

Office of University Building Official (OUBO)

Fire Protection Requirements
Part I – Fire Suppression

Agenda

- Code Overview
- GMU HECO Manual Requirements
- GMU Design Standards
- OUBO Process & Tips for Success
 - Plan Review
 - Inspections
 - Close-out Documents

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Code Overview

Relevant Codes & Standards



- **Virginia Uniform Statewide Building Code**

- Virginia Construction Code, 2018
- Virginia Existing Building Code, 2018
- International Fire Code, 2018
- **NOT Life Safety Code!**

- **National Fire Protection Association (NFPA)**

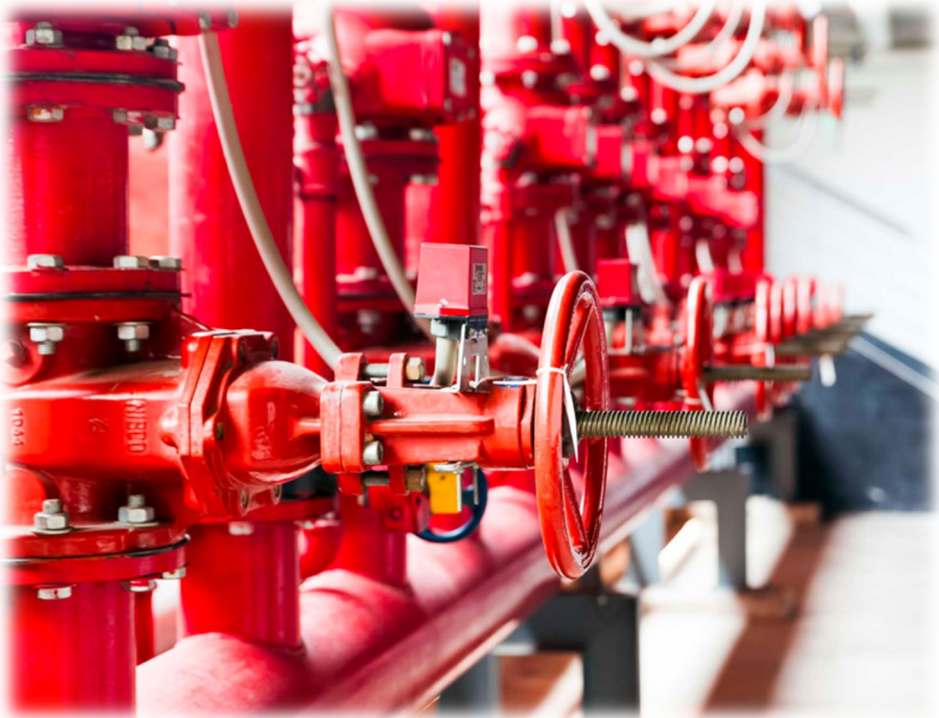
- NFPA 13, Installation of Sprinkler Systems, 2016
- NFPA 13R, Installation of Sprinkler Systems in Low-rise Residential Occupancies
- NFPA 14, Installation of Standpipe and Hose Systems, 2016
- NFPA 20, Installation of Stationary Pumps for Fire Protection

Virginia Construction Code (VCC) Sections 901 – 905 & 912 – 913

Fire Protection System Requirements

- 901 General Requirements
 - Integrated Testing
 - High-Rise
 - Smoke Control Systems
- 902 Fire Pump & Riser Room Size
- 903 Automatic Sprinkler Systems
- 904 Alternative Automatic Fire Extinguishing Systems
- 905 Standpipe Systems
- 912 Fire Department Connections
- 913 Fire Pumps

Fire Protection Systems



AUTOMATIC SPRINKLER SYSTEMS

Occupancy Group Determines

- Fire Area Size/Location
- Occupant Load Thresholds
- Required Throughout Some Occupancies
- Non-required Systems (VCC 103.3)

Fire Protection Systems



STANDPIPE SYSTEMS

Building Height Determines

- Height Above Apparatus Road
- Combined Sprinkler/Standpipe System
- Manual
 - Low-Rise
- Automatic
 - High-Rise



GMU Higher Education Capital Outlay Manual (HECOM)

M Office of University Building Official

Plan Review

HOME / SERVICES / PLAN REVIEW

Project managers can submit drawings to the OUBO in e-Builder by starting the **OUBO Plan Review (UBOPL)** process.

Constructions documents will be reviewed to ensure conformance with applicable Federal, State and University Codes and Standards.

- 5 days – Schematic, Small Projects
- 10 days – Preliminary Reviews
- 15 days – Construction Drawings and first submittal of Shop Drawings

Documents must conform to the following:

- [Building Codes](#)
- [Facilities Design Guidelines](#)
- [HECOM](#)

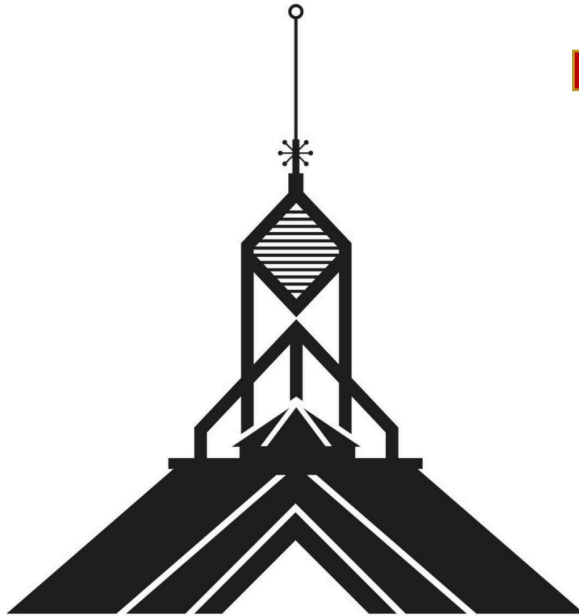
Project Review

Plan Review

Permits

Inspections

GEORGE MASON UNIVERSITY Higher Education Capital Outlay Manual 2023



Vice President of Facilities

References: The Commonwealth of Virginia "Construction and Professional Services Manual" (CPSM) and the "Design & Construction Guidelines" are referenced extensively and should be readily available when using this Manual.

