

**COLUMBIA FIRE & RESCUE
FIRE MARSHAL'S OFFICE
DEVELOPMENT REQUIREMENTS**



**COLUMBIA FIRE & RESCUE
700 NORTH GARDEN STREET
COLUMBIA, TN 38401**

FIRE MARSHAL CONTACTS

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SCOPE

These requirements have been developed to assist development applicants, architects and contractors in determining the minimum requirements for fire protection systems, emergency access/gates, and fire apparatus access roads. It will provide the minimum design, installation, testing, and inspection procedures in the City of Columbia based on the following:

- Columbia Municipal Code, Title 7, Chapters 1-6
- International Fire Code 2018 Edition
- International Building Code 2018 Edition
- International Residential Code 2018 Edition
- National Fire Protection Association (NFPA) Standards – As adopted by the 2018 International Fire Code.

The authority having jurisdiction in determining compliance with the above codes and standards shall be the Columbia Fire Department.

WATER AGENCY / DISTRICT CONTACTS SERVICING COLUMBIA

Columbia Power & Water Systems

201 Pickens Ln
Columbia, TN 38401
(931) 388-4833

Maury County Water System

765 New Lewisburg Hwy
Columbia, TN 38401
(931) 381-8900

1.0 WATER AGENCY / DISTRICT REQUIREMENTS

- 1.1** Contractors or developers will contact the Water Agency / District and request the following information to facilitate designing private fire service mains and fire sprinkler systems:
- Water service size, material type and schedule.
 - Length of service, fittings and valves installed.
 - Water meter manufacturer, model and size (if fire service is metered).
 - Backflow manufacturer, model, size and arrangement.
- 1.2** The Water Agency / District will provide flow information for water mains or fire hydrants:
- Static pressures.
 - Dynamic/residual pressures.
 - Gallons per minute.

- Water main size and configuration.
- Fire Hydrant Identification Numbers used in testing and street address or location description. Indicate Fire Hydrant Identification Number where pressure readings were taken.
- Fire hydrant flow-test data is good for a period of one (1) year.

2.0 PLANS AND PERMITS

- 2.1** When there are significant changes in occupancy, water supply, storage heights, type and quantity of storage, storage configurations, tenant improvements or any other changes which may affect the fire sprinkler system design, the owner, tenant or contractor shall submit plans and secure permits.
- 2.2** Complete plans for private fire service mains or fire sprinkler systems should be submitted for approval well in advance of installation. Underground Fire System Mains shall be a separate plan submittal and permit.
- 2.3** Plans shall be submitted online **ONLY** at:

[City of Columbia | Permitting \(onlama.com\)](http://onlama.com)

Counter Hours: Monday through Friday – 7:00 AM to 4:00 PM

The final fees are based on the fee schedule adopted by resolution of the Columbia City Council.

- 2.4** Provide complete sets of listings and manufacturer's technical data sheets for all system components with plan submittals. All system materials shall be UL listed or FM approved for fire protection service and approved by Fire Marshal's Office prior to installation.
- 2.5** Plans shall include all necessary engineering features, including all hydraulic reference nodes, pipe lengths and pipe diameters as required by the appropriate codes and standards. Plans and support data (calculations and manufacturer's technical data sheets), including fire flow data, shall be submitted with each plan submittal. Complete and accurate legends for all symbols and abbreviations shall be provided on the plans.

"As Built Drawings and Calculations" will be accepted when there are minor deviations from approved drawings and calculations. Significant changes will require a resubmittal of plans.

The Fire Marshal's Office will make the final determination of fire flow requirements, number of fire hydrants and hydrant spacing.

