Fire Suppression
MasterFormat Section 21-00-00

The guidelines described herein shall be used on all projects, unless USAA’s Project Variance Request process has been used to secure an approved, project-specific variance.

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Fire Suppression (Long Term Lease or Owned) and FM Global approval required

The A/E is fully responsible for fire protection systems to include but not limited to: life safety, finishing rating, fire detection, fire suppression, location of fire extinguisher, means of egress, egress capacity, location of fire hydrants, fire mains, fire access to the facility, mass notification, evacuation plans, etc. The system shall be designed by a qualified and experienced Fire Protection Engineer (FPE). The following is a guide to the minimum design analyses required at the earliest possible stage in design.

1. **Specific Hazards**
   a. Identify all hazardous areas (chemicals, fuels, ordnance, etc.), processes, and special hazards requiring special fire protection considerations such as Radio Frequency (R-F) Shielded Rooms, Secured Rooms, Computer Rooms, commercial kitchen appliances, etc. Provide any relevant information pertaining to the hazards and how they are protected. Include the information on the drawings.

2. **Summary of Fire Protection Features**
   a. Provide a brief summary of the active and passive features of fire protection. Description and location of all new and existing fire extinguishing and/or detection systems, fire alarm systems, fire pumps to be provided or existing to remain or modified.

3. **Summary of Existing Conditions**
   a. Provide a brief summary of existing conditions impacting the project, such as existing detection/suppression systems or existing building construction features.

4. **Summary of Other Design Features**
   a. Provide a brief summary of the other features of the design relevant to the fire protection of the project.
   b. Examples of “other features” include methodology for foam waste containment for foam systems, structural engineering evaluation of existing floor systems supporting gaseous agent or foam concentrate storage tanks, etc.

5. **Building Code Analysis**
   a. Include the following information: occupancy classification; height and area calculations (area per floor & total); type of construction; required building
separation or exposure protection; rating of structural components; classification of interior finishes; location of fire-rated walls and partitions; description of construction; whether rated floor and roof assemblies are restrain or unrestrained; interior fire and/or smoke rated wall/partition requirements, fire rating of each floor, ceiling system, roofing system when applicable.

b. Discuss if, and how the proximity to, and classification of adjacent structures factored into the analysis.

c. Include the information on the drawings.

   a. Identify egress information, including the occupancy classification, number of exits, type of exits, exit travel distance, total exit width, total occupant load, common path of travel, etc.
   b. Include the information on the drawings.

7. Water Supply Analysis
   a. Provide a summary of the data obtained from the water flow test and determination of the adequacy of the water supply (even for facilities without sprinkler protection), along with sketches of the water distribution system.
   b. If fire flow demands cannot be met, cite the deficiencies and recommend design alternatives/solutions to correct the problem of an insufficient water supply (e.g., fire pump(s), and/or water storage tank(s), etc.).
   c. Include the information on the drawings and show the tested fire hydrant(s).