The most current version of these two documents are on the following websites:
<https://facilities.gmu.edu/> and www.dgs.virginia.gov

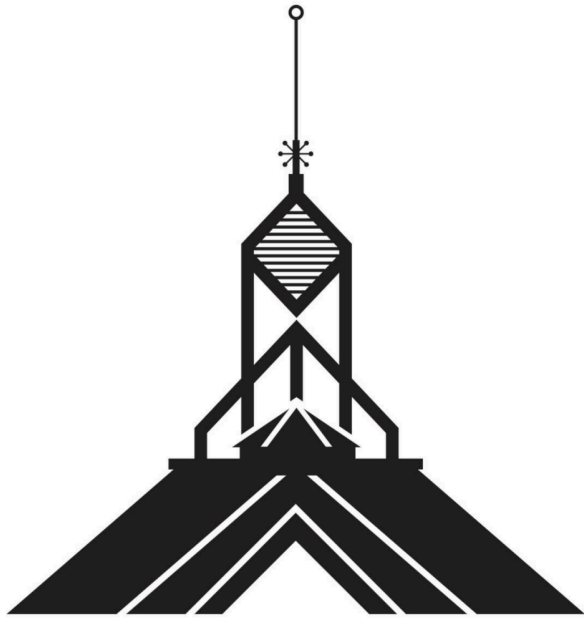
Page | 1

CHAPTER 7: ENGINEERING AND TECHNICAL CRITERIA

- Section 7.1 General
- Section 7.2 Building Codes
- Section 7.3 Accessibility Standards for State-Owned Buildings
- Section 7.4 Special Procedures for Asbestos Abatement
- Section 7.5 Special Procedures for Lead based Paint Abatement
- Section 7.6 Underground Storage Tank Systems (USTS) and Aboveground Storage Tanks (AST)
- Section 7.7 Chesapeake Bay Program
- Section 7.8 Special Building Planning Requirements
- Section 7.9 Earthwork
- Section 7.10 Stormwater Management and Erosion and Sediment Control Requirements
- Section 7.11 Fire Protection and Life Safety Systems
- Section 7.12 Pressure Vessels
- Section 7.13 Temporary Electrical Service

CHAPTER 8: PROJECT DESIGN STANDARDS AND REQUIREMENTS

- Section 8.1 General
- Section 8.2 Drawing Standards
- Section 8.3 Specification Standards
- Section 8.4 Cost Estimate Standards
- Section 8.5 Design Initiation /Pre-design Conference
- Section 8.6 Schematic Design Project Criteria
- Section 8.7 Preliminary Design
- Section 8.8 Working Drawing
- Section 8.9 Bid Forms & Procedures
- Section 8.10 Additive Bid Items
- Section 8.11 Project Submission Requirements
- Section 8.12 Authority Having Jurisdiction Reviews and Approvals
- Section 8.13 Quality Control/Quality Assurance
- Section 8.14 Value Engineering (VE)
- Section 8.15 Structural and Special Inspections, & Structural Observations
- Section 8.16 Structural Observations
- Section 8.17 Commissioning of HVAC Systems
- Section 8.18 Electrical Coordination Analyses (Shop Drawings) Review
- Section 8.19 Fire Protection Shop Drawings



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8.2.2.1 Arrangement of Drawings: Drawings shall be arranged in the following order with the discipline identifying character shown:

G - Title Sheet, Index, Code Compliance, and Life Safety Drawings

C - Plot and/or Site plans

C - Sanitary and Civil

B - Boring logs

L - Landscaping

D - Demolition

A - Architectural

S - Structural

FA – Fire Alarm

FX – Fire Suppression, Standpipes, and Accessories

P - Plumbing

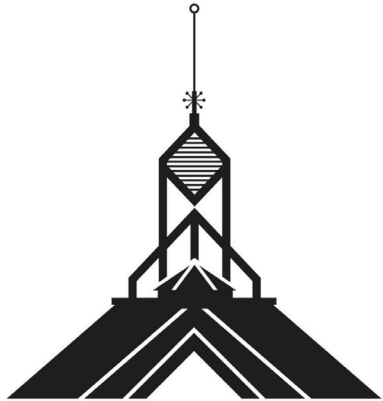
M - Mechanical (heating, cooling, ventilation, etc.)

E - Electrical

R - Asbestos Abatement

T–Telecom/AV

AC – Access Controls (Access Controls, Cameras, and Alarm Systems)



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Preliminary Drawings (FX)

Fire Suppression (FX) Plans:

1. Water flow test data required by NFPA 13.
2. Identify each type of automatic fire suppression system and where it is or is not used.
3. Identify occupancy hazard classifications and densities as established in NFPA 13 for each floor level.
4. Show and identify all new and existing standpipes.
5. Provide a small-scale drawing showing locations of water hydrants, test and low hydrants (for water flow tests), and routing of underground pipe; or, alternatively, state the drawing number where the information may be found on other drawings. Conduct the test in conformance with NFPA 13, 14, and 291 and provide the required documentation of test results. (See NFPA 13 annex for additional guidance.) Two locations are required for these tests of water supplies. Use an approved gauge to read the 'test' or 'residual' pressures at the hydrant nearest the building and a 'Pitot' tube or gauge at the next closest hydrant to measure the 'flow'. If the local water authority prohibits flow testing, indicate on the documents the flow and pressure data provided by the authority and note as such.
6. Determine capability of water supply and verify initially if a fire pump is necessary to boost the available water supply pressure. Where an existing fire pump is to be used in the project, its performance and condition is to be established and validated. This is to be accomplished by submitting a copy of the recent report of the fire pump inspection, testing, and maintenance, compliant with the Virginia Statewide Fire Prevention Code: Fire Pumps - Testing and Maintenance. This section requires that fire pumps be inspected, tested, and maintained in accordance with NFPA 25. The current edition of NFPA 25 defines the parameters for the report. The performance and condition of the fire pump is to be validated on an annual basis.



Fire Suppression (FX) Plans

Fire Suppression Systems – Water-based: Fire Sprinkler/Standpipe

The A/E shall confirm complete project specific drawings and specifications that define a code compliant fire suppression system. User's programmatic requirements which may supplement or provide additional levels of protection above the minimum requirements of the code shall be included in the design. Changes to the design during the construction phase of the project shall be submitted to the Office of the University Building Official (OUBO) for review and approval. The A/E shall assure that code compliant fire suppression systems(s) is provided through the review of the fire suppression shop drawings and the observation of the progress and quality of the work. The A/E shall confirm that the fire suppression system(s) is complete and code compliant. It is the responsibility of the A/E to provide a project specific design. **Performance criteria do not meet the intent of this section.**

Working Drawing Submission

Provide the following as a minimum to demonstrate code compliance on the working FX drawing submission:

1. Identify the occupancy hazard classification and show the location of sprinklers for each of the spaces on each floor within the buildings. The location of sprinklers are to be based on the VCC, NFPA 13 and the user's programmatic requirements with the understanding that the quantity, coverage, location and type of sprinkler are not to be altered by the Contractor, without prior written approval by the A/E and the Office of the University Building Official (OUBO).
2. Show the location of fire department valves and risers within the building. Indicate that the fire department valves are attached to either a standpipe riser, combined standpipe and sprinkler riser, or wet pipe sprinkler system risers. The locations of fire department valves are to be based on the VCC, NFPA 13, NFPA 14 and the user's programmatic requirements.

