



**CHARLOTTE FIRE DEPARTMENT  
FIRE MARSHAL'S OFFICE  
500 DALTON AVE  
CHARLOTTE, NC 28206**



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## Fire Plan Review Guidelines

*(All Plans Submitted to Land Development Prior to the Application Date 15 February 2022 Will Be Reviewed Under the Old Requirements)*

### **General Requirements**

#### **A. Submittal Requirements:**

1. Building permit information can be found on Mecklenburg County's "LUESA" site. [Click Here](#)
2. City of Charlotte Planning Department (City Engineering). [Click Here](#)

#### **B. Appendix B:**

1. Provide information for the entire project and include the following:
  - a. Project name and address
  - b. Fire district status
  - c. Occupant load
  - d. Seismic category
  - e. Fire alarm status and type
  - f. Sprinkler status and type

### **New/Shell Building Requirements**

#### **A. Site Requirements:**

1. Fire apparatus access roads shall have an unobstructed width of not less than 20 feet and an unobstructed vertical clearance of not less than 14 feet. This shall include multi-family properties and residential communities with privately maintained streets; on-street parking shall be prohibited unless the minimum 20 feet width can be established and maintained.



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2. Dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved area for turning around fire apparatus.
3. The minimum turning radius shall be 42 feet-3 1/2 inch outside and 30 feet inside for all proposed fire apparatus access roads.
4. Fire apparatus access roads shall not have a slope greater than 10%.
5. Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be surfaced to provide all-weather driving capabilities. CFD's largest trucks (ladder companies) have a Gross Vehicle Weight (GVW) of 85,000 lbs.
6. Fire apparatus access roads shall be within 200 feet of all exterior walls of sprinkled buildings and 150 feet of all exterior walls of non-sprinkled buildings.

**B. Water Supply:**

1. Current hydrant test shall be included in shell submittals for all buildings that have an ISO NFF calculation or has a wet standpipe that is served by a fire pump.
2. An ISO needed fire flow (NFF) calculation shall be completed for all non-sprinkled buildings, NFPA 13D and NFPA 13R Systems.
3. For non-sprinkled buildings - An approved fire hydrant shall be located within 400 feet from the most remote point of all buildings and measured "as an approved apparatus route as determined by the fire code official". (NCIFC 2018 ed. Sec. 507.5.1.)
4. For sprinkled buildings - An approved fire hydrant shall be located within 600 feet from the most remote point of all buildings and measured "as an approved apparatus route as determined by the fire code official". (NCIFC 2018 ed. Sec. 507.5.1. exception #2)
5. Hydrants that serve standpipe systems shall be within 100 feet of a fire hydrant (NCIFC 2018 ed. Section 507.5.1.1.)
6. The fire department connection (FDC) shall not be greater than 50 feet from a fire department access road.
7. Water mains that are 6 inches in diameter and serving a fire hydrant shall not exceed 350 feet in length.



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8. Show an NFPA 13 FDC location within 200 feet of a fire hydrant as the truck travels. (See water supply Section.)
9. Show an NFPA 13R FDC location within 200 feet of a fire hydrant as the truck travels. (See water supply Section.)
10. Show all existing and new hydrant locations, including size of mains. Friction loss calculations shall be required for all new hydrant installations in a water-model format.
11. Buildings protected with an NFPA 13R sprinkler system shall be calculated, with a 50% credit allowance given on the NFF.
12. Include recent hydrant flow test (within the past 12 months) of the most remote hydrant at 20 psi from our hydrant test coordinator by calling 704-336-2101 or [Click Here](#).
13. For all buildings being served by a fire pump the following must be provided. Pump information including but not limited to, pump driver details including manufacturer, horsepower, voltage, or fuel system details, rated capacity and location of pump.

**C. Fire Sprinkler Protection: \***

1. Provide the sprinkler design criteria based off the 48-hr. low hydrant test. A hydraulic adjustment is required to adjust the water supply curve to the lowest pressures the system encounters during a 48-hour time period. Adjustment of the water supply curve entails shifting both the static and residual pressures downward to the lowest static pressure the system encountered during the 48-hour test. The curve should show two curves in parallel shifted along the y-axis. See example:  
*Water supply calculation example:*  
*48-hour low: 70 psi static*  
*Conditions during flow test: 80 psi static 65 psi residual 965 gpm.*  
*Adjustment: 70 psi static 55 psi residual 965 gpm.*
2. Show all FDC and hydrant locations.