8. Hydraulic Supply Analysis
   a. Evaluating the available water supply is critical for buildings with and without sprinkler protection. Documents cannot be released for advertisement with expectations of the contractor determining the available water supply. The capability of the water supply to support the required fire flow demand must be confirmed. The Fire Protection Designer of Record (FPDOR) is responsible for obtaining water distribution maps, establishing flow testing procedures and coordinating flow testing with the utility provider. The FPDOR must not, under any circumstance, rely on data from flow tests not supervised by an FPE. The FPDOR will be responsible for conducting the actual flow testing for facilities. The FPDOR must graph the results for comparison with the anticipated hydraulic demand. This analysis is required for both sprinkled and non-sprinkled facilities.
   b. The A/E shall perform a fire hydrant test and the test shall be observed by FPE. The test cannot be more than six month old. Information from the test shall be provided to other disciplines to support the basis of design.
   c. Water flow testing of the existing water supply system(s) is required to determine the capability of the available water supply to support the expected demands. Perform testing in accordance with FM Global Property Loss Prevention Data Sheet 3-0. Provide a fire protection water flow test report in the Basis of Design.
   d. The A/E shall consider water surge as part of the design of the fire system
   e. The design professional shall include in the Construction Documents the Fire Sprinkler System—Sprinkler Head and main header location, plans, riser locations and diagrams. Risers shall include sprinkler header take-offs with Fire Alarm points located on the drawing. The A/E shall perform a fire hydrant test and the test shall be observed by FEP. The test cannot be more than six month old. Information from the test shall be provided to other disciplines to support the basis of design.
9. Drawing Requirements (see NFPA standards and City Code for additional requirements)
   a. The Code Compliance Summary Sheet must be prepared by the FPDOR and must immediately follow the title sheets. Use legend and symbols in NFPA 170 for drawings and diagrams.
   b. Provide symbols in accordance with NFPA 170 for fire prevention and visual alerting requirements.
   c. Scale the floor plans so the entire footprint fits on a single sheet provided that all information is clearly legible and the scale is no smaller than 1/16-inch (1:200) with the exception of the Site Plan.
      i. Name of the protected premise, owner, and occupant
      ii. Name of installer or contractor
      iii. Date of issue and any revision dates
      iv. Identification of any ceiling over 10 feet
   d. Building Code Site Plan Sheet shall include but not limited to the following:
      i. The information that is required by City of San Antonio Chapter 11 Fire Prevention Section 501.3.1 The Fire Protection Site plan shall be drawn to scale (no less than 1:60)
      ii. Compass reading
      iii. Property and/or lot lines
      iv. Street frontages
      v. Line of encroachment identifying minimum separation distances from adjacent buildings and assumed property lines
      vi. Building perimeter used for frontage increases
      vii. Fire Department vehicle access to building
      viii. Fire staff access to the building
      ix. Location of all buildings (existing and proposed)
      x. Fire apparatus access roads (i.e., fire lanes) to buildings
      xi. Fire lanes shall be highlighted and shall include dimensions (width, turning radii, clearance to overhead obstructions, etc.)
      xii. Fences, gates walls, streams and other obstructions to firefighter access
      xiii. Location of all fire hydrants (existing and proposed). This shall include the direction and the distance to all hydrants not shown on the site plan, but within one thousand (1000) feet of the building to be protected
      xiv. Size (diameter and length) and locations of all fire main piping (proposed and existing). The pressure class and type of new pipe to be installed shall be identified
      xv. The location, type, and size, of backflow prevention device, where installed
      xvi. Location of all automatic sprinkler and standpipe risers
      xvii. Location of Fire Department connection(s)
      xviii. Size, type, and location of valves including post indicator valve (if they are located in a pit), control room automatic sprinkler system shut-off, etc.
      xix. Other water supplies
      xx. Where required, type of protection from collision that may cause physical damage to fire protection equipment
      xxi. Fuel tanks and separation requirements
      xxii. Fire hydrant used for design to include the test information
10. **Building Code Summary Sheet** shall include but not limited to the following:
   a. Classification of occupancy
   b. Allowed vs. provided type of construction
   c. Basic allowable heights & areas vs. actual heights & areas
   d. Allowable vs. provided height and/or area increases per floor and total
   e. Calculations supporting height and area modifications/increases
   f. Required vs. provided exterior exposure protection
   g. Required vs. provided interior fire rated occupancy separations
   h. Required vs. provided internal fire area separations