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Working Drawings (FX)

3. Show proposed sprinkler piping and standpipe layout including the sprinkler mains (including cross mains) within the building and layout of branch lines for the most hydraulically demanding zone(s) on each floor of each sprinkler system. Indicate the size of pipes that are shown.
4. Provide a table summarizing the characteristics of each of the sprinkler systems. Define the type of sprinkler system(s), areas of coverage, hazard, minimum rate of water coverage (density) per area, water required for each area of coverage, hose stream allowances for each area, total water requirements for each area of coverage, hydraulically calculated pressure requirements at a common reference point at design flow for each area of coverage, and water supply (flow & pressure) available at the common reference point.
5. Provide a small-scale drawing showing locations of water hydrants, test and flow hydrants (for waterflow tests), and routing of underground pipe. Indicate the waterflow Test results, the date and time taken and who conducted the test. Indicate the water supply (flow & pressure) at a reference point common with the sprinkler/standpipe system design. Refer to Section 8.7.6, Preliminary Design, for additional information on waterflow test procedures required.
6. Show and identify all existing sprinkler systems and standpipe systems.
7. Show and indicate all new connections to existing systems.
8. Provide sprinkler riser diagram with appropriate fittings, accessories, sizes, alarms, valves, etc., noted.
9. Detail inspector's test station location(s) and associated discharge/ drainage piping.
10. Show the location of the fire department connection(s) with all interconnecting piping to the sprinkler and standpipe systems.
11. Show the location and details of the fire pump, driver, fire pump controller, piping, components and piping specialties.
12. Show the location of the fire pump test header and all interconnecting piping.
13. Show sprinkler type (i.e., standard, quick-response, residential, etc.), K-factor and temperature ratings.



3. Provide a description of the acceptance testing requirements. Indicate which of the acceptance tests are to be witnessed by the OUBO and the regional office of the State Fire Marshal (Capital projects only).

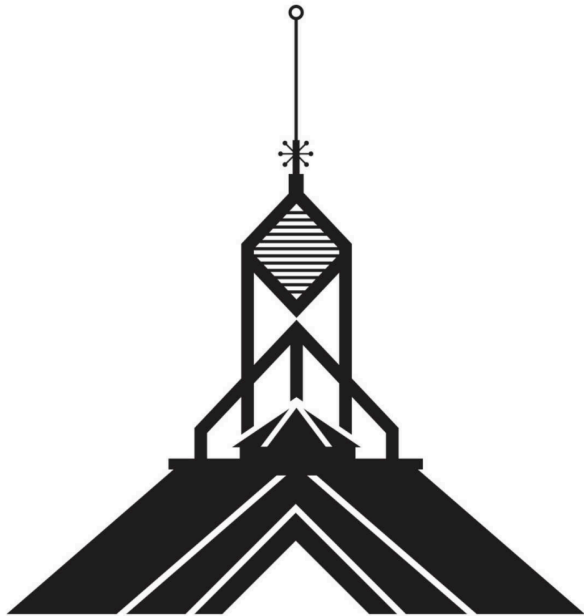
Calculations

Provide the following as a minimum to demonstrate code compliance:

1. Provide final hydraulic calculations for each sprinkler system and standpipe system.
2. The calculations shall demonstrate the performance of the system with an automatic water supply for the most hydraulically demanding zone on each floor of the building for each of the fire sprinkler systems compliant with NFPA 13 and NFPA 14.
3. The calculations shall also demonstrate the performance of the sprinkler and standpipe systems as connected to the manual water supply (fire department pumper truck – validate pumper truck performance with local fire department as applicable for non-high-rise buildings) by the fire department connection and interconnecting piping compliant with VCC, NFPA 13 & NFPA 14.

Shop Drawings Review

Shop drawings (working plans, product data and calculations) are to be reviewed by the A/E of record for compliance to the project contract documents and the code. Shop drawings shall meet applicable provisions of the *OUBO Water-Based Fire Suppression System Shop Submission Guidelines*.



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SECTION 8.19 FIRE PROTECTION SHOP DRAWINGS:

Refer to chapters 7 and 8 of this manual for the OUBO submission guidelines for additional information related to various fire protection systems. Fire protection shop drawings and product submission data shall be reviewed and approved by the A/E of record. When the submission,

with any added notations is satisfactory to the A/E, the A/E shall provide a “sealed” statement, attached to the reviewed shop drawings indicating that the fire protection shop drawings (working plans, product data and calculations as applicable) satisfy the requirements of the project contract documents and the code (cite the applicable NFPA and USBC Sections).

Code of Virginia – DPOR Regulations

“§ 54.1-402. Further exemptions from license requirements for architects, professional engineers, and land surveyors.

A. No license as an architect or professional engineer shall be required pursuant to § 54.-406 for persons who prepare plans, specifications, documents and designs for the following, provided any such plans, specifications, documents or designs bear the name and address of the author and his occupation:

... 8. The preparation of shop drawings, field drawings and specifications for components by a contractor who will supervise the installation and where the shop drawings and specifications (i) will be reviewed by the licensed professional engineer or architect responsible for the project or (ii) are otherwise exempted...”

International Building Code (IBC), 2018 Excerpt

[A] 107.2 Construction documents.

Construction documents shall be in accordance with Sections 107.2.1 through 107.2.8.

[A] 107.2.1 Information on construction documents.

Construction documents shall be dimensioned and drawn on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *building official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official*.

[A] 107.2.2 Fire protection system shop drawings.

Shop drawings for the *fire protection system(s)* shall be submitted to indicate conformance to this code and the *construction documents* and shall be *approved* prior to the start of system installation. Shop drawings shall contain all information as required by the referenced installation standards in Chapter 9.

[A] 107.3.4 Design professional in responsible charge.

Where it is required that documents be prepared by a *registered design professional*, the *building official* shall be authorized to require the *owner* or the *owner's* authorized agent to engage and designate on the building permit application a *registered design professional* who shall act as the *registered design professional in responsible charge*. If the circumstances require, the *owner* or the *owner's* authorized agent shall designate a substitute *registered design professional in responsible charge* who shall perform the duties required of the original *registered design professional in responsible charge*. The *building official* shall be notified in writing by the *owner* or the *owner's* authorized agent if the *registered design professional in responsible charge* is changed or is unable to continue to perform the duties.

The *registered design professional in responsible charge* shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

[A] 107.3.4.1 Deferred submittals.

Deferral of any submittal items shall have the prior approval of the *building official*. The *registered design professional in responsible charge* shall list the deferred submittals on the *construction documents* for review by the *building official*.