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3. Provide riser diagram and type of system.
4. Show the riser location.
5. Provide vertical elevation of each floor

\*Fire sprinkler shop drawings are required for **all new systems.**

**D. Fire Alarm Systems: \***

1. Show all notification and initiating devices, note new-N, existing-E including candela ratings and the (FACP) location.
2. Provide the riser diagram including all devices and monitoring of all suppression systems.
3. Provide the matrix/sequence of operations.

\*Fire alarm shop drawings are required for all new systems.

4. Design Professional shall provide information as required in NCIFC 2018 ed. Sec. 907.1 - 907.1.2 to include 1 through 8 and 12 through 14, since NC Admin. Code does not recognize a NICET Fire Alarm Technician as a design professional.

**E. Standpipe Systems:**

1. Provide the type of system and note "wet" or "dry".
2. FDC location shall be within 100 feet of an approved hydrant and with-in 50 feet of access road.
3. Hose valves shall be on all floor landings, NOT intermediate landings. Additional hose valves are required where the most remote portion of a floor or area exceeds 200 feet from a hose connection for a sprinkled building, or 150 feet for a non-sprinkled building.
4. Provide vertical standpipe riser diagram to include stair elevation diagram (isometric view).
5. (1) 2 1/2" inlet will be provided per 250 gpm. of required standpipe demand.

\****Design per NFPA 14***



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**F. Alternative Suppression Systems:**

1. Engineer to provide the design criteria and type of system being used.
2. Provide detail of the fire suppression system being installed. The details shall include size, length, and arrangement of connected piping. Description and location of nozzles.
3. Provide information pertaining to the location and function of detection devices, operating devices, auxiliary equipment, and electrical circuitry.
4. Provide cut sheets of new equipment.

\*Shop Drawings are not required for alternative suppression systems.

**G. Emergency Responder Radio Coverage (ERRC)**

1. All new buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building. NCIFC 2018 ed. Sec. 510.1, 510.4.1.
2. The in-building 2-way emergency responder communication coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1221.
3. Amplification systems and components. Buildings and structures that cannot support the required level of in-building 2-way emergency responder communication coverage shall be equipped with systems and components to enhance the radio signals and achieve the required level of emergency communication coverage specified in Sections 510.4.1 through 510.4.1.3. Emergency communication systems utilizing radio-frequency-emitting devices and cabling shall be approved by the fire code official. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.
4. Technical criteria. The fire code official shall maintain a document providing the specific technical information and requirements for the in-building 2-way emergency responder communication coverage system. This document shall contain, but not be limited to, the various



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frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.

5. Standby power. In-building 2- way emergency responder communication coverage systems shall be provided dedicated standby power or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 604. The standby power supply shall be capable of operating the in-building 2- way emergency responder communication coverage system. at 100-percent system capacity for a duration of not less than 12 hours.
6. Signal booster requirements. If used, signal boosters shall meet the following requirements:
  - a. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.
  - b. Battery systems used for the emergency power source shall be contained in a 3R or higher-rated cabinet.
  - c. Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.
  - d. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
  - e. Active RF emitting devices used in in-building 2- way emergency responder communication coverage systems shall have built-in oscillation detection and control circuitry.
7. The installation of amplification systems or systems that operate on or provide the means to cause interference on any in-building 2- way emergency responder communication coverage network shall be coordinated and approved by the fire code official.
8. System monitoring. The in-building 2-way emergency responder communication coverage system shall be monitored by a listed fire alarm control unit, or when approved by the fire code official, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signal shall include the following:



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- a. Loss of normal AC power supply.
  - b. System battery charger(s) failure.
  - c. Malfunction of the donor antenna(s).
  - d. Failure of active RF-emitting device(s).
  - e. Low-battery capacity at 70-percent reduction of operating capacity.
  - f. Failure of critical system components.
  - g. The communications link between the fire alarm system and the in-building 2- way emergency responder communication coverage system.
  - h. Oscillation of active RF-emitting device(s)
9. Additional frequencies and change of frequencies. The in-building 2- way emergency responder communication coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.
  10. Design documents. The fire code official shall have the authority to require “as-built” design documents and specifications for in-building 2- way emergency responder communication coverage systems. The documents shall be in a format acceptable to the fire code official.
  11. Radio communication antenna density. Systems shall be engineered to minimize the near-far effect. In-building 2-way emergency responder communication coverage system designs shall include sufficient antenna density to address reduced gain conditions.