3.0 PRIVATE FIRE SERVICE MAINS

- 3.1 NFPA 24 shall establish the minimum requirements for the installation of private fire service mains and their appurtenances supplying automatic sprinkler systems, open sprinkler systems, water spray fixed systems, foam systems, private hydrants, monitor nozzles or standpipe systems with reference to water supplies, private hydrants and hose cabinets.
- 3.2 Private fire service mains shall be not less than eight (6) inches in diameter when serving private fire hydrants and fire sprinkler systems.
- 3.3 Piping with a minimum rating of class 200 installed to NFPA 24 standards is required for all private fire service mains.
- 3.4 All thrust blocks on private fire service mains, private fire hydrant lines and fire sprinkler laterals shall be calculated as required by NFPA 24 or use Water Agency / District drawings. Calculations shall be submitted and the resulting dimensions of thrust blocks shall be shown on the plans. Restrained Joint Systems are allowed in lieu of thrust blocks. Minimum design working pressure shall be 200 psi. Special design considerations may be required on lines with high static pressures or lines in which fire pumps are installed.
- 3.5 Private fire service mains, when supplying three (3) or more fire hydrants, shall be designed with a looped water supply.
- 3.6 In order to isolate the fire sprinkler underground lateral from any private fire hydrant system, a non-indicating listed underground gate valve with an approved roadway box shall be required.
- 3.7 On site fire hydrants and fire department connections, located less than three (3) feet behind the face of a curb or when no curb is provided, shall be protected by guard posts set in concrete to the following specifications:
 - Constructed of steel not less than four (4) inches in diameter and concrete filled.
 - Spaced not more than four (4) feet between posts on center.
 - Set not less than three (3) feet deep in a concrete footing of not less than a fifteen (15) inch diameter.
 - Set with the top of the posts not less than three (3) feet above ground. Located not less than three (3) feet from the fire hydrants, post indicator valves and fire department connections.
 - All guard posts shall be painted yellow (Rust-Oleum Safety Yellow #2149 or equivalent).
- 3.8 The installing contractor shall provide a **signed and completed "Contractors Material and Test Certificate for Underground Piping"** form as required by NFPA 24 (2016 edition).

Double Check Detector Assemblies (Private)

- 3.9 All Double Check Detector Assemblies (DCDA) shall be UL listed / FM approved for fire protection service in compliance with NFPA 24.

- 3.10** All DCDA shall be installed with two (2) tamper switches and electrically monitored at a UL listed central station service, when there are:
- Twenty or more fire sprinkler heads.
 - Fire sprinkler supervision and alarm, fire alarm or security systems are installed.
- 3.11** All DCDA shall be provided with a chain and frangible security lock. A key shall be kept in the spare sprinkler head box and Knox box.
- 3.12** Reduced pressure zone assemblies or reduced pressure detector assemblies shall not be installed in private fire service mains and fire sprinkler systems.

Fire Department Connections (FDC)

- 3.13** FDC shall be installed at apparatus access roads in locations approved by the Fire Marshal's Office. Check with the Fire Marshal prior to plan submittal. The FDC shall extend between thirty (30) inches and thirty-six (36) inches above finished grade.
- 3.14** FDC shall be visible (facing the apparatus access road), accessible and installed in approved locations downstream of all DCDA. FDC shall be located within one hundred (100) feet of a public fire hydrant. Exceptions may be made by the Fire Marshal.
- 3.15** The curb adjacent to the FDC shall be painted red for a total of fifteen (15) feet (7 1/2 feet on each side of the FDC).
- 3.16** When the total sprinkler system demand, including hose allowance, is less than 1,000 GPM, the FDC riser shall be four (4) inches in nominal diameter and shall have a standard 2-way threaded 2 1/2 inch connection.
- 3.17** When the total sprinkler system demand, including hose allowance, is 1,000 GPM to 1,199 GPM, the FDC riser shall be six (6) inches in nominal diameter and shall have a standard 3-way threaded 2 1/2 inch connection.
- 3.18** When the total sprinkler system demand, including hose allowance, is greater than 1,200 GPM, the FDC riser shall be six (6) inches in nominal diameter and shall have a standard 4-way threaded 2 1/2 inch connection.
- 3.19** In a building complex where two (2) or more buildings are served, the identification of which building is served by separate FDC; the Fire Marshal's Office will require signs of substantial construction to be posted at each FDC identifying the respective buildings served. The minimum letter size shall be one (1) inch on a contrasting background.
- 3.20** FDC shall be painted red (Rust-Oleum Safety Red # 2163 or equivalent).
- 3.21** FDC piping shall be ductile iron from the private fire service main to the FDC check valve. The pipe from the FDC check valve to the FDC shall be galvanized steel pipe. NFPA 13R FDC piping shall be copper from the private fire service main.

Fire Hydrants (Private)

- 3.22** Commercial fire hydrants with three (3) outlets (one-5 inch and two-2 1/2 inch) are required when fire flow demand is 1,500 GPM or greater. Residential fire hydrants with two (2) outlets (one-5 inch and one-2 1/2 inch) are required when the fire flow

demand is less than 1500 GPM. Existing residential fire hydrants that are located within 250 feet of a residential property line do not need to be upgraded to commercial fire hydrants if the hydrant can provide the required fire flow.

- 3.23 Private hydrants shall be oriented with the four (5) inch discharge facing the street or fire apparatus access road.
- 3.24 The curb adjacent to the fire hydrant shall be painted red for a total of fifteen (15) feet (7 1/2 feet on each side of the hydrant).
- 3.25 Private fire hydrants shall be painted red (Rust-Oleum Safety Red # 2163 or equivalent).
- 3.26 Blue reflective markers shall be installed to identify location of fire hydrants. These markers shall be visible from both directions of vehicle travel.
- 3.27 Hydraulic calculations shall be provided for all private fire hydrant systems. Calculations shall be calculated back to the point of the flow test. The fire hydrant system shall meet the fire flow requirements as required by the International Fire Code (2018 Edition).
- 3.28 When the private fire service main serves both fire sprinkler system(s) and private fire hydrant(s), the hydraulic calculation shall include the fire hydrant flow rate with associated private fire hydrant(s) and fire sprinkler flow rate for a minimum design of 20 psi residual pressure for the fire hydrant(s).