11. **Life Safety Code Sheet** shall include but not limited to the following:
   a. Classification of occupancy - Building areas having different occupancy and hazard classifications
   b. Occupant load factor(s) and total calculated load. Require vs. provided load.
   c. Required vs. provided number of exits
   d. Required vs. provided capacity of means of egress
   e. Required vs. provided arrangement of means of egress including remoteness of exits, horizontal exits, travel distance, common path of travel, dead-end corridor lengths, egress travel requirements (travel distances, common paths of travel, dead-end corridors, etc.)
   f. Required vs. provided discharge from exits
   g. Required vs. provided fire rated separation of exits and exit access
   h. Flam spread/smoke development ratings of interior finishes
   i. Requirements (if any) for smoke control systems based on the specific occupancy chapter and building design considerations
   j. Requirements (if any) for smoke control systems based on the specific occupancy chapter and building design considerations
   k. Coordination with electrical engineer to determine type of electrical systems that need to be installed for hazardous location and other locations
   l. Partition locations with fire rated partitions and horizontal exits identified
   m. Room numbers, corresponding occupancy classification and calculated occupant load
   n. Rooms and/or areas requiring special life safety and/or fire protection features
   o. Fire Extinguisher cabinet and surface-mounted fire extinguisher locations
   p. Fire Extinguisher type/quantity table identifying the total number and type of extinguishers required
   q. Location of primary fire alarm control panel and storage shall be identified with the limitation for the storage areas

12. **Fire Suppression Plan Sheet** shall include but not limited to the following:
   a. Hazard classifications. Where a facility has multiple hazard classifications, differentiate each classification area by border and/or hatching
   b. Areas protected with special fire suppression systems
   c. Locations of sprinkler riser room
   d. Show the maintenance working area for the fire system – riser room and alarm room
   e. Fire department connections
   f. Post indicator valves
   g. Isolation control valves
   h. Sprinkler branch lines or feed main piping if a specific routing is required, i.e., single feed to computer room or elevator equipment room and hoist way
i. Location of control panels used for release fire suppression systems  
j. Fire pump and associated equipment  
k. Hydraulic information

13. Fire Suppression Detail Sheet shall include but not limited to the following:  
a. Enlarged plan view of sprinkler riser room showing sprinkler risers, control  
   valves, backflow prevention device and service entrance (supply) manifold  
   drawn to scale.  
b. Cross-sectional elevations of sprinkler and standpipe risers.  
c. Enlarged plan view of fire pumps and piping arrangement, jockey pump, and  
   associated controllers and equipment drawn to scale.  
d. Releasing system riser diagram for pre-action or deluge sprinkler systems.  
e. Identify all zones, circuit inputs and circuit outputs necessary for controls,  
   including interconnection with building fire alarm control panel.  
f. Work service areas for all fire protection equipment.  
g. Provide marking and labeling information.

14. Fire Alarm Sheet shall include but not limited to the following:  
a. Provide floor plans identifying location of field installed components and  
   interconnected devices. Plans may identify fire suppression control/release system  
   information identified in the Fire Suppression Sheets.  
b. Control panel(s).  
c. NAC extender panels.  
d. Radio transmitter or master box.  
e. Line and low voltage surge arrestors.  
f. All initiating devices (including duct smoke detectors).  
g. All notification appliances.  
h. Supplemental equipment interfaced with the fire alarm system such as voice  
i. evacuation panels, electromagnetic door holders, delayed-egress or access-  
j. controlled doors, elevator system components, etc.  
k. Single station smoke detectors.  
l. Supplemental fire suppression equipment control panels such as fire pump  
   controllers, fire suppression control/release panels.  
m. Interconnection to the Emergency and Standby Power System.  
n. Classification of the Emergency Power Supply Systems. Coordinate information with  
   the electrical Sheets.

15. Fire Alarm Detail Sheet shall include but not limited to the following:  
a. Provide a riser diagram showing hierarchy, arrangement and zoning of the system.  
b. Do not identify every field device individually, such as smoke and heat detectors.  
c. Identify all typical circuits, interconnections and interlocks necessary for associated  
   controls.  
d. Identify required line and low voltage surge arrestors.  
e. Interface with security systems for required delayed-egress or access-  
   controlled doors.  
g. Identify interface with fire suppression control/release panels.
Specification and Other Requirements

1. Qualifications of the Installer:
   a. Prior to installation, submit data showing the Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a contractual agreement with a subcontractor having such experience.
   b. Include names and locations of at least two installations where the Contractor, or subcontractor, has installed such systems. Indicate type and design of each system and certify that each has performed satisfactorily as intended for not less than eighteen (18) months.