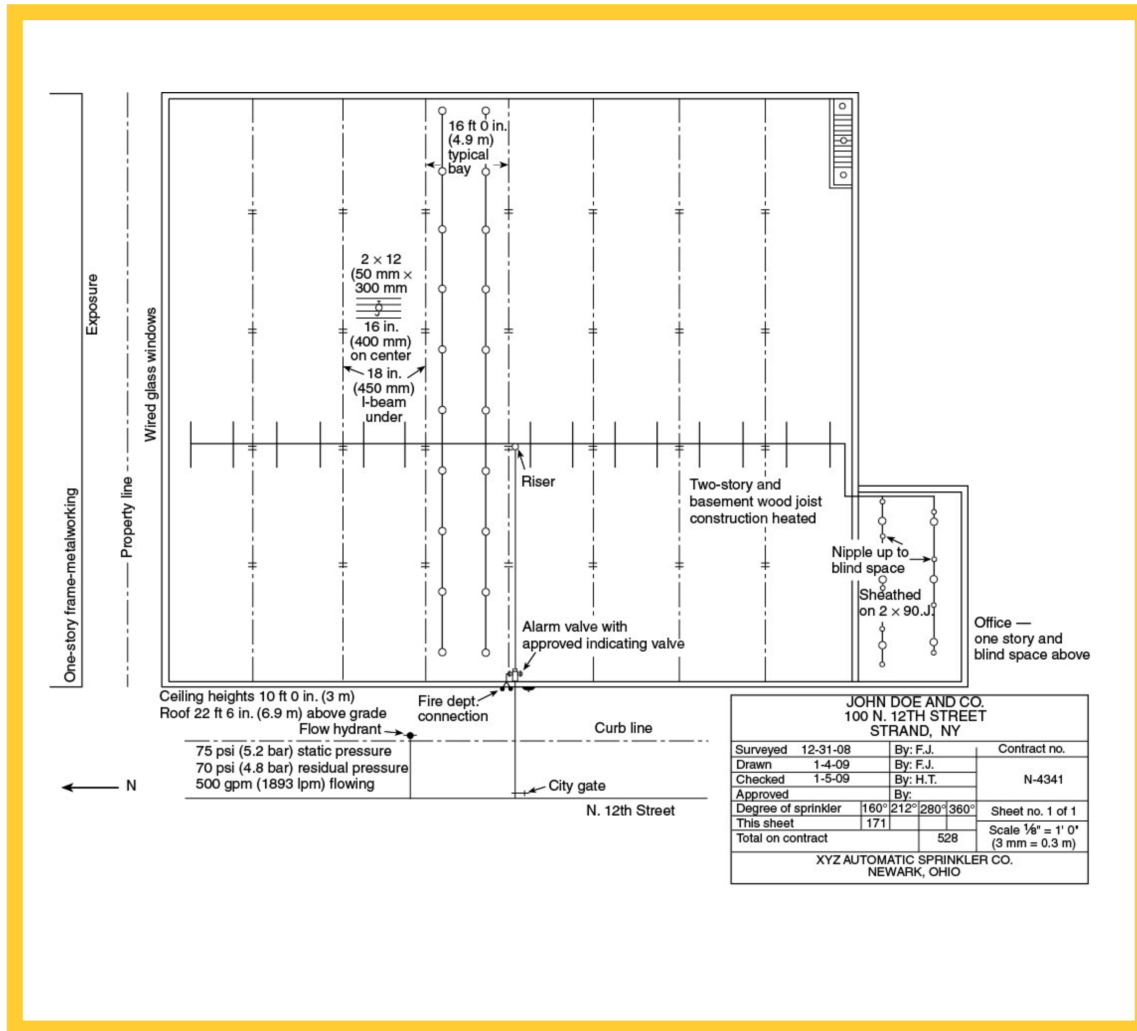
Documents for deferred submittal items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *building official* with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been *approved* by the *building official*.

Preliminary Design v. Shop Drawings

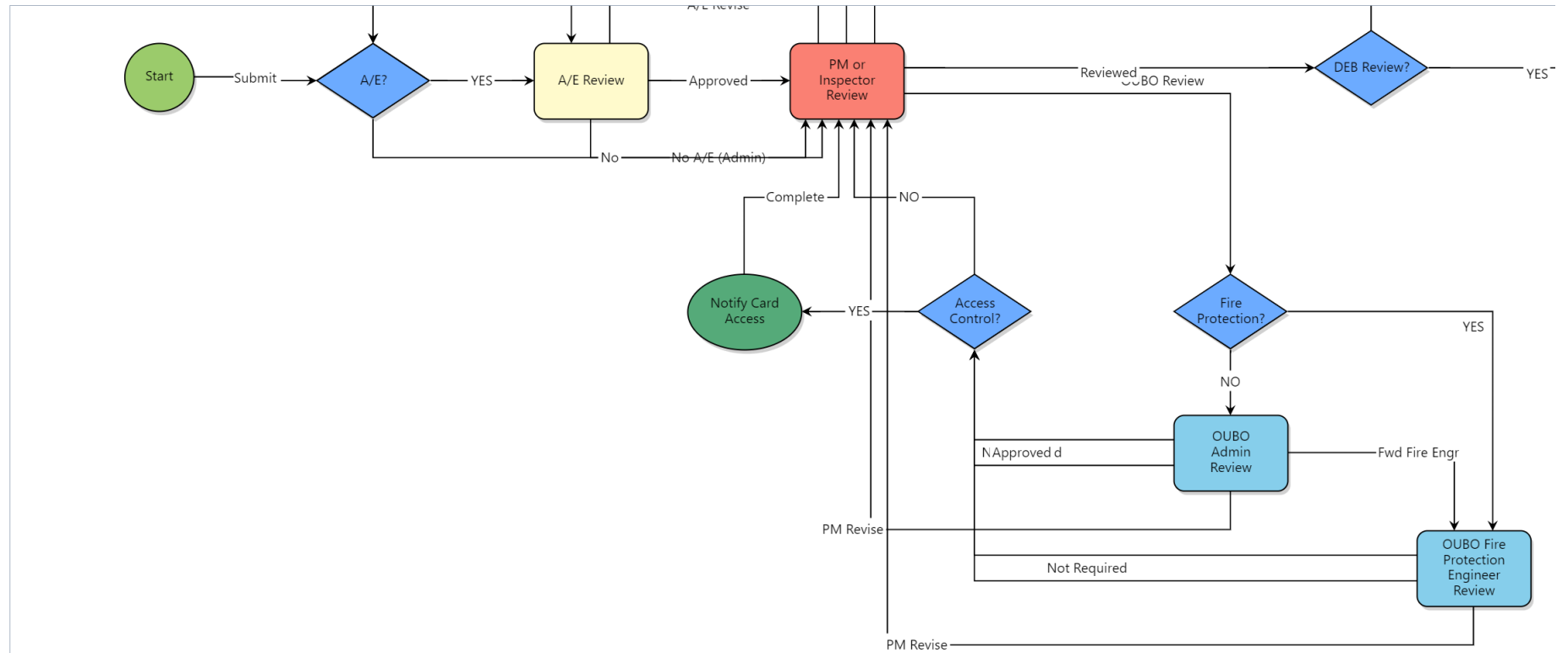
NFPA 13 A.23.1

“Preliminary plans should be submitted for review to the authority having jurisdiction prior to the development of working plans [see [Figure A.23.1\(a\)](#)]. The preliminary plans can be part of the construction documents submitted in order to obtain a building permit. However, working drawings in accordance with Section [23.1](#) should be submitted and approved prior to the installation of system equipment. **Preliminary plans should include as much information as is required to provide a clear representation of the hazard to be protected, the system design concept, the proposed water supply configuration, and building construction information pertinent to system layout and detailing.**”

