

d. Dedicated phone line that bypasses UM's centralized switching system.

e. **Knox Box:** Provide a Knox-Box 3200 Series with hinged door (Knox-Box ph#800.552.5669) to store elevator keys.

2.8. **Smoke Detectors:** Smoke detectors shall be selected (ionization, photoelectric, temperature rise, or combinations) considering usage of the space being protected and the environment anticipated for special function rooms.

2.9. **Building HVAC System Duct Smoke Detector Control via the Automatic Temperature Control (ATC) System:** The following requirements apply to all building 'HVAC systems.' A building HVAC system is defined as an individual air circulation system comprised of a supply air system and a return air system. An HVAC system can be either a 100% outside air system or a re-circulating air system.

a. Per NFPA 90A, provide a duct smoke detector in the supply riser and in each floor's return air duct for each HVAC system over 15,000 cfm. In doing this, do not provide redundant detectors at the unit itself if they are already being provided at the floor locations.

b. For each duct detector, provide a remote LED indicator for quick identification of the detectors' location. At the floor locations, mount the remote LED at six (6) inches to twelve (12) inches below the ceiling in the wall. For detectors located in rooftop HVAC system units, mount the remote LED indicator just inside the units' mantrap door for quick identification. Do not include the test switch option with the remote LED indicator.

c. The building's ATC system will coordinate the shutdown of an HVAC system and its' associated smoke and fire dampers due to a duct smoke detector alarm from the fire alarm systems (FAS). Do not perform any direct interconnection between the duct smoke detector's contact outputs and the HVAC system starter(s) and any of its' smoke and fire dampers and damper actuators.

d. Provide a dedicated addressable relay for each HVAC system with duct smoke detectors regardless of the quantity of duct smoke detectors on the HVAC system. The output from the addressable relay will be used to represent a 'shutdown request' to the ATC system for the multiple duct smoke detectors on each HVAC system.

e. For each HVAC system, coordinate with the ATC contractor and locate the dedicated addressable relay next to the ATC network panel that will be used to receive a 'shutdown request' from the FAS due to a duct smoke detector alarm.

f. Since most buildings have several HVAC systems over 15,000 cfm, the above requirements will have several dedicated addressable relays next to the ATC panel(s). Again, provide a dedicated addressable relay for each HVAC system with duct smoke detectors and locate them next to the ATC panel(s).

g. Label each HVAC system's addressable relay to identify the HVAC system number and the device address of the relay.

h. If the above requirements are properly met, when a duct smoke detector goes into alarm the following sequence of events should occur:

(1) The detector reports a 'supervisory' signal to the FAS which is relayed to the UM central monitoring station as a 'supervisory' signal.

(2) The FAS will initiate a contact output from the addressable relay associated with the detector in alarm to the ATC system panel which in turn will execute shutting down the HVAC system and closing its' associated smoke and fire dampers.

2.10. Building HVAC Systems Dedicated for Life Safety Purposes: The fire alarm system directly monitors and controls stairwell pressurization fans, atrium exhaust systems, etc. Provide the following:

a. Provide a dedicated addressable relay for each fan motor. Using the addressable relay provide a control output to start and stop the fan motor and derive a status input from the starter for remote monitoring at the GAP.

b. At the GAP, provide dedicated key switches for each fan motor and separate 'run' and 'off' status LED's.

2.11. **Fire Alarm Graphic Annunciator Display Requirements:** Wall-mounted backlit panel indicating the varying floor plan layouts of the building. A typical plan can be used for those floors with identical layouts. The building graphic shall include the building outline, all stairs, all exterior doors, all elevators, the location of the fire department hose connection, the location of the fire alarm control panel, the location of the main sprinkler valve, a north arrow, a "You are Here" indication and the four sides of the building as directed by the University Fire Marshal. There shall be an LED provided on the building graphic at each stairwell, exterior door, elevator lobby, zone, and other location as directed by the University Fire Marshal. An "LED Matrix" shall also be provided to identify, by floor, the type of device (i.e. pull station, smoke detector, heat detector, water flow, duct detector, tamper switch). There should also be LED indication of the Fire Pump Running (RED), fire pump trouble (Yellow), and fire pump normal (Green). The color scheme for the rest of the panel shall be red for alarm, yellow for supervisory, trouble, and green for normal.