**Upfit/Existing Buildings**

**A. Fire Sprinkler Protection**

1. Show all sprinkler head locations on a reflected ceiling plan (RCP) or fire protection sheet (FP).
2. Identify all sprinkler heads as new, existing, relocated, or plugged.



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3. Show all ceiling obstructions and walls and show heads on both sides of new tenant separation walls.

\*Fire Sprinkler Shop Drawings are required when adding **20 or more heads**. *Can be deferred within 90 days of issuance of permit.*

**B. Fire Alarm Systems:**

1. Indicate all notification and initiating devices, show new-N, show existing-E including candela ratings and the FACP location.
2. Provide the riser diagram including all devices and monitoring of all suppression systems.
3. Provide the matrix/sequence of operations.
4. Design Professional shall provide information as required in NCIFC 2018 ed. Sec. 907.1 - 907.1.2 to include 1 through 7 and 12 through 14, since NC Admin. Code does not recognize a NICET Fire Alarm Technician as a design professional.

\*Fire Alarm Shop Drawings are required for **5 or more devices and new panels**. Multi-tenant buildings may require shop drawings per the field inspector. The Fire Alarm contractor is responsible for calculations to verify adequate power for addition of new devices.

**C. Alternative Suppression Systems:**

1. Engineer shall provide the design criteria and type of system being used.
2. Provide cut sheets of new equipment.

\*Shop Drawings are **not** required for alternative suppression systems, but such systems must be installed per manufacturer's specifications. All pre-engineered systems shall be shown on the permit plans.





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**Special Circumstances/Use**

**A. High-rise Buildings:**

1. For two-way fire department communications, although the North Carolina Fire Code requires that a two-way fire department communication system comply with NFPA 72 be installed in high-rise buildings, with a repeater system being the “exception”, the Charlotte Fire Department requires a repeater system. If a designer/building owner wishes to install fire phones complying with NFPA 72, that will be an added level of protection, but not an alternative.
2. Pressure reducing valves (PRV) are required to be field adjustable. (*THIS ITEM IS STILL UNDER REVISION*).
3. For buildings, structures, or parts thereof required by the International Building Code or the NCIFC to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of NCIFC 2018 ed Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to describe adequately the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied with sufficient information and analysis to demonstrate compliance with these provisions.
4. In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of NCIFC 2018 ed. Section 909 shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission



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accompanying the construction documents shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the testing involved. The special inspections and tests required by the NCIFC shall be conducted under the same terms as in Section 1704 of the International Building Code.

5. A rational analysis performed by the registered design professional and approved by the fire code official supporting the types of smoke control systems to be employed, the methods of their operations, the systems supporting them and the methods of construction to be utilized shall accompany the construction documents submission and include, but not be limited to, the items indicated in Sections 909.4.1 through 909.4.7. of the NCIFC.
6. Smoke barriers required for passive smoke control and a smoke control system using the pressurization method shall comply with Section 709 of the International Building Code. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:
  - a) Walls:  $A/A_w = 0.00100$
  - b) Interior exit stairways and ramps and exit passageways:  $A/A_w = 0.00035$
  - c) Enclosed exit access stairways and ramps and all other shafts:  $A/A_w = 0.00150$
  - d) Floors and roofs:  $A/A_f = 0.00050$  where:  $A$  = Total leakage area, square feet (m<sup>2</sup>).  
 $A_f$  = Unit floor or roof area of barrier, square feet (m<sup>2</sup>).  
 $A_w$  = Unit wall area of barrier, square feet (m<sup>2</sup>).

The leakage area ratios shown do not include openings due to gaps around doors and operable windows. The total leakage area of the smoke barrier shall be determined in accordance with Section 909.5.1 and tested in accordance with Section 909.5.2.
7. The primary mechanical means of controlling smoke shall be by pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke-control zone of fire origin.