The owner's information certificate, shown as [Figure A.23.1\(b\)](#), should be used to obtain a declaration of the intended use of the occupancy to be protected...”



FP Submittal – Flow Chart





GMU Design Standards



Resources

[HOME](#) / [RESOURCES](#)

OUBO Procedures

- [Office of the University Building Official Charter](#)
- [Procedure for Engineering Judgements](#)
- [Construction Permit Procedures](#)
- [De-Rating Procedure for Fire Rated Assemblies](#)
- [GMU Fire Alarm Shop Submission Requirements](#)
- [GMU Fire Suppression Shop Submission Requirements](#)
- [Small Project Procedure](#)
- [Issuance of Partial Building Permits](#)
- [Posting of Building Permits](#)

University Resources

- [OUBO e-Builder Processes](#)
- [GMU Design Standards Manual](#)
- [GMU HECO/DGS Forms](#)
- [GMU e-Builder](#)
- [GMU Facilities Planning, Design and Construction](#)
- [GMU Senior Vice President of Administration & Finance](#)

Codes & Design Criteria





Facilities Administration
George Mason University
4400 University Drive
Fairfax, VA 22030-4444

28 June, 2013

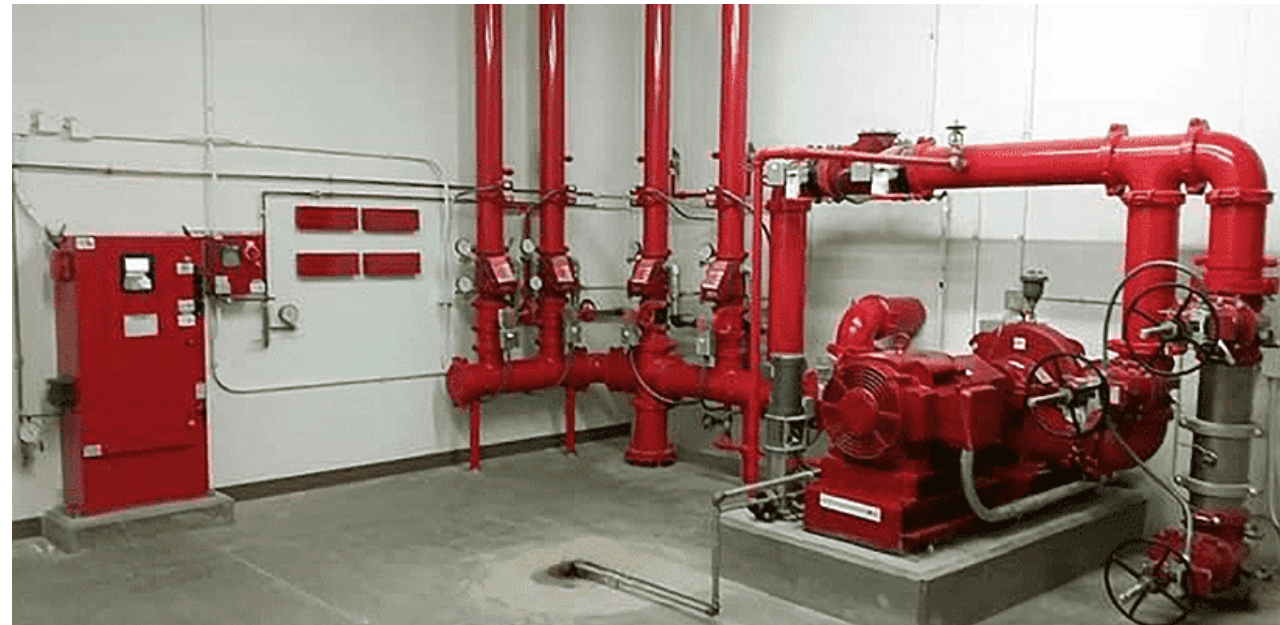
Section	Title	Link/File Name	Date
3.2	Interior Space Standards	SITEWORK.pdf	6/28/2013
3.2.1	General	Chap 3/3.2.1 GENERAL INTERIOR SPACE STANDARDS.pdf	6/28/2013
3.2.2	Classrooms	Chap 3/3.2.2 CLASSROOMS.pdf	6/28/2013
3.2.3	Laboratory Facilities	Chap 3/3.2.3 LABORATORY FACILITIES.pdf	6/28/2013
3.2.4	Office Facilities	Chap 3/3.2.4 OFFICE FACILITIES.pdf	6/28/2013
3.2.5	Study Facilities	Chap 3/3.2.5 STUDY FACILITIES.pdf	6/28/2013
3.2.6	Special Use Facilities	Chap 3/3.2.6 SPECIAL USE FACILITIES.pdf	6/28/2013
3.2.7	General Use Facilities	RESERVED	RESERVED
3.2.8	Support Facilities	RESERVED	RESERVED
3.2.9	Health Care Facilities	RESERVED	RESERVED
3.2.10	Residential Facilities	RESERVED	RESERVED
3.2.11	Unclassified Facilities	RESERVED	RESERVED
3.2.12	Circulation Areas	RESERVED	RESERVED
3.2.13	Building Service Areas	RESERVED	RESERVED
3.2.14	Mechanical Areas	RESERVED	RESERVED
3.2.15	Retail Subtenant Spaces	RESERVED	RESERVED
3.3	Building Systems	See Below	6/28/2013
3.3.1	HVAC Systems	Chap 3/3.3.1 HVAC SYSTEMS.pdf	6/28/2013
3.3.2	Electrical Design Criteria	Chap 3/3.3.2 ELECTRICAL DESIGN CRITERIA.pdf	6/28/2013
3.3.3	Plumbing Systems	Chap 3/3.3.3 PLUMBING SYSTEMS.pdf	6/28/2013
3.3.4	Fire Suppression Systems	Chap 3/3.4 FIRE SUPPRESSION SYSTEMS.pdf	6/28/2013
3.4	Environmental Standards	Chap 3/3.4 ENVIRONMENTAL STANDARDS.pdf	6/28/2013
3.4.1	General	See Above	6/28/2013
3.4.2	Regulatory Issues	See Above	6/28/2013
3.4.3	Efficient and Long Lasting Buildings	See Above	6/28/2013
3.4.4	Sustainable Sites	See Above	6/28/2013
3.4.5	Occupant Engagement and Well-Being	See Above	6/28/2013
3.4.6	Materials and Resources	See Above	6/28/2013
3.5	Security and Life Safety Standards	Chap 3/3.5 SECURITY AND LIFE SAFETY STANDARDS.pdf	6/28/2013
3.5.1	Design for Security	See Above	6/28/2013
3.5.2	Design for Life Safety	See Above	6/28/2013
3.6	Accessibility Standards	Chap 3/3.6 ACCESSIBILITY STANDARDS.pdf	6/28/2013
3.6.1	Barrier Free Design	See Above	6/28/2013