2.12. The fire alarm system shall be designed and constructed to meet or exceed ADA requirements, including those for application of audible and visual signals. Audible and visual signal concerns should be addressed separately in the design, so that code requirements may be met efficiently and effectively. It is not acceptable to simply place a combination audible/visual signal everywhere a visual or audible signal is needed. Intolerable sound levels created by excessive concentrations of audible signals must be avoided. In high ambient noise and/or difficult visibility areas such as mechanical rooms, high output signals such as sirens and rotating beacons shall be considered.

2.13. All new fire alarm systems should be addressable with alarm and event history log, separate dot-matrix printer, and graphic annunciator. Alphanumeric displays must be provided at the control panel.

2.14. Locate all pull stations and notification appliances in compliance with applicable handicap codes. Provide firestopper II weatherproof audible alarm covers on all pull stations at building exterior exit door locations and at all pull stations in Parking Garages.

2.15. All fire alarm systems should be designed with a field adjustable, five (5) to ten (10) minute timer to silence the alarm if not reset within the pre-set time. The timer is to be automatically reset with the fire alarm system reset.

2.16. All sprinkler valve supervisory switches should be connected to initiate a system trouble signal. All water flow alarm switches should be connected to initiate a system alarm signal. Tamper and water flow switches shall be connected to separate zones.

2.17. Provide elevator fireman's service in accordance with ANSI, NFPA and Elevator Codes.

2.18. The building fire alarm system shall recall all elevators to the main floor unless otherwise directed by elevator lobby smoke detectors.

2.19. Smoke detectors shall not be used in elevator lobbies where ambient conditions will subject them to false alarms. Heat detectors can be used where ambient conditions do not permit smoke detector usage.

2.20. Elevator machine room smoke and heat detectors shall only initiate supervisory signals to the fire alarm system.

2.21. Smoke and Heat detectors shall not be placed in elevator pits or shafts.

2.22. **Roof Top Fire Alarm Devices:** Regardless of building type and height, provide a horn-based weatherproof notification appliances and weatherproof rotating beacon lights indicating appliances on the roof of the building, connected to the building fire alarm system. Where packaged mechanical roof-top units are provided, provide voice-activated speakers and strobes in a weatherproof enclosure inside the packaged mechanical equipment. Consult with UM OFM Project Manager and the University Fire Marshal for exact requirements.

3. CCTV SYSTEM:

3.1. UM's Office of Public Safety operates a centralized CCTV system from Pine Street Police Station for surveillance of the campus streetscape. Strategically located remote control zoom/pan/tilt cameras on building rooftops permit UM Police Officers at the Pine Street Station communications desk to view pedestrian and vehicular activity on any of three central monitors. The Officer has the option to manually activate DVR recording. Each camera also has a dedicated 9" monitor located at the communications desk. Video transmission and camera control are accomplished over UM's optical fiber cable network.

3.2. Interior spaces are not monitored by the central system at Pine Street Station, but some buildings with special security needs, such as parking garages, may require a CCTV system within that facility.

3.3. Consult the UM OFM Project Manager and the electrical engineer for the product information on CCTV camera's, controllers, monitors, interface connections etc. for the UM central CCTV system. The central CCTV system shall include the following:

a. CCTV microprocessor controller with a video matrix switch and multiple distribution line controllers. The microprocessor controller and the matrix switch are to be located in the Pine Street Police station.

b. Outdoor mounted, multi-speed pan and tilt controlled cameras. All existing outdoor cameras are connected to the controller via fiber optic cables. Cameras are typically projected out from a corner mounting on building roofs to provide a full two hundred seventy (270) degree view of the streetscape below. Mounts shall have a mechanism to retrieve camera for convenient servicing on the roof. Mounts must be designed for the appropriate load and use. The entire construction including the means of attachment to the parapet or roof structure must be reviewed and certified by a registered professional engineer. All hardware must be stainless steel.

c. The following is a summary of the major components required for adding remote CCTV monitoring to a campus building. All additional components shall be compatible with the existing system:

(1) **Monitors:** Monitors shall be colored, nine (9) inch measured diagonally, 120V, AC, 60 HZ.

