

# Office of University Building Official (OUBO)

Fire Protection Requirements

Part II – Fire Alarm & Signaling Systems

# Agenda

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

# OUBO Staff

## Administration

### **David M. Kidd, P.E.**

University Building Official  
Email: dkidd7@gmu.edu

### **William (Bill) G. Miller**

Deputy Building Official  
Phone: 703-993-8339  
Email: wmille3@gmu.edu

### **Donna Martinez-Vallejos**

Permit Administrator  
Phone: 703-993-6070  
Email: dmartinb@gmu.edu

## Review Engineers

### **Justin Biller, P.E.**

Fire Protection Plan Review Engineer  
Phone: 571-545-0252  
Email: jbillier@gmu.edu

### **Tim Hagedorn, P.E.**

Civil/Structural Plan Review Engineer  
Phone: 571-545-0255  
Email: jhagedo@gmu.edu

### **Kevin Kline, P.E.**

Electrical Plan Review Engineer  
Phone: 571-545-0253  
Email: kkline7@gmu.edu

### **Ethan Scholl, P.E.**

Mechanical Plan Review Engineer  
Phone: 571-545-0254  
Email: escholl4@gmu.edu



# Code Overview

# Relevant Codes & Standards

- **Virginia Uniform Statewide Building Code**
  - Virginia Construction Code, 2018
  - Virginia Existing Building Code, 2018
  - International Fire Code, 2018
  - **Life Safety Code is not applicable in VA**
- **National Fire Protection Association (NFPA)**
  - NFPA 4, Integrated Fire Protection and Life Safety System Testing, 2015
  - NFPA 72, National Fire Alarm and Signaling Code, 2016
  - NFPA 70, National Electrical Code (NEC), 2017
  - NFPA 720, Installation of Carbon Monoxide (CO) Detection and Warning Equipment, 2015
- **Accessibility Regulations**
  - ADA Standards for Accessible Design, 2010



# Virginia Construction Code (VCC) Sections 901, 907, 908, 911, 915, 916 - 918

## Fire Protection System Requirements

- 901 General Requirements
  - Integrated Testing
    - High-Rise
    - Smoke Control Systems
- 907 Fire Alarm and Detection Systems
- 908 Emergency Alarm Systems
- 911 Fire Command Center
- 915 Carbon Monoxide Detection
- 916 Gas Detection Systems
- 917 Mass Notification Systems
- 918 In-Building Emergency Communications Coverage



# Fire Protection Systems

## AUTOMATIC FIRE ALARM SYSTEMS

### Occupancy Group Determines

- Fire Area Size/Location (VCC 901.7)
- Occupant Load Thresholds
- Required Throughout Some Occupancies
- Non-required Systems (VCC 103.3)



# Fire Detection Systems

## R-2 Dormitories

- College & University Buildings (VCC 907.2.9.3)
  - Common Spaces
  - Corridors
  - Laundry, Mech. Rm., Storage
- Single- & Multiple Station-Smoke Alarms in Sleeping/Dwelling Units
  - Student/Staff Housing Shall Be Interconnected (only within the unit)