4 CONSTRUCTION PRODUCTS AND ACTIVITIES

Div 01	General Requirements	Chap 4/DIV 01 GENERAL REQUIREMENTS.pdf	6/28/2013
Div 02	Existing Conditions	Chap 4/DIV 02 EXISTING CONDITIONS.pdf	6/28/2013
Div 03	Concrete	Chap 4/DIV 03 CONCRETE.pdf	6/28/2013
Div 04	Masonry	Chap 4/DIV 04 MASONRY.pdf	6/28/2013
Div 05	Metals	Chap 4/DIV 05 METALS.pdf	6/28/2013
Div 06	Wood, Plastics and Composites	Chap 4/DIV 06 WOOD PLASTICS AND COMPOSITES.pdf	6/28/2013
Div 07	Thermal and Moisture Protection	Chap 4/DIV 07 THERMAL AND MOISTURE PROTECTION.pdf	6/28/2013
Div 08	Openings	Chap 4/DIV 08 OPENINGS.pdf	6/28/2013
Div 09	Finishes	Chap 4/DIV 09 FINISHES.pdf	6/28/2013
Div 10	Specialties	Chap 4/DIV 10 SPECIALTIES.pdf	6/28/2013
Div 11	Equipment	Chap 4/DIV 11 EQUIPMENT.pdf	6/28/2013
Div 12	Furnishings	Chap 4/DIV 12 FURNISHINGS.pdf	6/28/2013
Div 13	Special Construction	Chap 4/DIV 13 SPECIAL CONSTRUCTION.pdf	6/28/2013
Div 14	Conveying Equipment	Chap 4/DIV 14 CONVEYING EQUIPMENT.pdf	6/28/2013
Div 21	Fire Suppression	Chap 4/DIV 21 FIRE SUPPRESSION SYSTEMS.pdf	6/28/2013
Div 22	Plumbing	Chap 4/DIV 22 PLUMBING.pdf	6/28/2013
Div 23	HVAC	Chap 4/DIV 23 HVAC.pdf	6/28/2013
Div 25	Integrated Automation	Chap 4/DIV 25 INTEGRATED AUTOMATION.pdf	6/28/2013
Div 26	Electrical	Chap 4/DIV 26 ELECTRICAL.pdf	6/28/2013



OUBO Process & Tips for Success



Existing Building Modifications Code Requirements

Article regarding NFPA 13 provisions

<https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2021/09/07/Modifications-To-Existing-Sprinkler-Systems>

GMU HECOM, 2023



8.6.1.1 Verification of Existing Conditions: The A/E shall visit the site and ascertain pertinent local conditions that must be addressed in the design. As part of the required services, it is the A/E's responsibility to verify, by on-site observations of applicable existing buildings, the configurations, locations, dimensions, sizes and conditions accessible for verification. Certain assumptions are made regarding existing conditions in the remodeling and or rehabilitation of an existing building. Some of these assumptions may not be verifiable without additional exploration or investigation of the building or site. To minimize the risk during construction of uncovering conditions that are not as shown on the documents and delaying project progress, the Agency should consider and evaluate the advice of the A/E to conduct additional investigation, verifications or checks to verify.

Submission Requirements:

- [GMU Fire Alarm Shop Submission Requirements](#)
- [GMU Fire Sprinkler Shop Submission Requirements](#)

Tips to Avoid Common Review Errors

- [Plan Review Tips](#)
- [Administrative Plan Review Tips](#)
- [Architectural Review Tips](#)
- [Electrical Review Tips](#)
- [Fire Safety Review Tips](#)
- [Fire Alarm Review Tips](#)
- [Fire Sprinkler Review Tips](#)
- [Mechanical and Plumbing Review Tips](#)
- [Structural Review Tips](#)

Permit Closeout 



PATRIOTS BRAVE & BOLD

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C. **Application of Requirements.** The full extent of these submission requirements is not required for “Minor Fire Protection Project,” unless otherwise required by the OUBO. “Minor Fire Protection Project,” for fire sprinkler systems are defined by the OUBO as any work involving the addition or relocation of less than 6 sprinklers (refer also to IBC 903.3.8 for light and ordinary hazard systems) on renovation projects, or new systems designed as “Limited Area Sprinkler Systems” in accordance with the Virginia Construction Code (VCC) section 903.3.5.1.1 Work related to small projects cannot have an adverse effect on the integrity of the existing fire protection system, including hydraulic design. All materials and equipment installed must be listed. A full plan review is not required for small projects, unless the OUBO requires a full submittal.

A “Minor Fire Protection Project” statement (i.e., separate letter or on construction drawings documentation) prepared by the A/E of Record, must include the following information: Project name, address, project scope of work, number of sprinklers, and indicate there will be no adverse hydraulic effects on the existing system’s remote area or demand. Typically, the submission of hydraulic calculations and equipment specification sheets for projects with less than 6 sprinklers **is not required**, but further consideration is at the discretion of the OUBO (refer also to table listed below); additionally, where 6 – 19 sprinklers are involved in renovation/alteration work and calculations are provided during A/E design phase (refer to 8.8.7 of the GMU HECOM for additional information), a shop submittal will not also be required. All installations require OUBO rough-in (including hydro-static testing) and final inspection regardless of the number of sprinklers altered or installed. Contractors are required to schedule inspections prior to work being covered. This excludes minor repairs and maintenance issues (refer to NFPA 25 for additional information) associated with existing systems.

	Permit Application	Full Shop Submittal Required	Hydraulic Calculations Required	Minor Fire Protection Project Statement	Minor Fire Protection Project Drawing (Details provided only on A/E Construction Documents only)
Minor Fire Protection Alterations (5 or fewer sprinkler alterations, or additions)	X			X	X
Limited Area Systems (19 or fewer new sprinklers for domestic system only – VUSBC 903.3.5.1.1)	X			X	X
20 or More Sprinklers (alteration, relocation or additions)	X	X	X		

1. Calculations provided by A/E during production of Working Drawings are permissible in lieu of shop drawings and calculations prepared by installing contractor (Refer to 8.8.7 of the GMU HECOM).