Water Plans and Water Main Installation (Private)

- 3.29 Provide the following notes on private fire service water main plans:

FIRE DEPARTMENT NOTES:

1. *The installation of the private fire service mains shall comply with:*
 - *NFPA 24*
 - *International Building Code (2018 Edition)*
 - *International Fire Code (2018 Edition)*
 - *Columbia Fire Department Development Requirements*
2. *No combustibles shall be delivered to building job site prior to the water mains and fire hydrants being operational.*
3. *The following inspections are required:*
 - *Thrust block pre-pour, trench, and backfill inspection.*
 - *Underground hydrostatic test - 200 psi for 2-hours.*
 - *Underground flush.*
 - *Underground final. A **completed and signed "Contractors Material and Test Certificate for Underground Piping"** form as required per NFPA 24 (2016 Edition).*

TO SCHEDULE INSPECTIONS CALL THE FIRE MARSHAL'S OFFICE AT (931) 560-1740 AT LEAST 48 HOURS PRIOR TO THE REQUESTED INSPECTION DATE AND TIME.

4. *All Double Check Detector Assemblies (DCDA) shall be installed with two (2) tamper switches and electrically monitored at a UL listed central station service, when there are:*
 - *20 or more fire sprinkler heads.*
 - *Fire alarms or security systems installed.*
5. *Ductile iron underground piping shall be installed beginning five (5) feet from a building and continue into the building.*
6. *No joints shall be installed under the building.*
7. *The civil engineer who designed the water system hereby certifies that this water system is in accordance with the requirements as prescribed by the Fire Prevention Bureau, the International Fire Code (2018 Edition) and NFPA 24 (2016 Edition).*
8. *Breakaway spools or breakaway bolts are required.*

4.0 FIRE SPRINKLER SYSTEMS – NFPA 13

Controls

- 4.1 All control valves shall be UL listed indicating valves.
- 4.2 All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit and monitored at a UL listed central station service.
- 4.3 An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box) shall be provided on the exterior of the building in an approved location. A second horn/strobe shall be installed in the interior of the building in a normally occupied location. Power shall be provided from a listed fire alarm control unit.
- 4.4 A dedicated electrical circuit with a circuit breaker lock shall be required for the listed fire alarm control unit.
- 4.5 All DCDA shall be located in hot boxes above ground near the street. DCDA shall not be located inside buildings or in underground pits.

Fire Sprinkler Risers (NFPA 13)

- 4.6 When more than one (1) fire sprinkler riser is served by a single private fire service main lateral, a separate system riser with a UL listed indicating control valve, riser check valve, water flow indicator and main drain is required for each fire sprinkler riser.
- 4.7 In multi-story buildings, each floor shall have a sectional riser with a UL listed indicating control valve, riser check valve, water flow indicator and main drain.
- 4.8 In order to provide access to the riser for future maintenance and repair, all fire sprinkler system riser locations shall provide a minimum eighteen (18) inch clearance to each side and to the front of the riser. If a riser is to be concealed by means of a wall or closet, access to the riser shall be provided by means of a door with minimum dimensions of two (2) feet and six (6) inches by six (6) feet and eight (8) inches.

Piping and Hangers (NFPA 13)

- 4.9** Threaded steel pipe shall have a minimum wall thickness of Schedule 30 for branch lines less than 2 1/2 inches and Schedule 40 for all other piping.
- 4.10** Rolled groove and welded steel pipe shall have a minimum wall thickness of Schedule 10.
- 4.11** The discharge area for the main drain and inspector's test valve shall be protected with a concrete splash pad to prevent damage to landscaping during periodic testing.
- 4.12** Lag bolts and screws are not acceptable for seismic bracing.
- 4.13** Seismic sway bracing shall use Schedule 40 pipe as a minimum.