# CO Detection Systems

## Group R (915.2)

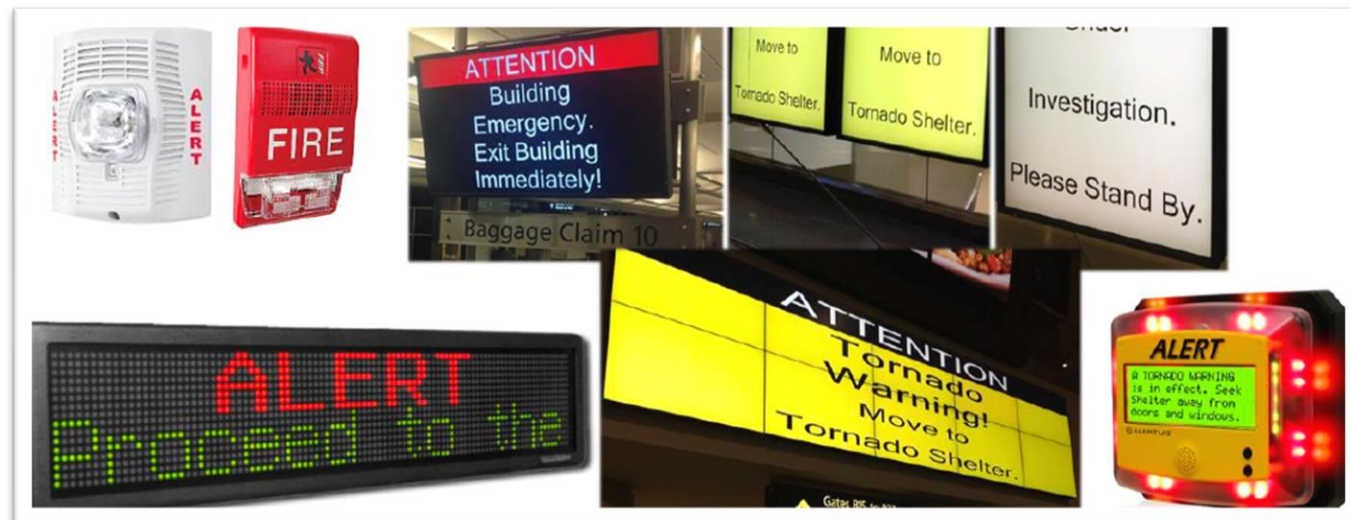
- In buildings containing fuel-burning appliance or an attached garage
  - Open parking garage shall not be considered attached garage
  - Enclosed parking garage ventilated to meet IMC shall not be considered attached garage
- Single- Station CO Alarms in Sleeping/Dwelling Unit
  - Units that do not contain fuel-burning appliances themselves (exception...)
- CO Detection System (915.4)
  - Meet NFPA 720
  - UL 2075



# Mass Notification Systems

## 917.1 College and University Campuses

- Prior to construction of a new building requiring a fire alarm system on a multiple-building college or **university campus having a cumulative building occupant load of 1,000 or more**, a mass notification risk analysis shall be conducted in accordance with *NFPA 72*. Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.
- NFPA 72 Chapter 24



# In-Building Emergency Communications

## 918.1 Localities Utilizing Public Safety Wireless Communications

- Refer also to VCC section 907.2.12.2 (FD Communications System – High-rise)
- Dedicated infrastructure to accommodate and perpetuate continuous in-building emergency communication *equipment* to allow *emergency public safety personnel* to send and receive emergency communications shall be provided in **new buildings and structures** in accordance with this section.
  - Exceptions (e.g., Type IV, V construction, small buildings, localities that do not provide the additional equipment required for operation)
- Installation (918.1.1)
  - Building Owner responsible to install cable
  - Locality is responsible for any additional equipment
- Operations
  - Locality will assume all responsibilities for the operation and maintenance of the emergency communications equipment

# Two-Way Communication Systems

- VCC 1009.8 Each Elevator Bank
  - No Area of Refuge
- VCC 403.5.3.1 High-rise Every Fifth Floor in Locked Stairs
- NFPA 72 Chapter 24



# Where are notification appliances required?

# Notification Appliances

- **Emergency Voice/Alarm Communication Systems (EVACS)** – VCC Section 907.5.2.2
  1. Speakers Throughout Building
  2. Paging Zones
    - Elevator Groups
    - Interior Exit Stairs
    - Each Floor
    - Areas of Refuge
  3. Integration of MNS (907.5.2.2.3)
  4. NFPA 72 Chapters 18 & 24
    - Intelligibility – NFPA 72 18.4.10
    - Acoustically Distinguishable Spaces (ADS)
  5. Emergency Power Required (907.5.2.2.5)



# Notification Appliances

- Public Use Areas & Common Use Areas

## International Building Code (IBC) /International Fire Code (IFC)

### Visible Alarms – Section 907.5.2.3

- Exceptions – not required in exit stairwells, elevator cars

#### 1. Areas open to the public

- Assembly use spaces, retail floor areas, etc.