	Permit Application	Full Shop Submittal Required	Hydraulic Calculations Required	Minor Fire Protection Project Statement	Minor Fire Protection Project Drawing (Details provided only on A/E Construction Documents only)
New Fire sprinkler System	X	X	X		
6 to 19 Sprinklers (alteration, relocation or additions)	X		X ¹	X	X



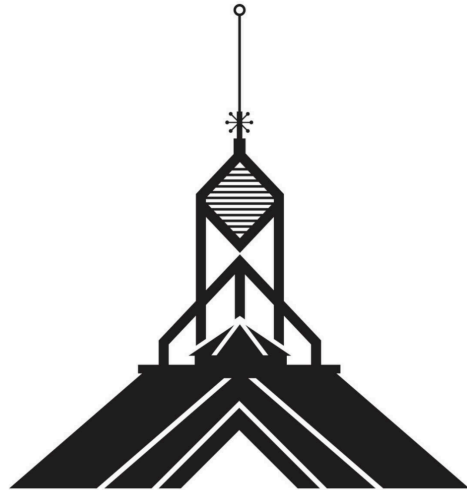
Fire Sprinkler Review Tips

- 1. Water Supply Flow Testing:** Indicate the water flow test results, the date and time taken, and who conducted the test. A small-scale drawing showing the locations of fire pumps, fire water tanks, test and flow hydrants and routing of underground pipe shall be included in submittals. Where a water flow test is performed for the purpose of a system design, the test shall be conducted no more than 12 months prior to working plan submittal. Test data must be adjusted to account for seasonal and daily pressure fluctuations, i.e., safety factors, etc. *(USBC 903.3.5, NFPA 13 23.2)*
- 2. Hazard and Commodity Classifications:** Sprinkler systems shall be designed to the correct hazard and commodity classification as prespecified within the provisions of NFPA 13 and through an engineering evaluation. An “owner’s information certificate” must be prepared by the A/E design team during schematic design and will be submitted by the project manager (PM) for schematic review. This approved document is to be included in shop drawing submission. *(USBC 903.3.1 NFPA 13 4.3, Chapters 5, and 22)*
- 3. Sprinkler Spacing and Obstructions:** The layout and arrangement of sprinklers, dependent upon the Hazard and Commodity Classification and the type of sprinkler used, must provide adequate coverage and meet the design provisions of NFPA 13. *(NFPA Chapter 8)*
- 4. Hydraulic Calculations:** When calculations are required, calculate the most hydraulically demanding portion(s) of the fire system (which shall include fire hose demand) back to the water supply source (flow test, fire pump, fire water tank, etc.) and provide a reference piping schematic, or reference drawings, indicating pipe arrangement and hydraulic nodes back to the source. *(NFPA 13 Chapter 22)*
- 5. Hanger Support:** Requirements for proper hanging of sprinkler piping shall meet the provisions of NFPA 13 and must be shown on the shop drawing submission. *(NFPA 13 Chapters 9 and 22)*
- 6. Seismic Protection:** When required by the seismic design category of the building - Seismic protection (sway bracing, branch line restraint, flexible couplings, etc.) locations, details and calculations shall be provided. *(USBC 1613.1, NFPA 13 Chapter 9)*
- 7. Hose Valve and FDC Threads:** Fire Hose Valve (FHV) and Fire Department Connection (FDC) threads shall comply with Fairfax County. *(USBC 901.4, USBC 903.3.6, and 912.3)*

- 8. Inspectors Test and Drains:** Location of all system drains, inspector’s test station(s) and associated discharge/draining piping shall be shown on the working drawing shop submission.

- 9. Drawing Submittals:** Each design phase; Schematic, Preliminary, and Construction Document, require a specific detail of scope in their submittal for OUBO review. The HECOM manual details each design phase’s required submittal for “fire protection”. In addition, NFPA 13 also has specific “plans and calculations” that shall be meet as part of the “fire protection” submittals. *(NFPA 13 23.1.3, A.23.1)*

- 10. System Acceptance:** All components of the designed sprinkler system shall be tested per NFPA 13 and witnessed by OUBO. Required documentation shall be provided, hydraulic name plates posted, and as-builts submitted. In buildings where an automatic sprinkler system is required by the VUSBC it shall be successfully tested and approved before occupancy. *(USBC 901.5 and NFPA 13 Chapter 25)*



Vice President of Facilities

This will facilitate the installation of In-Building Mass Notification Systems (Emergency Communication Systems). A mass notification risk analysis is required for any new building on campus in accordance with the USBC and NFPA 72. This risk analysis to be completed during schematic design and a determination be made for the need of a mass notification system in accordance with the USBC and NFPA 72.

7.11.3 Fire Suppression Systems – Water-based: Fire Sprinkler/Standpipe

Validation of the Water-based Fire Suppression Systems

Fire suppression systems are to be acceptance tested in accord with the requirements of the code. The Office of the University Building Official (OUBO) shall observe the installed fire alarm system and witness the fire alarm system performance tests in accordance with the Uniform Statewide Building Code and NFPA 13, 13R, 13D and 14. The A/E and Contractor shall certify that the fire suppression system is complete. The regional State Fire Marshal's office shall be notified in advance of final testing to determine their availability to be on-site for all Capital projects.

7.11.4 Fire Suppression Systems – Alternate Automatic Systems

Validation of the Alternate Fire Suppression Systems

Fire suppression systems are to be acceptance tested in accord with the requirements of the code. The Office of the University Building Official (OUBO) shall observe the installed fire alarm system and witness the fire alarm system performance tests in accordance with the Uniform Statewide Building Code and NFPA 11, 12A, 16, 17, 17A, 2001 as applicable. The A/E and Contractor shall certify that the fire suppression system is complete. **On capital projects**, the regional State Fire Marshal's office shall be notified in advance of final testing to determine their availability to be on-site.

Section 7.11.5 Fire Pumps (Electrical or Diesel-Driven)

Validation of the Fire Pump

Fire pumps are to be acceptance tested in accord with the requirements of the code. The Office of the University Building Official (OUBO) shall observe the installed fire alarm system and witness the fire alarm system performance tests in accordance with the Uniform Statewide Building Code and NFPA 20 as applicable. The A/E and Contractor shall certify that the fire suppression system is complete. **On capital projects**, the regional State Fire Marshal's office shall be notified in advance of final testing to determine their availability to be on-site.

