13 Special Construction

GENERAL

Designers shall verify that all applicable portions of these standards are incorporated into the project's design, drawings, specifications and final construction. Requests for variances from these standards shall be submitted in writing to the DCM Project Manager, using the KU Standards Variance Request Form found in Appendix A1.1, for review and written approval or rejection as indicated on the form.

RELATED DOCUMENTS & REQUIREMENTS

Refer to the following for requirements that also apply to work of this section.

- ❑ Division 1 - General Requirements; refer to sections regarding construction testing and field quality control requirements.
- ❑ Division 16 – Electrical

LIGHTNING PROTECTION – 13100

General: All University buildings shall be provided with lightning protection, unless the University waives this requirement.

System Requirements: All new projects will require a complete building lightning protection system. All new systems should have the UL Master Label which should be attached permanently to the building along with the installer's name plate. The location shall be as determined by the University. The evaluation and design should, as a minimum, meet the requirements of the NEC, LPI, NFPA 780 and/or UL96 and 96A.

- ❑ Down conductors should be hidden from view where possible.
- ❑ Down conductors shall be selected from copper, tin-copper or aluminum materials that are compatible with roofing or substrate materials.
- ❑ Where down conductors extend to grade level, they shall be placed in metallic conduit to protect them for the bottom 8' above finish grade, which shall be painted to closely match color of substrate materials.
- ❑ Air terminals shall be mechanically-fastened to substrates. Adhesive-only attachments are NOT acceptable. Mount above roof and flash or seal fastener penetrations to make watertight. Concrete block bases may also be used, set on flat roofs.

- The lightning protection system ground, the electrical power system ground, and all other system grounds such as telephone and cable television, shall be bonded together per NEC requirements.

Surge Suppression: Lightning surge arresters should be installed at all building primary power transformers and all other wire services where they enter the building and they should have the lowest possible voltage breakdown for maximum protection. The electrical primary service system is 12,470/7,200 volts, and the surge arrester should be 9KV.

- Where service is provided by the power company at the use voltage, the surge suppression should be located at the point the service enters the building.
- Reroofing projects shall require maintaining the existing lightning protection system, upgrading it as required to meet current codes, or adding one if none exists.

KENNELS & ANIMAL SHELTERS – 13185

The design of animal holding facilities must meet the regulations of the National Institute of Health for the care and use of laboratory animals.

INTRUSION DETECTION – 13720

Engineered System Definitions. The University has established the following distinction between security and access control systems.

- **Security Systems** include those non-programmable devices that monitor the status of occupancy of a secured area (including motion detectors) as well as those devices that monitor the positions of doors, windows, and gates located at the perimeter of a secured area (including magnetic contact switches).
- **Access Control Systems** include equipment that is capable of reading encoded data from personalized ID cards and interrogating programmed databases to determine an individuals authority to gain access to the secured area.

Scope of Systems: Requirements for security and access control will be determined on a project-by-project basis. The Designer should determine, through discussions with University personnel if the project programming has included a requirement for either security or access control equipment.

System Components:

- Security system designs are to be completed using Simplex-proprietary part and model numbers for appliances, devices and control hardware and software. In this manner, security data may be transmitted to remote monitoring stations by the existing campus-wide fire alarm system communications network.

- Access Control systems, where required, are not to form a part of the fire alarm/security system communications network. Access control system hardware is to be linked to PC file servers and/or workstations that are the responsibility of individual University departments and building users, and are not to be monitored by the University Office of Public Safety.

FIRE ALARM – 13851

General: The University has a negotiated procurement contract in-place for the provision of fire alarm systems on all University buildings. The majority of projects SimplexGrinnell shall provide a turnkey installation including the electrical sub-contractor's work. SimplexGrinnell shall provide a bid to the General Contractor or Construction Manager for this work.

- Refer to Appendix A13.1 for the Fire Alarm Standards.
- Refer to Appendix A13.2 for the Standard Fire Alarm Specification. Please download and use.
- Refer to Appendix A13.3 for the Fire Alarm standard Graphic Symbols. Please download and use.

Local Fire Dept. Coordination: Although the AHJ for the majority of projects on State owned land is DFM (State Division of Facilities Management), the local entity charged with responding to fire and safety emergency situations at the University is the city of Lawrence Fire Department (LDCFM- Lawrence Douglas County Fire Medical). As the designated initial responders, LDCFM should be consulted to determine the appropriate locations for Knox boxes, fire alarm control panels/annuciators, primary and secondary Fire Department Access, fire lanes and fire hydrants. .

- It is the Designer's responsibility to obtain approval through the University Fire Marshal acting as liaison to the local authorities for the specific locations and arrangements of devices critical to timely and effective initial response activities.