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8. Where approved by the fire code official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones using the airflow method, shall be permitted. The design airflow shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects. Smoke control systems using the airflow method shall be designed in accordance with NFPA 92.
9. Where approved by the fire code official, mechanical smoke control for large, enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. Smoke control systems using the exhaust method shall be designed in accordance with NFPA 92.
10. The design fire shall be based on a rational analysis performed by the registered design professional and approved by the fire code official. The design fire shall be based on the analysis in accordance with Section 909.4 through 909.9.4, where applicable.
11. Equipment including, but not limited to, fans, ducts, automatic dampers, and balance dampers shall be suitable for their intended use, suitable for the probable exposure temperatures that the rational analysis indicates, and as approved by the fire code official. Refer to NCIFC Sections 909.10.1 through 909.10.5.
12. Smoke control systems shall be provided with standby power in accordance with NCIFC Section 604.
13. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907 and Sections 909.12 through 909.12.4. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.
14. Control air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections and shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action as listed in NCIFC 909.13.1 through 909.13.3.
15. Identical control diagrams showing all devices in the system and identifying their location and function shall be maintained current and kept on file with the fire code official, the fire department and in the fire command center in a format and manner approved by the fire chief.



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16. A fire fighter's smoke control panel for fire department emergency response purposes only shall be provided and shall include manual control or override of automatic control for mechanical smoke control systems. The panel shall be in a fire command center complying with NCIFC Section 508 in high-rise buildings or buildings with smoke-protected assembly seating. In all other buildings, the fire fighter's smoke control panel shall be installed in an approved location adjacent to the fire alarm control panel. The fire fighter's smoke control panel shall comply with Sections 909.16.1 through 909.16.3.
17. Smoke-control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as dampers and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts, and other equipment. For purposes of smoke control, the fire fighter's control panel response time shall be the same for automatic or manual smoke control action initiated from any other building control point. The total response time, including that necessary for detection, shutdown of operating equipment and smoke control system startup, shall allow for full operational mode to be achieved before the conditions in the space exceed the design smoke condition. The system response time for each component and their sequential relationships shall be detailed in the required rational analysis and verification of their installed condition reported in the required final report.
18. Five floor grouping for fire alarm notification is the acceptable means for high-rise buildings. The fire alarm shall be zoned/grouped for five floors which are: the fire floor, two above it, and two below it. This is a CFD FMO Operating Guideline approved by the Fire Marshal.
19. Five floor grouping for fire evacuation is the acceptable means for high-rise buildings. The fire alarm shall be zoned/grouped for five floors which are (commonly referred to as the "Rule of 5" or "5 Move 5"): the fire floor, two above it for safety, and two below it (so that the second floor below the fire floor can be used as a staging area for fire department operations). Occupants on these five floors are relocated down five floors thus being relocated to at least three floors from the fire floor; if the fire is on or below a floor that is six floors from street level, the occupants usually will be evacuated from the building. The evacuation plan must be submitted to the Inspector for approval. This is a CFD FMO Operating Guideline approved by the Fire Marshal.



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**B. Cell Phone Towers:**

1. Site shall be provided with an approved fire department access road of not less than 20 feet in width, and an unobstructed vertical clearance of not less than 14 feet.
2. Dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved area for turning around fire apparatus.
3. The minimum turning radius shall be 42 feet-3 1/2 inches outside and 30 feet inside for the proposed fire apparatus access road.
4. Fire apparatus access road shall not have a slope greater than 10%.
5. Fire apparatus access road shall be designed and maintained to support the imposed loads of fire apparatus and shall be surfaced so as to provide all-weather driving capabilities. CFD's largest trucks (ladder companies) have a Gross Vehicle Weight (GVW) of 85,000 lbs.
6. Fire apparatus access road shall be within 150 feet of all exterior walls of the building (200 feet if building is sprinkled).

**C. Gates and Access Controlled Fencing:**

1. Must be a minimum width of 20 feet for undivided entry/exit or 16 feet for divided entry/exit.
2. All gates shall have a Knox Box or Knox Switch for fire department access.
3. 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 the requirements of ASTM F2200.