2. Qualifications of the System Technician:
   a. Installation drawings, shop drawing and as-built drawings shall be prepared, by or under the supervision of, an individual who is experienced with the types of works specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with minimum Level-III certification in the fire protection certification program applicable to the work being performed.
   b. Submit data for approval showing the name and certification of all involved individuals with such qualifications at or prior to submittal of drawings.

3. Construction Surveillance:
   a. The FPE shall visit the construction site as necessary to ensure life safety and fire protection systems are being constructed, applied, and installed in accordance with the approved design documents, approved construction submittals, and manufacturer's requirements.
   b. Frequency and duration of the field visits are dependent upon particular system components, system complexity, and phase of construction. At a minimum, field visits shall occur just prior to installation of suspended ceiling system to inspect the integrity of passive fire protection features and fire suppression system piping, preliminary inspections of mass notification, fire alarm/detection and suppression systems, and final acceptance testing of mass notification (if applicable), fire alarm/detection and suppression systems.

4. Fire Wall Identification
   a. Identify all fire rated walls with signs stating the following:
      a. “X Hour Fire Barrier, Do Not Penetrate.”
      b. “Smoke Barrier, Do Not Penetrate”
   b. For aesthetic reasons, this requirement does not apply to walls inside stairwells or public areas such as offices, lobbies, corridors, etc., that do not have drop ceilings.
   c. In areas with drop ceilings, paint notification on the wall above the drop/finished ceiling.
   d. In mechanical, electrical and other similar rooms, place signs at eight (8) feet above finished floor level. Space signs at a maximum of ten (10)-foot intervals. In rooms with raised flooring, place signs on fire walls under the floor with spacing of signage reduced to five (5) foot intervals.
   e. Apply signs using florescent red or orange paint over stencils. Letters must be a minimum of four (4) inches in height. Metal, plastic or paper decal signs are not acceptable. Take care when applying signage to prevent over-spray onto adjacent finishes.

5. Preliminary and Final Inspections and Acceptance Testing:
   a. FPE shall personally witness all preliminary inspections and testing of mass notification (if required), fire alarm/detection and suppression systems.
b. Once preliminary inspections and testing have been successfully completed, the Contractor shall submit a signed certificate to the City of San Antonio that systems are fully compliant and ready for final inspection and acceptance testing.

c. The Contractor shall provide a minimum of 14 working days advance notice to the local authority having jurisdiction to schedule the final inspection and acceptance testing with the Fire Inspection Office and the Fire Protection Engineer.


a. The FPE shall provide USAA certification that all life safety and fire protection features and systems have been installed in accordance with applicable criteria, the contract documents, approved submittals, and manufacturer's requirements. This certification shall summarize all life safety and fire protection features, and shall bear the professional seal of the fire protection engineer.

7. Preaction and Dry Systems

a. Provide isolation valve above the pre-action assembly to allow testing without introducing water to pre-action system.

b. Use double interlock preaction valve for all preaction fire sprinkler systems

c. Use nitrogen system as much as practical for preaction system.

d. Provide auxiliary drains for all trapped pipe sections - When the capacity of trapped sections of pipe is less than three gallons, the auxiliary drain shall consist of a valve not smaller than 1/2 inch and a plug or nipple and cap. When the capacity of trapped sections of piping is more than three gallons, the auxiliary drain shall consist of two one inch valves and one, two inch x 12 inch condensate nipple or equivalent, located in an accessible location.

e. Dry system NOT exposed to outside elements to be black only if Nitro-Generator is installed.

f. Dry system NOT exposed to outside elements to be black only if Nitro-Generator is NOT installed.

g. Dry system exposed to outside elements to be galvanized pipe. Black pipe if pipe is painted and if Nitro-Generator is installed.

h. Dry system exposed to outside element to be galvanized pipe when Nitro-Generator is NOT installed.