#### 2. Common use areas

- Corridors
- Public restrooms
- Shared Offices/Conference Spaces
- Medical Exam Rooms



# Notification Appliances

[F] TABLE 907.5.2.3.2 VISIBLE ALARMS

NUMBER OF SLEEP UNITS	SLEEPING ACCOMMODATIONS WITH VISIBLE ALARMS
6 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1,000	5% of total
1,001 and over	50 plus 3 for each 100 over 1,000

- R-1 Residential, Transitory

Visible Alarms – Section 907.5.2.3.2

- Table 907.5.2.3.2

1. Refer to GMU HECOM Clarification (R-1 v. R-2 for Dormitories)
2. Refer to GMU Design Manual
  - All Dormitory Dwelling Units to Have Visible Alarms





What systems need to be monitored?

# Supervision & Monitoring Code Requirements

## International Building Code (IBC) /International Fire Code (IFC)

- **Sprinkler System Supervision** – Section 903.4
  - Valve Supervisory Signals to FACP/FACU
    - Sprinkler Control Valves
    - Fire Pump Control Valves
    - Water level/temp. on Water Supply Tanks
  - Waterflow/Air-pressure (dry-pipe) switches
  - NFPA 13 allows locking or alarm supervisory (13:8.17.1.4.2)
- **Monitoring** – Section 903.4.1
  - Alarm, Supervisory & Trouble Signals required to supervising station
- **Outside Sprinkler Waterflow Alarm** – Section 903.4.2
  - NFPA 13 allows for water motor-operated or electronically operated bell (13:6.8.3)
  - IBC/IFC requires electronically operated bell

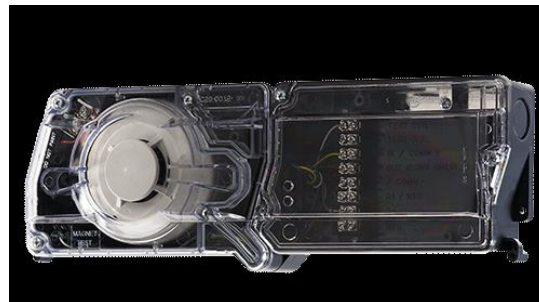


# HVAC Return Air System Shutdown

- **Virginia Mechanical Code (VMC)** requires return air protection
  - **606.2.1 Return air systems.** Smoke detectors shall be installed in return air systems with a **design capacity greater than 2,000 cfm**, in the return air duct or *plenum* upstream of any filters, *exhaust air* connections, outdoor air connections, or decontamination *equipment* and appliances...
  - **606.4.1 Supervision.** The duct smoke detectors shall be connected to a fire alarm system **where a fire alarm system is required by Section 907.2** of the *International Fire Code*. The actuation of a duct smoke detector shall activate a visible and audible **supervisory signal** at a constantly attended location

## Exceptions:

- ...2. **In occupancies not required to be equipped with a fire alarm system**, actuation of a smoke detector shall activate a visible and audible signal in an *approved* location ...
- **Duct detection where required doesn't drive decision to provide a fire alarm but mechanical codes do require connection to fire alarm if it is being installed**



# Fire Alarm Systems



- What is required for a fire alarm monitoring system?

## International Building Code (IBC) /International Fire Code (IFC)

Where required – Section 907.2

[F] 907.2 "...Not fewer than one manual fire alarm box shall be provided in an approved location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices...."

[F] 907.4.1 Protection of fire alarm control unit. "In areas that are not continuously occupied, a single smoke detector shall be provided at each fire alarm control unit, notification appliance circuit power extender, and supervising station transmitting equipment."





# 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 OUUBO in e-Builder by starting the **OUUBO 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](#)