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**Shop Drawing Requirements**

**A. Plan Submittal:**

1. Fire alarm systems:

Shop drawing submittal for fire alarm systems shall include, but not be limited to, the following information, in accordance with Section 907 of the North Carolina Fire Code and NFPA 72 Section 7.4 under the current recognized standard edition or the latest edition but must be used in its entirety:

- A floor plan that indicates the use of all rooms.
- Locations of alarm-initiating devices.
- Locations of alarm notification appliances, including candela ratings for visible appliances.
- Location of fire alarm control unit, transponders and notification power supplies.
- Annunciators.
- Power connection.
- Battery calculations.
- Conductor type and sizes.
- voltage drop calculations.
- Manufacture's cut sheets for equipment, devices and materials.
- Details of ceiling heights and construction.
- The interface of fire safety control functions.
- Classification of supervising station.



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2. Fire sprinkler systems:

Shop drawing submittal for fire protection systems shall include, but not be limited to, the following information, in accordance with Section 907 of the North Carolina Fire Code and NFPA 13 Chapter 23 under the current recognized standard edition or the latest edition but must be used in its entirety:

- Cut sheets for sprinkler heads.
- Hydraulic calculations (must include all fixed losses per manufacturers cut sheets to include backflow and metering devices tapped to a City main.).
- Utility plans indicating all below-ground piping and associated connections including sectional valves, PIVs and control valves.
- Fire hydrant flow test results unless current test is within a 12-month period.
- Provide a permanent means to test the backflow downstream.

**B. Submittal Timeline:**

1. Shop drawings shall be submitted within 90 days of building permit issuance. Installation shall not take place until plans are reviewed and approved.
2. Plans will be reviewed within 7-10 business days, based on the size of the project from the date the reviewer receives them. If you are submitting midrise and high-rise shell projects, Group H, and Group I based upon the size of the project your turn around time will not be more than 30 days. We will notify the submitter when the review has been completed.

**C. Submittal Procedure: \***

The current shop drawing fee for fire alarm systems and fire sprinkler systems is \$135.00 per system. In order to process and complete your review request, you must complete the “Charlotte Fire Department Shop Drawing Review Application” form. This form must accompany all shop drawings. [Click Here](#)



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**Plans must be submitted in electronic format.** Submittal may be via: Other electronic format via the link below, dropbox.com (or similar program), or delivered in electronic format to our office at 500 Dalton Avenue.

1. When submitting electronically, submit via [cfddlansubmittal@charlottenc.gov](mailto:cfddlansubmittal@charlottenc.gov).
  2. Upon receipt of your plans, we will contact you for payment arrangements.
- \*If you have any questions, contact the Fire Marshal's Office at 704-336-2101.

**D. Review Application and Fees:**

**\*Fees are assessed on every submittal whether the plans are approved or disapproved.**

Hydrant Test - 34a - \$195.00

Rezoning Petitions – Major - 34b - \$115.00

Rezoning Petitions – Minor - 34t - \$40.00

Multi Family - 34c - \$195.00

Fire Alarm Plans (Shop drawings) - 34d - \$195.00

Fire Sprinkler Plans (Shop drawings) - 34e - \$310.00

Plans Review-Const. less than 50,000 - 34g - \$155.00

Plans Review-Const. \$50,001 to 100,000 - 34h - \$195.00

Plans Review-Const. \$100,001 to 500,000 - 34i - \$270.00

Plans Review-Const. \$500,001 to 1,000,000 - 34j - \$310.00

Plans Review-Const. \$1,000,001 to 5,000,000 - 34k - \$350.00

Plans Review-Const. \$5,000,001 to 10,000,000 - 34l - \$545.00

Plans Review-Const. Greater Than 10,000,000 - 34m - \$1,550.00

Performance Tests - Fire pumps - 34n - \$235.00

Performance Tests - Sprinkler System - 34o - \$310.00

Performance Tests - Fire Alarm (Shell) - 34p - \$310.00

Performance Tests - Fire Alarm (Upfit) - 34q - \$310.00





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Performance Tests - Private fire hydrants - 34r - \$80.00

Performance Tests - Standpipe system tests - 34s - \$310.00

Performance Tests - Automatic fire-extinguishing systems - 34f - \$115.00

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Kevin Miller, Fire Marshal  
Charlotte Fire Department  
Fire Prevention  
Fire Marshal's Office