Section 7.11.6 Smoke Control/Management Systems

Validation of the Smoke Control System(s)

The smoke control system(s) are to be inspected and acceptance tested in accord with the requirements of the code and the special inspection requirements of VCC chapter 17. The Office of the University Building Official (OUBO) and the Special Inspector shall observe the installed smoke control/management system in accordance with the Uniform Statewide Building Code

Inspections

[HOME](#) / [SERVICES](#) / [INSPECTIONS](#)

Construction projects are inspected for compliance with fire safety requirements, accessibility guidelines, and structural, mechanical, electrical, and plumbing codes during all phases of construction. Required inspections are listed on all approved Building Permits.

- Contact [Bill Miller](#), Deputy Building Official to discuss when and how to schedule an inspection.
- Submit all inspections at least 24 hours in advance using [e-Builder](#)
- OUBO recommends scheduling a pre-inspection meeting through the project manager to discuss expectations and procedures for Capital Projects

Prior to inspection request to the OUBO the project manager should verify if the applicable guides have been reviewed by the contractor before inspection request.

Project Review 

Plan Review 

Permits 



Please note the construction documents (plans, specifications, RFI's, ASI's, and change orders) shall have the corresponding date to indicate they have been approved by OUBO and be available for construction and inspection personnel. (USBC Sections 108.1, 109.5, and 110.5.)

The OUBO fully supports all options available to ensure accurate and timely inspection services including remote inspections and [3rd party inspections](#) if applicable.

Prior to inspections review the appropriate inspection guide:

- [ADA Compliance Inspection Guide](#)
- [Electrical Inspection Guide](#)
- [Fire Rated Assemblies Inspection Guide](#)
- [Fire Alarm Systems Inspection Guide](#)
- [Fire Sprinkler Inspection Guide](#)
- [Fire Suppression System Inspection Guide](#)
- [Generator and Emergency Lighting Inspection Guide](#)
- [Means of Egress Inspection Guide](#)
- [Mechanical & Plumbing Guide](#)
- Temporary Certificate of Occupancy (Issued in e-Builder)

Required Inspections

This list is provided as a courtesy and may not be all inclusive. Additional inspection may be required or deleted based on actual field conditions found by the OUBO.

Building Inspections Required	+
Mechanical Inspections Required	+
Plumbing (Water and Sewer) Inspections Required	+

Inspections 

Permit Closeout 



Fire Sprinkler Inspection Guide

The numbers following checklist comments represent NFPA code sections unless otherwise specified. *

SYSTEM INSTALLATION

- Approved shop drawings to be kept on job site.
- Sprinklers match sprinkler identification number (SIN) listed on plans. Spare sprinklers to be provided on the premises (each type), as well as a sprinkler wrench in spare sprinkler cabinet. (13:6.2)
- Sprinklers to be free of dirt, damage, and/or paint - any sprinklers that are damaged or painted over must be replaced. (13:6.2)
- Hangers and end of line restraints per plans: Minimum 1 hanger per pipe section; hanger spacing per NFPA 13 table 9.2.3.5; arm-movers no longer than 24" w/o brace; wrap around hanger at end of line or threaded rod tight against pipe: end of line restraint if required.
- Inspector's test valve at end of line where required.
- FDC shall be installed no higher than 18" – 48" unless otherwise approved. (13: A.8.17.2)
- FDC must be visible, accessible, couplings swivel, caps in place, ID signs in place, check valve not leaking.
- Standard spacing from the wall for upright and pendent sprinkler should be 4" (13:8.6.3.3) Max space of heads = 15', unless otherwise specified.
- Standard spacing from the ceiling for side wall sprinkler should be 4-6" unless otherwise specified. (13:8.7.4.1.1)
- Pressure water gauges should be provided on each side of the water supply when an alarm check valve is installed.
- Caution signs shall be attached to all valves controlling sprinklers. Control, drain, test connection valves shall also be identified.
- All exposed sprinkler system piping shall be protected against freezing. (40°F)
- System valves and gauges shall be accessible for operation, inspection, tests, and maintenance. (13:8.1.2)

- Sprinklers shall be installed under fixed obstruction over 4 ft. in width such as ducts, decks, open grate flooring, cutting tables, and overhead doors. (13:8.5.5.2).
- Hydraulic plates (calc plates) shall identify location of design area(s), discharge densities over design area(s), required flow & residual pressure demand at base of riser, occupancy or commodity classification & max permitted storage height, hose stream demand in addition to sprinkler demand. (13:25.5.1)

SYSTEM OPERATIONAL TESTS

- Prior to the underground system being connected, perform a flushing of all underground piping including all lead-ins, connections hydrants, etc. With minimum flow rates required by NFPA 13. (13:10.10.2)
- Hydrostatic test: All piping and attached accessories subjected to system working pressure shall be hydrostatically tested at 200 psi and shall maintain that pressure without loss for 2 hours. (25.2.1.1)
 - Test pressure read from gauge located at the low elevation point of the system or portion being tested. (25.2.1.8)
 - Record Initial Pressure. Return in 2 hours; determine if there is any gauge pressure loss or visual leakage and record final pressure.
 - Modifications affecting more than 20 sprinklers will require isolation and hydrostatic testing. (20 or fewer sprinklers shall not require hydrostatic testing in excess of system working pressure – 13:25.2.1.4.1)
- Main drain test: Main drain must be opened until system pressure stabilizes. This will be tested and static and residual pressures will be recorded during final acceptance.
- Waterflow test: Verify that flowing water will alert the fire department and alarm company by opening the inspectors test valve at the end of the system or the alarm valve at the system riser. (13:25.2.3)
- Backflow Prevention Assembly: Forward-flow testing of backflow preventer at calculated flow rate to verify proper operation. (13:25.2.5)
- Dry Pipe/Double Interlock Preaction System 24-hour Air Test: System is tested at 40 psi not to lose more than 1.5 psi over the 24-hour period. Modifications of existing sprinklers allowed to be tested for 2-hour duration with up to 3 psi loss. (13:25.2.2.1)
- Dry Pipe Trip Test: A working test of dry pipe valve to determine time to trip valve and deliver water to inspector's test connection (most remote point on dry pipe system). Must deliver within 60 seconds unless equipped with quick-operating device or other exceptions. (13:25.2.3.2)
- All test results to be recorded on NFPA 13 test certificate forms – *Contractor's Material and Test Certificate for Underground Piping* and *Contractor's Material and Test Certificate for Aboveground Piping*. (13:10.10.1; 25.1)

*Based on the 2018 USBC

A large crowd of spectators fills a sports arena, with cheerleaders in the foreground. The cheerleaders are wearing white and green uniforms with yellow accents and are holding large white and green pom-poms. The arena floor is visible in the background, and the crowd is cheering with their hands raised. The text "QUESTIONS?" is overlaid in the center of the image.

QUESTIONS?

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