Design Requirements: All new installations, and all system upgrades should be designed as active multiplexed systems, with addressable appliances and devices. Building control panels should be designed to link by fiber-connection to, and be monitored by, an existing campus-wide fire alarm system communications network.

- Specific design requirements for fire alarm system projects are described Appendix A13.1 - Integrated and Multiplexed Intrusion Detection/Fire Alarm Systems.

Basis for Design: The Designer should use the following documents as basis for design:

- NFPA 72 - National Fire Alarm Code
- NFPA 70 - National Electrical Code
- NFPA 101 - Life Safety Code
- Current IBC version approved by DFM or local jurisdiction if not on State land

- Kansas Fire Prevention Code- State Fire Marshal's Handbook
- 1991 ADA Accessibility Guidelines (change anticipated for July 1, 2010)

Responsibilities for Design: The Designer is responsible for development of a code-compliant system design that meets the specific needs of the site and/or building location of the project. The SimplexGrinnell provides and bid to the general contractor and and installs the system under that contract.

Coordination with Other Disciplines: The Designer should be aware of the following typical coordination requirements for fully-functioning, code-compliant campus fire alarm systems:

- Designers shall consider including a framed, permanently mounted reduced graphic floor plan directory with room numbers adjacent to the remote annunciator panel, to orient firefighters to the building.
- Specifications for door hardware should require that magnetic door holders are a part of the fire alarm system and furnished by the fire alarm manufacturer in lieu of the door hardware manufacturer.
- Designs in project areas served by the University building automation control system (BACS) should include an interface module.
- Designers shall show interface with Machanical for duct detection locations and Fire Protection for fire sprinkler control and monitoring locations.

Submittals: Refer to Section A1.6 for code compliance submittal requirements.

Record "As Built" Documents: Contractor shall provide record documents of the fire alarm installation to the Owner. Refer to A13.1 for requirements.

CLOCK CONTROLS - 13810

General: The University has a limited master clock system. Determination if the affected project areas are to be added to the existing master clock system will be on a case-by-case basis. The Designer should determine, by discussions with the University, if interface with the existing system is desired.

Design Criteria for Uncontrolled Clock Installations: Wall clock outlets shall be provided in public areas, classrooms seating 21 or more persons, and assembly areas of 100 or more persons. Recessed clock outlets shall be included in the project construction documents. Purchase of clocks should be specified to be part of the Simplex procurement contract.

FIRE SUPPRESSION SYSTEMS - 13900

Relevant Masterspec Sections:

Section No.	Section Title	Description
13915	FIRE SUPPRESSION PIPING	Classes I,II, and III standpipes; wet-pipe, dry-pipe, pre-action, and deluge sprinklers.
13916	FIRE-SUPPRESSION SPRINKLERS	Wet- and dry-pipe sprinklers.
13920	FIRE PUMPS	Evaluations only to support Sections 13921, 13922, 13926, and 13927.
13921	ELECTRIC-DRIVE, HORIZONTAL FIRE PUMPS	Horizontally and vertically mounted, split case.
13956	FIRE-EXTINGUISHING FOAM PIPING	Piping, fittings, nozzles, and equipment.
13967	CLEAN-AGENT EXTINGUISHING SYSTEMS	Equipment, agent, piping, and controls.
13975	STANDPIPES AND HOSES	Class I,II,&III, automatic wet and dry; semiautomatic wet; and manual wet and dry standpipes.

Responsibilities for Design: In accordance with requirements of the State Division of Facilities Management- *Building Design and Construction Manual (BDCM) ,* the Designer is responsible for the complete fire suppression system design showing sprinkler head layout, risers, main line locations and water supply calculations on drawings. Refer to BDCM requirements at the following web site:

http://www.da.ks.gov/fp/manual.htm See chapter 7 and chapter 13

The Designer is responsible for the design, layout and hydraulic calculations of wet and dry sprinkler, pre-action and deluge systems. System components that are specifically identified in this manual as being the responsibility of the Designer for selection, sizing, location, and interfacing include but may not be limited too:

- ❑ Fire pumps and water storage tanks, if required.
- ❑ Chemical or gas extinguishing systems.
- ❑ Piping, valves, gauges, flow switches, bells, nozzles and heads.
- ❑ Activation methods, and building systems' interconnects (such as fire alarm activation and fan shutdown.)
- ❑ Standpipes, hose connections, hose cabinets.

- ❑ Fire hydrants and test stations.

The Designer should prepare construction documents detailing all fire suppression system components as required by the referenced DFM Manual and as required for a code-compliant system.

Contractor Qualifications and Responsibilities. The fire protection contractor has responsibility for installation and testing of a fire suppression system that conforms to the design's requirements.