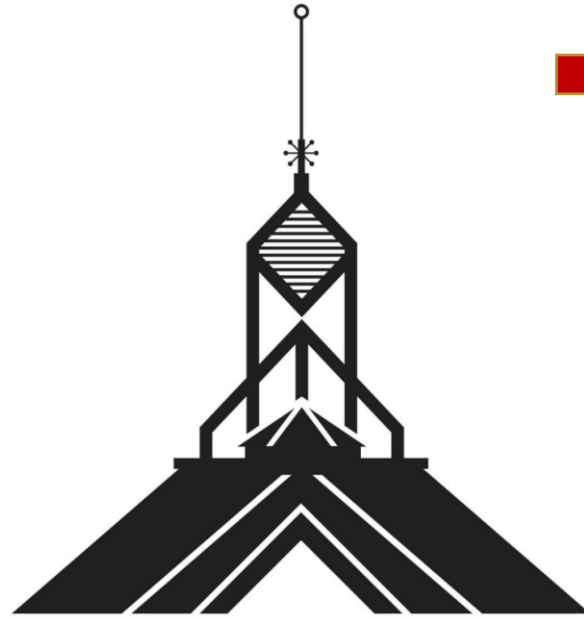
Project Review

Plan Review

Permits

Inspections

# GEORGE MASON UNIVERSITY Higher Education Capital Outlay Manual 2023



Vice President of Facilities

## 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

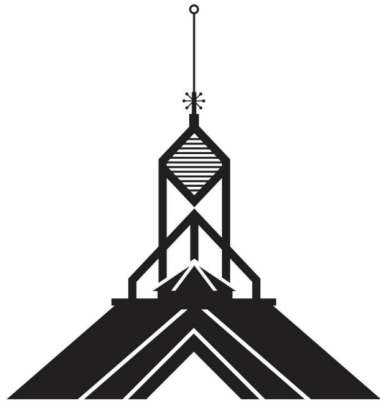
Section 8.16 Structural Observations

Section 8.17 Commissioning of HVAC Systems

Section 8.18 Electrical Coordination Analyses (Shop Drawings) Review

Section 8.19 Fire Protection Shop Drawings





Vice President of Facilities

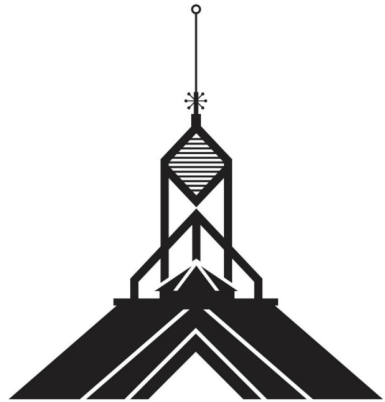
## Fire Alarm Code Clarifications

**7.2.11 Code Clarifications:** Code clarification requests should be made in writing to the OUBO. The following are code clarifications that shall be applied to University and state-owned buildings and structures.

### 7.2.11.1 Buildings at Colleges and Universities:

1. Buildings for business and vocational training shall be classified and designed for the (Use) Group corresponding to the training taught.
2. Academic / educational buildings having classroom-type education functions (including associated professor / teacher office spaces), shall include the following additional requirements:
  - a. Provide a fire alarm system in the building.
  - b. Provide 72” minimum corridor widths in the classroom corridors.
  - c. Calculate the occupant load for each space based on VCC Chapter 10 and the type of occupancy (not Group) of the space.
3. Buildings housing research, testing and science laboratories shall include a fire alarm system.
4. Dormitories, Fraternity and Sorority Houses and similar dwelling units with sleeping accommodations – provide one of the following:
  - a. Written University Policy which prohibits the use of these residences as housing for persons / groups / occupants for periods of less than 30 days, or
  - b. Design that complies with the most stringent requirements of both Group R-1 (Hotels) and Group R-2 (Dormitory)
5. Dormitory Occupant Load Calculations and Plumbing Fixture Calculations:
  - a. The number of occupants shall be computed per VCC Chapter 10 with the following changes to the maximum floor area allowances per occupant:
    - i. Dormitory sleeping areas – 1 occupant / 50 net SF