Design (NFPA 13)

- 4.14** For commercial and industrial "Shell Buildings", with the potential for high-pile storage and/or wherein no specific end use is identified at the time of plan check, the sprinkler system shall provide a minimum density of .45 GPM/square foot for a 2,000 square foot design area and 286°F sprinkler heads shall be used in these buildings. Roof coverage over mezzanine areas shall also be built to this standard. Any deviation from this requirement will require the Fire Marshal's approval.
- 4.15** It is incumbent upon the sprinkler system designer to advise the building owner that the above density and design area are minimums for shell buildings; and that increases in sprinkler protection may be required based on future occupancy hazard classification, storage commodity classification, and storage configuration according to NFPA 13 and the International Fire Code (2018 Edition).
- 4.16** When a shell building is built without a hard lid or T-bar ceiling, the upright fire sprinklers shall be designed to the unfinished ceiling height and the density and design area for the required floor area.
- 4.17** Fire sprinkler design shall be limited to 90% of the available water supply.
- 4.18** Non-combustible construction shall be as defined by the International Building Code (2018 Edition). Wood frame construction shall be considered combustible construction regardless of materials used for surface covering.
- 4.19** Sprinklers with a temperature rating of not less than an intermediate temperature rating are required in all main electrical panel and meter rooms. No combustible materials shall be stored in these rooms.
- 4.20** Light fixtures, soffits and other potential obstructions shall not interfere with the spray patterns of sprinkler heads. The sprinkler contractor shall ensure that the type and location of potential obstructions are considered in the design and installation of the system. The sprinkler contractor is responsible for coordinating and resolving conflicts in coverage patterns.
- 4.21** Fire sprinklers shall not be installed directly below automatic smoke and heat vents.
- 4.22** Inspector Test Valve access panels and doors to fire sprinkler riser rooms shall have signs with appropriate descriptions.
- 4.23** All electrical rooms, upright sprinklers at the roof or in the attic space, non-conditioned rooms or exterior sprinkler heads shall be 200°F – 212°F heads.

- 4.24 If the attic space is less than thirty-six (36) inches in height and of combustible construction, all upright fire sprinkler heads shall be in accordance with NFPA 13, Section 8.15.1.6.

Plans (NFPA 13)

- 4.25 Complete detailed work sheets and computer hydraulic calculations as required by NFPA 13 shall be included with all submittals for hydraulically designed sprinkler systems. Calculations shall extend to the point at which the water supply data was determined.
- 4.26 Water supply curves and system demand curves, including underground friction loss, hose allowance, and applicable in-rack sprinkler demand, shall be computer generated graphs. Sprinkler system design, including hose demand, shall be limited to 90% of the available water supply. Water supply data may be obtained from the Office of the Fire Marshal by calling (931) 560-1740.
- 4.27 If installed piping is six (6) inches or larger, structural load calculations will be required for the structural elements/systems supporting the load.
- 4.28 Provide separate drawings for the piping plan and reflective ceiling plan.
- 4.29 Provide a fire sprinkler legend including sprinkler symbol, manufacturer, Sprinkler Identification Number (SIN), model, style, K-factor, degree, finish, escutcheon and quantity.
- 4.30 Provide the occupancy type of each room, ceiling heights and ceiling slopes with direction, slope pitch and ceiling height at the beginning of the slope as applicable.
- 4.31 Provide soffit and ceiling pocket details including widths, depths and heights.
- 4.32 Hydraulic Plate information shall be included on the drawings.
- 4.33 Provide calculations of the number of sprinklers to calculate and the number of sprinklers on a branch line and list assumed remote area square feet.
- 4.34 Mark on the drawings the most hydraulically demanding remote area; and zone of influence for lateral and longitudinal seismic bracing.
- 4.35 Pipe Schedule Design shall not be used in existing systems, extension of existing systems or new systems.
- 4.36 Provide the following notes on fire sprinkler plans:

FIRE DEPARTMENT NOTES (NFPA 13):

1. *The installation of the sprinkler system or modifications to existing sprinkler systems shall comply with:*
 - *NFPA 13*
 - *International Building Code (2018 Edition)*
 - *International Fire Code (2018 Edition)*
 - *Columbia Fire Department Development Requirements*
2. *The Fire Marshal's Office will require the following inspections and tests as a minimum:*

- *Overhead installation and hydrostatic test – 200 psi for 2-hours.*
- *Fire sprinkler system final inspection. A **completed and signed "Contractors Material and Test Certificate for Aboveground Piping"** form as required per NFPA 13.*

TO SCHEDULE INSPECTIONS CALL THE OFFICE OF THE FIRE MARSHAL AT (931) 560-1740 AT LEAST 48 HOURS PRIOR TO THE REQUESTED INSPECTION DATE AND TIME.