- ❑ A professional engineer shall be required to design and seal the fire protection contractor's shop drawing submittals.

System Performance Requirements. The University will provide the results of a hydrant flow test to the Designer during the programming phase of the building design.

- ❑ The Designer shall identify the specific hydrant(s) to be flow-tested for each project.
- ❑ The Designer shall specify densities, design fire pump installations, specify pipe schedule standpipe systems, coordinate the water supply, coordinate electrical requirements, and specify materials and methods which meet University and nationally recognized standards, as well as building and fire codes.
- ❑ When a project requires sprinkler designs based on fire modeling, the sprinkler piping and heads shall be laid out by either a registered engineer proficient in fire protection design, or a NICET Level 4 Designer.

Prohibited Piping Types And Systems: Due to the extended anticipated life span of University buildings, CPVC, PB and other plastic piping or thin-wall steel piping shall NOT be specified, or approved for use on KU projects.

Design Standards For Materials And Methods: The Designer shall edit pertinent specification sections to accommodate the following University requirements:

- ❑ All equipment shall be UL listed and FM approved.
- ❑ Flanged, threaded, welded or grooved piping connections are acceptable.
- ❑ Flanged connections are required around fire pumps.
- ❑ Threaded pipe shall be a minimum of Schedule 40 black iron.
- ❑ Mechanical rolled grooved pipe may be Schedule 40 black iron.
  - ❑ Schedule 10 galvanized is NOT permitted.
- ❑ Use galvanized pipe for dry-pipe, deluge and pre-action systems, and the fire pump suction pipe.
- ❑ Copper pipe may be used in areas susceptible to magnetic fields.

- ❑ Firestopping shall be installed in accordance with Division 7 - Thermal and Moisture Protection.
- ❑ Provide permanent signs to identify drains, test connections, control valves, risers supplying hydraulically designed sprinkler systems, and each alarm. Label valves normally open (NO) or normally closed (NC).
- ❑ Adequate drainage should be provided to drain and test the sprinkler system. Typical floor drains usually do not have capacity to handle full flow main drain tests. All main drains and express drains shall discharge to the exterior of the building. The Designer should coordinate a location with the Architect to minimize damage to landscaping or building from the main drain discharge.

Testing and Commissioning Responsibility: Determination of the justification for a commissioning agent is project-specific. During the design phases, the University will advise the Designer if a commissioning agent will be retained for the project. In section's 13915 or 13916, commissioning should be included only if an independent commissioning agent will NOT be retained.

Post-Construction Testing: The Designer shall specify that the acceptance of the fire protection system will be based upon completion of the necessary testing as outlined in the National Fire Codes. All testing must be documented on certificate forms. The fire protection contractor is responsible for maintaining the equipment in service after the acceptance test as well as minimizing impairments to the system for the remainder of the project.

- ❑ On projects involving installation of new hydrants, the Designer shall include specification requirements that the Contractor shall conduct a fire hydrant flow test of all new hydrants.
  - ❑ Tests shall be jointly observed by the Designer and Owner's representatives, plus the local fire department's representatives shall be invited to observe these tests.
  - ❑ The Contractor shall be required to submit the hydrant flow test information in the shop drawings.

Fire Pumps: The Designer should refer to the following supplemental guidelines and standards of practice for projects involving installation of a fire pump.

- ❑ Applicability. For all projects that involve the installation of new, or extension of existing, water-based fire suppression systems, the Designer shall determine the need for fire pump(s). The Designer shall determine when fire pumps are needed based on hydraulically calculated flow analysis using the highest system demand including standpipe demand. A fire hydrant flow test may be required to verify calculations.
- ❑ Energy Source. The University strongly prefers the use of electric-drive, rather than diesel-drive centrifugal fire pumps.
  - ❑ Fire pumps shall be on the building's emergency power system.
- ❑ Design of Electrical Service. To insure that during a fire emergency the building electrical system may be de-energized without the loss of the fire pump service, the electrical feeders to the pump controller should originate at the building service transformer

secondary terminations. The fire pump controller should not be fed by any feeder that originates downstream of a building substation main disconnect. The Designer should refer to NEC® Article 695, NFPA 20, and NEMA Stds. Pub. ICS 14-1998 for guidance regarding design of transformers, transfer switches, conductors, and overload protection in fire pump service. Circumstances that require the invocation of Exception No. 1 of NFPA 20¶6-3.2.2 should be reviewed with the University during system design.

- ❑ Design of System Monitoring Service. Provision should be made to interface the fire pump and controller to the campus-wide fire alarm system network. The fire alarm system shall monitor essential supervisory fire pump conditions, including: pump running, loss of power, phase reversal and controller troubles.

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