(2) **Outdoor Cameras:** Outdoor cameras shall be TCP/IP with the Integrated Fiber Module and Camera Dome which is an outdoor day/night high speed PTZ camera with variable speed drive, environmental housing, 23X high-resolution day/night camera/lens, optional fiber module with "up-the-fiber" capability and clear outer dome. Consult the vendor for information on mounting options and their part numbers.

(3) **Outdoor Camera Power Supply:** 120VAC input/28VAC output to camera. Mount this power supply in the local data closet where the fiber patch cord will be derived from for connecting the camera to the campus fiber backbone. Do not simply install an outlet concealed in the ceiling nearest to the camera. Put camera 120V power on local UPS serving the Facilities Ethernet Switch.

(4) **Video/Data Receiver:** At the head-end Video Matrix Switch(s) and Line Controllers at the Pine Street Police Building, provide a Video/Data Receiver; single fiber in, RS-422 and simplex video out.

4. ACCESS CONTROL AND INTRUSION DETECTION SYSTEMS:

4.1. **University Building Entrance Security System:** The complete security system of the project shall be clearly indicated in the contract documents, including a written description of the function and sequence of operation for each location, set of doors or secure area. The operation shall be as determined during design by the A/E, University Campus Police, OFM and the user.

4.2. The A/E shall plan to attend approximately five (5) 'Security Design Meetings' with members of the University design committee regarding requirements and operation of the security system.

4.3. The Office of Public Safety monitors and controls access to UM facilities through the University building entrance security system, by means of a central computer and two host controllers located in the Pine Street Police Station. The system can be connected to up to thirty two (32) remote multiplexers. Connections are made via hard wire twisted pair cabling only, i.e., no telephone lines. Cables are typically run in University-owned duct bank, though Baltimore City ductbank has been used for some older existing cables, to Howard Hall, School of Nursing and Pearl Street Garage which due to its central location has been established as a cabling and ductbank hub for the campus.

4.4. Components of the building entrances security system shall include:

a. Consult the UM assigned electrical engineer for product information on the required network panel, Card reader interface(s), card reader(s), contact condition monitors (CCM), etc applicable for the project.

b. For fail safe operation, mechanical panic bars should be used as the release mechanism on exit doors and with an internal switch to shunt the alarm only. Motion detectors are not acceptable as a door release or alarm shunt. For emergency exit only, applications coordinate with UM.

c. Door status switches or alarm contacts are connected to nearest card reader or CCM as appropriate.

d. All additional access control equipment shall be compatible with the existing system.

5. CAMPUS EMERGENCY PHONES:

5.1. Emergency phones are installed at strategic locations throughout the UM Campus to provide quick and easy access to communication links to the UM Campus Police Department.

5.2. The requirement for the type of phone, either wall mounted or pedestal type units.The location(s) shall be coordinated with the UM Project Manager with the UM Campus Police Department during all design phases of the project.

5.3. Depending on the project requirements, and unless otherwise directed by the UM Project Manager, the A/E shall include at least one of the following phone types in the design:

a. Wall Mounted Emergency Phone:

(1) Ramtel Corp. Model # PLW-6 MD(Midnight Blue)/RR733 with a two (2) inch Button

(2) Provide one (1) inch EMT or Non-Metallic conduit (depending on site conditions) from phone to the Main Telecommunications Room with pull string for communications wiring.

(3) Provide one (1) inch EMT or Non-Metallic conduit (depending on site conditions) from phone location to nearest electrical closet for 120 volt power connection. Obtain 120 volt power source from emergency panel board.

b. Pedestal Mounted Emergency Phone:

(1) Ramtel Corp. Model # PLC 8 (Coordinate the complete catalog number with the UM Project Manager)

(2) Provide one (1) inch EMT or Non-Metallic conduit (depending on site condition) from phone to the Main Telecommunications Room with pull string for communications wiring.

(3) Provide one (1) inch EMT or Non-Metallic conduit (depending on site condition) from phone location to nearest electrical closet for 120 volt power connection. Obtain 120 volt power source from emergency panel board.

c. The design for the installation and location of the phones shall be coordinated with all disciplines.

END OF SECTION 3 - ED - PART III