3. *A dedicated electrical circuit with a circuit breaker lock shall be required for the listed fire alarm control unit.*
4. *All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit and monitored at a UL listed central station service.*
5. *An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box) shall be provided on the exterior of the building in an approved location. Power shall be provided from a listed fire alarm control unit.*
6. *The fire sprinkler branch lines shall be restrained against excessive vertical and lateral movement by use of a wrap-around U-hook or by other approved means per NFPA 13.*

5.0 FIRE SPRINKLER SYSTEMS – NFPA 13R

Design (NFPA 13R)

- 5.1 The sprinkler contractor shall calculate the friction loss for all pipes, meters, valves, fittings and other appurtenances when designing the hydraulic calculations for the NFPA 13R fire sprinkler system.
- 5.2 Fire sprinkler design shall be limited to 90% of the available water supply.
- 5.3 Fire sprinkler systems shall require a single 2 1/2 inch FDC when the building exceeds 2,000 square feet or is more than one-story.
- 5.4 An inspector's test valve must be provided from a remote portion of the system. Orifice size shall be the smallest orifice of any sprinkler in the system. This valve shall be a full port ball valve with signed access panel and a copper stub outside the wall.
- 5.5 Access panels for fire sprinkler risers, inspector test valves and doors for fire sprinkler riser rooms, all shall have signs with appropriate descriptions.
- 5.6 Fire sprinkler protection is required in any size bathroom when a walk-in closet must exit through a bathroom.
- 5.7 Fire sprinkler protection is required for carports, garages and similar structures, regardless of construction, unless physically separated by a minimum of fifteen (15) feet from dwellings or other structures.
- 5.8 Minimum piping size shall be one (1) inch nominal.

- 5.9 Light fixtures, soffits and other potential obstructions shall not interfere with the spray patterns of sprinkler heads. The sprinkler contractor shall ensure that the type and location of potential obstructions are considered in the design and installation of the system. The sprinkler contractor is responsible for coordinating and resolving conflicts in coverage patterns.
- 5.10 All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit and monitored at a UL listed central station service.
- 5.11 An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box) shall be provided on the exterior of the building in an approved location.
- 5.12 A dedicated electrical circuit with a circuit breaker lock shall be required for the listed fire alarm control unit.
- 5.13 Additional exterior horn/strobes may be required when there are more than four (4) dwelling units per building.
- 5.14 Contractor shall provide a spare head box with sprinkler wrench and three (3) spare sprinkler heads of each type, unless there are less than three (3) heads of that type.

Plans (NFPA 13R)

- 5.15 Piping shall be detailed on drawing from public water main to riser including pipe sizes, pipe types, pipe lengths, all fittings, all valves, water meter manufacturer and model, back flow device manufacturer, model and size and elevations of house finished floor relative to fire hydrant outlet where pressures were taken.
- 5.16 Provide a riser detail on the drawing, including a flow control valve with a tamper switch.
- 5.17 Provide an inspector test detail on drawing.
- 5.18 Provide a table on the drawings for piping support spacing and one (1) and two (2) point sprinkler head vertical restraint spacing.
- 5.19 Provide a fire sprinkler legend including sprinkler symbol, manufacturer, Sprinkler Identification Number (SIN), model, style, K-factor, degree, finish, escutcheon and quantity.
- 5.20 Provide occupancy type of each room, ceiling heights and ceiling slopes with direction, slope pitch and ceiling height at the beginning of the slope as applicable.
- 5.21 Provide soffit and ceiling pocket details including widths, depths and heights.
- 5.22 Provide beam details including widths, heights and spacing.
- 5.23 Provide location of required horn/strobes.
- 5.24 Provide the following notes on fire sprinkler plans:

FIRE DEPARTMENT NOTES (NFPA 13R):

1. *The installation of the sprinkler system or modifications to existing sprinkler systems shall comply with:*
 - *NFPA 13R*

- *International Building Code (2018 Edition)*
- *International Fire Code (2018 Edition)*
- *Columbia Fire Department Development Requirements*

2. *The Fire Marshal will require the following inspections and tests as a minimum:*

- *Overhead installation and hydrostatic test – 200 psi for 2-hours.*
- *Fire sprinkler system final inspection. **A completed and signed "Contractors Material and Test Certificate for Aboveground Piping" form as required per NFPA 13R.***

TO SCHEDULE INSPECTIONS CALL THE OFFICE OF THE FIRE MARSHAL AT (931) 560-1740 AT LEAST 48 HOURS PRIOR TO THE REQUESTED INSPECTION DATE AND TIME.