1. Wet Systems

a. Provide auxiliary drains at the farthest point from supply and pipe the drains to sanitary sewer.

b. Provide auxiliary drains in locations necessary to bleed trapped air.

c. Use black pipe.

2. General

a. Provide schedule 40 pipe and fully reamed from main water supply through fire pump to control valves and standpipes for all systems.

b. Provide all auxiliary drains as specified by NFPA. Pipe all wet system auxiliary drains to sanitary sewer.

c. All control valves and shut off valves shall be located below ceiling level in readily accessible areas.

d. Sprinkler heads – Concealed are approved. Heads must meet FM global approval.

e. Sprinkler K-factors shall meet FM global guidelines.

f. Flexible drop are acceptable, must be braided and FM global approved.

g. All sprinkler heads shall be center of tile.

h. All control valves shall be Butterfly valves with built in tamper switch.

i. OS&Y valves shall only be installed where required by code,
j. All pre-action valves shall be double interlock Pneumatic/Electric release. With butterfly testing valve minimum of 2’ of pre-action valve. 1” testing valve should be located in the 2’ of piping.

3. Fire Sprinkler Systems at Electronic Equipment Rooms
   a. Electronic equipment rooms include rooms used for data systems, telephone systems, security systems and audio-visual systems.
   b. On the Fire Protection Drawings, a note needs to be added at all electronic equipment rooms that reads "INSTALLATION OF FIRE SPRINKLER HEADS AND PIPING MUST BE COORDINATED WITH OWNERS EQUIPMENT LAYOUT SO THAT HEADS AND PIPING ARE LOCATED ABOVE WALKWAY AISLES, NOT EQUIPMENT."
      i. Fire sprinkler main or supply lines shall NOT enter or pass through the communications/IT rooms.
      ii. Fire protection systems shall be installed in conformance with NFPA Codes and procedures, to include NFPA 75 for Data Centers.

4. Fire Sprinkler System Flushing
   a. Flushing of the fire sprinkler system is a mandatory requirement of USAA prior to acceptance of all projects where this system is installed new.
      i. The project engineer shall develop the fire sprinkler system flushing procedure per NFPA 25.
      ii. Provide a floor drain and associated piping of an appropriate size in the Fire Pump Room to accommodate flushing of the fire sprinkler system into the nearest sanitary sewer inlet.

5. Inspections and Testing
   a. Systems that have been tested and inspected are required to have inspection certification tags installed prior to substantial completion. Technical data (hydraulic data) plate shall be attached to standpipe.
   b. Fire sprinkler heads must be protected by temporary coverings to prevent construction debris from fouling the sprinkler device. Temporary protection must remain in place from the time heads are installed until substantial completion.
      i. NFPA 13 states the following: Where sprinklers have had paint applied by other than the sprinkler manufacturer, they shall be replaced with new listed sprinklers of the same characteristics, including orifice size, thermal response, and water distribution.

6. O & M information
   a. Dry and Preaction Systems - Contractor shall:
      i. Provide a narrative with a detailed description of steps required to drain all new dry and preaction systems.
      ii. Provide complete record drawings that identify the location of all system components (valves, drains, gongs, flow switches, etc.). Identify on drawings any areas in dry systems that will hold water.
   b. Wet Systems - Contractor shall provide a detailed description of location of all system components (valves, drains, gongs, flow switches, etc.)

Fire Protection Specialties:

All penetrations in fire-rated walls and floors shall be sealed and fire stopped with approved methods and materials in accordance with FM Global’s current Approval Guide.

END OF SECTION