3. *A dedicated electrical circuit with a circuit breaker lock shall be required for the listed fire alarm control unit.*
4. *All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit and monitored at a UL listed central station service.*
5. *An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box) shall be provided on the exterior of the building in an approved location.*

6.0 FIRE SPRINKLER SYSTEMS – NFPA 13D

Design (NFPA 13D)

- 6.1 A full port ball valve shall be installed at one- and two-family dwelling units as a shut-off valve for both domestic and fire sprinkler water supply. A shut-off valve shall be installed for the domestic water supply after the fire sprinkler system take-off.
- 6.2 The sprinkler system piping shall not have a separate control valve installed.
- 6.3 Fire sprinkler system design shall be limited to 90% of the available water supply.
Fire sprinkler systems shall be combined domestic and fire sprinkler service to the dwelling. Hydraulic calculations shall include 5 GPM domestic water demand at the domestic water take-off.
- 6.4 Access panels for fire sprinkler risers shall have a sign with an appropriate description.
- 6.5 Fire sprinkler protection is required in any size bathroom when a walk-in closet must exit through a bathroom.
- 6.6 A single pilot head shall be installed in attic areas over the forced air unit(s).

- 6.7 All listed equipment and materials shall be installed in accordance with the terms of their listings and the manufacturer's instructions.
- 6.8 Fire sprinkler protection is required for garages and similar structures, regardless of construction, unless physically separated by a minimum of fifteen (15) feet from dwellings or other structures.
- 6.9 Piping systems shall be tested in accordance with the International Plumbing Code for multipurpose piping and NFPA 13D and manufacturer's listing and recommendations for fire sprinkler piping.
- 6.10 Light fixtures, soffits and other potential obstructions shall not interfere with the spray patterns of sprinkler heads. The sprinkler contractor shall ensure that the type and location of potential obstructions are considered in the design and installation of the system. The sprinkler contractor is responsible for coordinating and resolving conflicts in coverage patterns.
- 6.11 Water Flow Switch and Alarm. A water flow switch shall be installed with every residential fire sprinkler system. The system shall include:
 - 1. *An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box or equal) shall be provided on the exterior of the building in an approved location. The horn/strobe shall be outdoor-rated.*
- 6.12 Contractor shall provide a spare head box with sprinkler wrench and two (2) spare sprinkler heads of each type, unless there is less than two (2) heads of that type.
- 6.13 Prescriptive pipe size method shall not be used to design fire sprinkler systems.
- 6.14 Hydraulic calculation procedures in accordance with NFPA 13 shall be used for all types of sprinkler systems.
- 6.15 Network fire sprinkler systems are prohibited.

Plans (NFPA 13D)

- 6.16 Piping shall be detailed on drawing from public water main to riser including pipe sizes, pipe types, pipe lengths, all fittings, all valves, water meter manufacturer and model, back flow device manufacturer, model and size and elevations of house finished floor relative to fire hydrant outlet where pressures were taken.
- 6.17 Provide a riser detail on the drawing.
- 6.18 Provide a table on the drawings for piping support spacing and one (1) and two (2) point sprinkler head vertical restraint spacing.
- 6.19 Provide a fire sprinkler legend including sprinkler symbol, manufacturer, Sprinkler Identification Number (SIN), model, style, K-factor, degree, finish, escutcheon and quantity.
- 6.20 Provide occupancy of each room, ceiling heights and ceiling slopes with direction, slope pitch and ceiling height at the beginning of the slope as applicable.
- 6.21 Provide soffit and ceiling pocket details including widths, depths and heights.
- 6.22 Provide beam details including widths, heights and spacing.
- 6.23 Design a looped fire sprinkler piping system where possible.

6.24 Provide the following notes on fire sprinkler plans:

FIRE DEPARTMENT NOTES (NFPA 13D):

1. *The installation of the sprinkler system or modifications to existing sprinkler systems shall comply with:*
 - *NFPA 13D (2016 Edition)*
 - *International Residential Code (2018 Edition)*
 - *International Fire Code (2018 Edition)*
 - *Columbia Fire Department Development Requirements*
2. *Water Flow Switch and Alarm. A water flow switch shall be installed in every dwelling unit fire sprinkler system. The system shall include:*
 - *An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box or equal) shall be provided on the exterior of the building in an approved location. The horn/strobe shall be outdoor-rated.*

7.0 INSPECTIONS AND TESTS

7.1 The system must pass all the fire protection systems inspections prior to a certificate of occupancy.

7.2 The Inspection, Testing and Maintenance of Water-Based Fire Protection Systems shall comply with NFPA 25 (2017 Edition).

7.3 Inspection, Flushing, and Hydrostatic Testing of Underground Fire Service Mains.

Note: It is the contractor's responsibility to notify the AHJ of inspection, performance of tests, and completion of Material and Test certificates (10.10.1).

1. *All pipe and fittings shall remain exposed for visual inspection.*
2. *Flush line until water runs clear and line is free of debris in accordance with NFPA 24 (10.10.2.1).*
3. *Use chart below (Figure 1.0) to determine appropriate number and size of hose lines for reach desired water flow for proper flushing. Example: a 6" underground fire line requires a flow of 880 GPM for proper flushing. To achieve a proper flow, two (2) – 2 1/2" hoses would need to be attached to the manifold. Alternately a single 4" hose could be attached to the manifold to achieve the same flow.*

Suggested Number of Lines to Reach Required Flow - Figure 1.0

Pipe Size	Required Flow Rate	2 1/2"	4"	6"	8"
4"	390 GPM	1	-	-	-
6"	880 GPM	2	1	-	-
8"	1,560 GPM	4	2	1	-
10"	2,440 GPM	6	3	1	-
12"	3,520 GPM	8	4	2	1

4. **SAFETY IS THE CONTRACTORS RESPONSIBILITY.** *If unsafe conditions are observed, Fire Prevention staff will require that corrective measures are taken. If corrective measures are not sufficient, Fire Marshal staff will end the inspection.*
5. *All pipes and fittings shall be hydrostatically tested to 200 psi or 50 psi above system working pressure, whichever is greater (10.10.2.2.1). System shall maintain pressure at +/- 5 psi for 2-hours. The trench should be backfilled before testing per NFPA 24 (10.10.2.2.4 and 10.10.2.2.5).*
6. *At the conclusion of hydrostatic testing, pressure shall be relieved in the presence of Fire Prevention staff to verify proper movement of gauge needle.*

7.4 OVERHEAD INSTALLATION.

ALL AREAS MUST BE VISIBLE. Contractor shall schedule inspections before insulating, dry walling or installation of ceilings occurs. Inspection shall review compliance with approved plans, spacing, hangers, seismic bracing, etc. All areas must remain visible for any corrections from this inspection. **A REINSPECTION OF CORRECTIONS WILL BE REQUIRED.**

All fire sprinklers utilizing CPVC pipe shall be required to have temporary test plugs installed at the time of rough-in inspections and hydrostatic testing. Sprinkler heads shall be installed only after all rough-in inspections and hydrostatic testing are completed satisfactorily.

The following is required prior to fire sprinkler final:

- **Approved drawings and hydrostatic calculations available on site.**
- **Water service to sprinkler riser shall be installed and live.**
- **All HVAC registers shall be installed.**
- **All electrical shall be installed for lights, ceiling fans and smoke detectors.**

ALL CORRECTIONS FROM PREVIOUS INSPECTIONS MUST BE COMPLETED AND SIGNED OFF.

- 7.5 A complete approved set of fire sprinkler system and private fire service main plans stamped approved (wet stamp and signature) by the Fire Marshal's Office shall be kept on the job site at all times. **INSPECTIONS WILL NOT BE CONDUCTED WITHOUT THE APPROVED PLANS.**
- 7.6 The permit and inspection record card (Job Card) shall be available with the approved plans at the job site. **INSPECTIONS WILL NOT BE CONDUCTED WITHOUT THE APPROPRIATE INSPECTION RECORD CARD (Job Card).**
- 7.7 Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this guideline or of other ordinances of the jurisdiction shall not be valid.

7.8 The following documents are required completed by the contractor and a copy shall be turned over to the fire department at the time of acceptance testing and final inspection:

- (1) Underground Fire Service Mains (NFPA 24)
 - Contractors Material and Test Certificate for Underground Piping
- (2) Fire Sprinkler Systems (NFPA 13 and 13R and 13D)
 - Contractors Material and Test Certificate for Aboveground Piping
- (3) Standpipe and Hose Systems (NFPA 14)
 - Contractors Material and Test Certificate for Aboveground Piping
- (4) Fire Pump Systems (NFPA 20)
 - Contractors Material and Test Certificate for Fire Pump Systems
- (5) Fire Pump Systems (NFPA 20)
 - Contractors Material and Test Certificate for Fire Pump Systems
- (6) Fire Alarm Systems (NFPA 72)
 - Record of Completion

8.0 FIRE ALARM SYSTEMS – NFPA 72

8.1 Burglar/Fire Alarm combo panels are not permitted in the City of Columbia, TN.

9.0 EMERGENCY ACCESS AND GATES

General

- 9.1** This section has been developed to assist development applicants, architects, contractors, and building/business owners in determining the minimum requirements for Knox switches on powered access gates, Knox boxes for non-powered gates, Knox box vaults for residential and commercial facilities and minimum access gate requirements for fire department access during emergency responses.

Plans

- 9.2** Plan submittals must identify all access gates and locations of Knox access switches and Knox boxes.

Gate Access Requirements

- 9.3** The installation of security gates across a fire apparatus access road shall be approved by the fire code official during the plan check review. Where security gates are installed, they shall have an approved means of emergency operation. The security gates and the emergency operation shall be maintained at all times.
- 9.4** A Knox key operated switch shall be installed at every automatic gate. Secured automated vehicle gates or entries shall utilize an approved Knox key switch when required by the fire code official. Secured non-automated vehicle gates or entries shall utilize an approved padlock or chain (maximum link or lock shackle size of a quarter (1/4) inch) when required by the fire code official.
- 9.5** Electric gate operators, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed and installed to comply with these requirements.
- 9.6** In the event of a power failure, the gates shall be defaulted or automatically transferred to a fail-safe mode allowing the gate to be pushed open without the use of special knowledge or any equipment. If a two-gate system is used, the override switch must open both gates.
- 9.7** Gate arms securing parking lots and parking structures shall be equipped with a fire department approved dual-keyed Knox key electric switch. When activated, the arm or arms shall open to allow fire and law enforcement access.
- 9.8** If there is no sensing device that will automatically open the gates for exiting, a fire department approved Knox electrical override switch shall be placed on each side of the gate in an approved location.
- 9.9** Approved security gates shall be a minimum of fourteen (14) feet in unobstructed drive width on each side with gate in open position. An unobstructed vertical clearance of not less than thirteen (13) feet and six (6) inches shall be provided and maintained at all times.

Building Access Requirements

- 9.10** Where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for emergency responder access, a Knox box vault will be required.

- 9.11 Knox box locations shall be mounted at five (5) feet above grade. Show locations of Knox access controls on plan elevation views. Show requirement in plan notes. Contact the Fire Marshal's Office by calling (931) 560-1740 for a Knox Authorization Order Form.
- 9.12 The Knox key box shall be of an approved type and shall contain keys to gain necessary access as required by the fire code official.
- 9.13 Secured emergency access gates serving apartment, townhome or condominium complex courtyard, must provide a Knox key box in addition to association or facility locks. The nominal height of Knox lock box installations shall be five (5) feet above grade.

Inspection Requirements

- 9.14 A final field inspection by the fire code official or an authorized representative is required before electronically controlled gates may become operative. Prior to final inspection, electronic gates shall remain in a locked-open position.
- 9.15 A final field inspection by the fire code official or an authorized representative for the installation of Knox box vaults with appropriate keys is required at time of final inspection.

10.0 FIRE APPARATUS ACCESS ROADS

General

- 10.1 This section has been developed to assist development applicants, architects, contractors, and building/business owners in determining the minimum requirements for the design of fire apparatus access roads for consistency with the best practices of the fire code in the interest of public safety.

Plans

- 10.2 Detailed fire apparatus access roads shall be submitted to the fire department for review and approval prior to construction. Plans shall include certification from a Registered Professional Engineer stating the roads are of all-weather construction and capable of supporting fire apparatus weighing 83,000 lbs. G.V.W.

Requirements

- 10.3 Designated Fire Lanes: In commercial and multifamily developments, designated fire lanes shall not be less than twenty-four (24) feet wide (curb face to curb face) with no parking on either side and shall be identified as fire lanes with red curb(s), stating in white lettering "**NO PARKING FIRE LANE CMC 15-603**", or by approved signage, or by both red curb(s) with white lettering and signage. Refer to the CFR Fire Lane Policy.
- 10.4 The grade of the fire apparatus access road shall be within the limits established by the fire code official based on the fire department's apparatus. No grade shall exceed 10% in commercial and 14% in city streets. Grade transitions shall not exceed maximum angle of approach and angle of departure based on the fire department's apparatus as determined by the fire code official.

- 10.5** The required turning radius of a fire apparatus access road shall be determined by the fire code official. Fire access road turns and corners shall be designed with a minimum inner radius of 30 feet and an outer radius of 43 feet.
- 10.6** Dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus. Refer to the City Engineers Design Standards.
- 10.7** Fire department access roads/driveways shall be provided so that no portion of the exterior wall of the first floor of any building will be more than 150 feet from such roads.
- 10.8** When fences are installed that because the distance from an approved fire department access road to exceed the maximum distance allowed in Section 503 herein, a gate shall be provided in the fence to maintain the required fire department access. The gate shall be a minimum four (4) feet in width and be equipped with a Knox key box and/or Knox lock accessible from both sides in accordance with Section 506 herein.
- 10.9** Access to building openings and roofs. An approved walkway with a minimum width of forty-eight (48) inches shall be maintained readily accessible to all exterior openings for emergency access by the fire department.
- 10.10** A secondary access road shall be provided for all developments with fifty (50) or more dwelling units.

Construction Requirements

- 10.11** Access for firefighting equipment shall be provided to the immediate job site at the start of construction and maintained until all construction is complete. Fire apparatus access roads shall have an unobstructed width of not less than twenty- four (24) feet and an unobstructed vertical clearance of not less than thirteen (13) feet and six (6) inches.