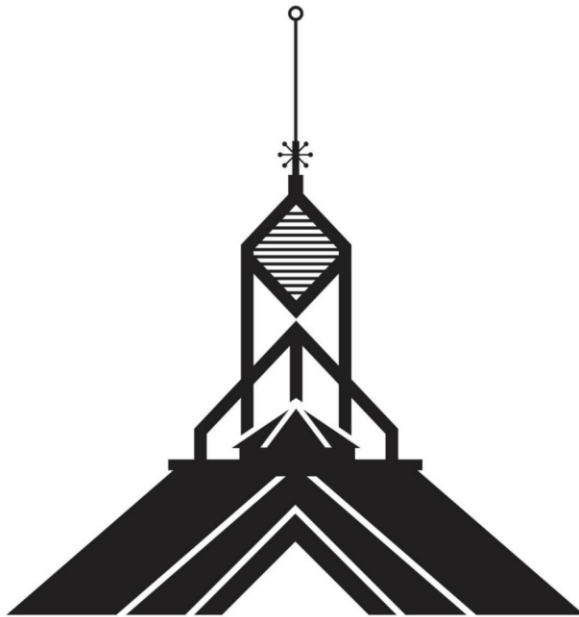


Vice President of Facilities

## Fire Alarm Code Clarifications

### **7.11.2. Mass Notification System (Emergency Communication Systems)**

All new fire alarm systems shall be tone and voice evacuation systems with a digital message repeater and microphone allowing for local paging from the control panel/annunciator. All acoustically distinguishable spaces (ADS) shall be identified in the drawings for purposes of voice intelligibility in accordance with NFPA 72.



Vice President of Facilities

**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

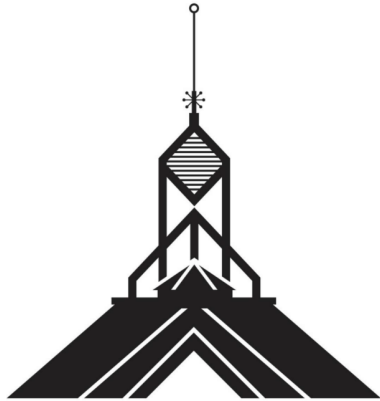
M - Mechanical (heating, cooling, ventilation, etc.)

E - Electrical

R - Asbestos Abatement

T–Telecom/AV

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



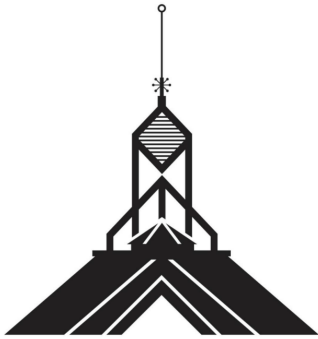
Vice President of Facilities

## Preliminary Drawings Fire Alarm (FA)

### **Fire Alarm, Detection and Signaling System (FA) Plans:**

Provide plan of each level showing the following (refer also to chapter 7 of this manual for additional information):

1. On floor plans, show location of control unit (FACU), battery and charger, transmitter, annunciator, fusible safety switch, remote trouble device, alarm devices and appliances, and each actuation device including fire extinguishing system switches.
2. Show single line fire alarm riser diagram.
3. A mass notification risk analysis is required for any new building on campus in accordance with the USBC and NFPA 72.
4. Statement documenting whether the local emergency public safety personnel utilizes public safety wireless communications.
5. Floor plans showing proposed locations for In-Building Emergency Communications infrastructure.



Vice President of Facilities

## Working Drawings (FX)

assure that code compliant fire alarm systems(s) is provided through the review of the fire alarm shop drawings and the observation of the progress and quality of the work. The A/E shall confirm that the fire alarm 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 for Working FA Drawings:

1. Locate and identify all fire alarm system alarm-initiating and notification appliances.
2. Locate and identify where protective covers are utilized with fire alarm system alarm initiating and notification appliances.
3. Locate and identify all fire alarm control and trouble signaling equipment.
4. Locate and identify all existing alarm system alarm-initiating and notification appliances.
5. Locate and identify all existing fire alarm control and trouble signaling equipment.
6. Locate and identify the interface requirements for all fire alarm system alarm initiating devices provided by other trades (e.g., HVAC duct smoke detectors, kitchen hood fire suppression systems, fire sprinkler flow and tamper switches, etc.).
7. Locate and identify the interface requirements for all devices whose operation is initiated by the fire alarm system such as door hold open devices, fire shutters, elevator recall, electronic door hardware and smoke control systems.
8. Identify the primary and secondary power supplies and connections.
9. Identify the candela output levels for all visual alarm notification appliances in accordance with NFPA 72 parameters. Candela ratings such as "15/75" are not compliant.
10. Provide a matrix that defines the interface of the fire safety control functions. Define the action that will initiate an alarm or trouble condition. Define the alarm-initiating device activated, the action of the control and trouble signaling equipment, the resulting alarm notification appliance actions and resulting operation of the equipment.
11. Provide fire alarm system riser diagram showing all system components. Define the "zones" to be protected. Diagrammatically define the location of the constantly attended location from which the fire alarm system will be supervised. Define the interface between the fire alarm system and the constantly attended location.
12. Provide wording in the Specifications that indicate that the location and type of fire alarm system alarm-initiating appliances and the type of fire alarm system alarm notification appliances and control and trouble signaling equipment, the location of major components 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). Changes to the design during the construction phase of the project shall be submitted to the Building Official for review and approval.

13. 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**).
14. Demonstrate that the quantity and location of the audible alarms as indicated on the drawings attain the required sound pressure levels in each of the respective spaces.
15. Demonstrate that the required capacity of the secondary power supply is attained.
16. Demonstrate that the indicated candela performance is attained for alarm notification devices where protective covers are utilized.
17. One site plan, show location of any PIV valves or other devices to be connected to the fire alarm system.
18. All acoustically distinguishable spaces (ADS) shall be identified in the drawings for purposes of voice intelligibility in accordance with NFPA 72.
19. Floor plans showing proposed locations for In-Building Emergency Communications infrastructure.
20. The design shall include a rebroadcasting agreement signed by the FCC License holder authorizing the system.
21. The design shall identify components to be provided by the locality.

### 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 Fire Alarm and Emergency Communication (ECS) System Shop Submission Guidelines*.

Provide plan of each level showing the following (refer also to chapter 7 of this manual for additional information):

1. On floor plans, show location of control unit (FACU), battery and charger, transmitter, annunciator, fusible safety switch, remote trouble device, alarm initiating devices and notification appliances, and each actuation device including fire extinguishing system switches. Indicate where additional NAC booster panels could be located as applicable.

### In-Building Emergency Communications System:

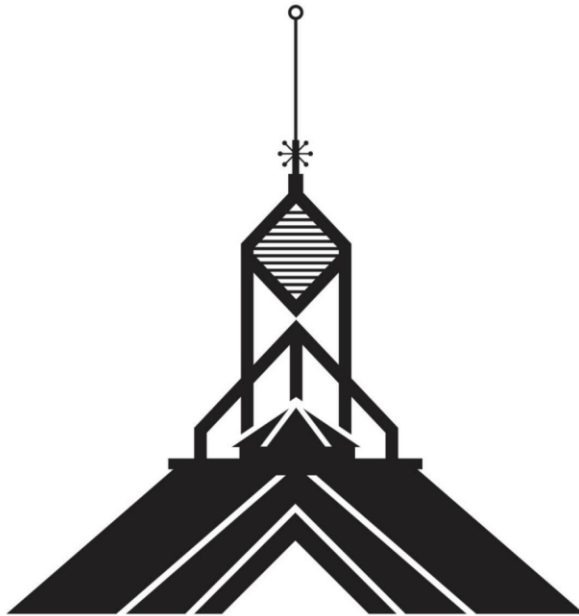
When an In-Building Emergency Communications System is required, the scope of work shall include the design of a complete and functioning system.

- a. Provide floor plans for each floor indicating locations for In-Building Emergency Communications infrastructure.
- b. The design shall include a rebroadcasting agreement signed by the FCC License holder authorizing the system.
- c. The design shall identify components to be provided by the locality.
- d. If delegated design of the system is specified, the design shop drawings shall be reviewed and approved by the A/E. Refer to Section 5.3.2. The delegated design shall be sealed by a Virginia Professional Engineer or a design technician with an FCC License.

### Fire Alarm, Detection and Signaling System (FA) Plans:

#### Fire Detection and Alarm Systems

The A/E shall provide complete project specific drawings and specifications that define a code compliant fire alarm 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



Vice President of Facilities

### 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).

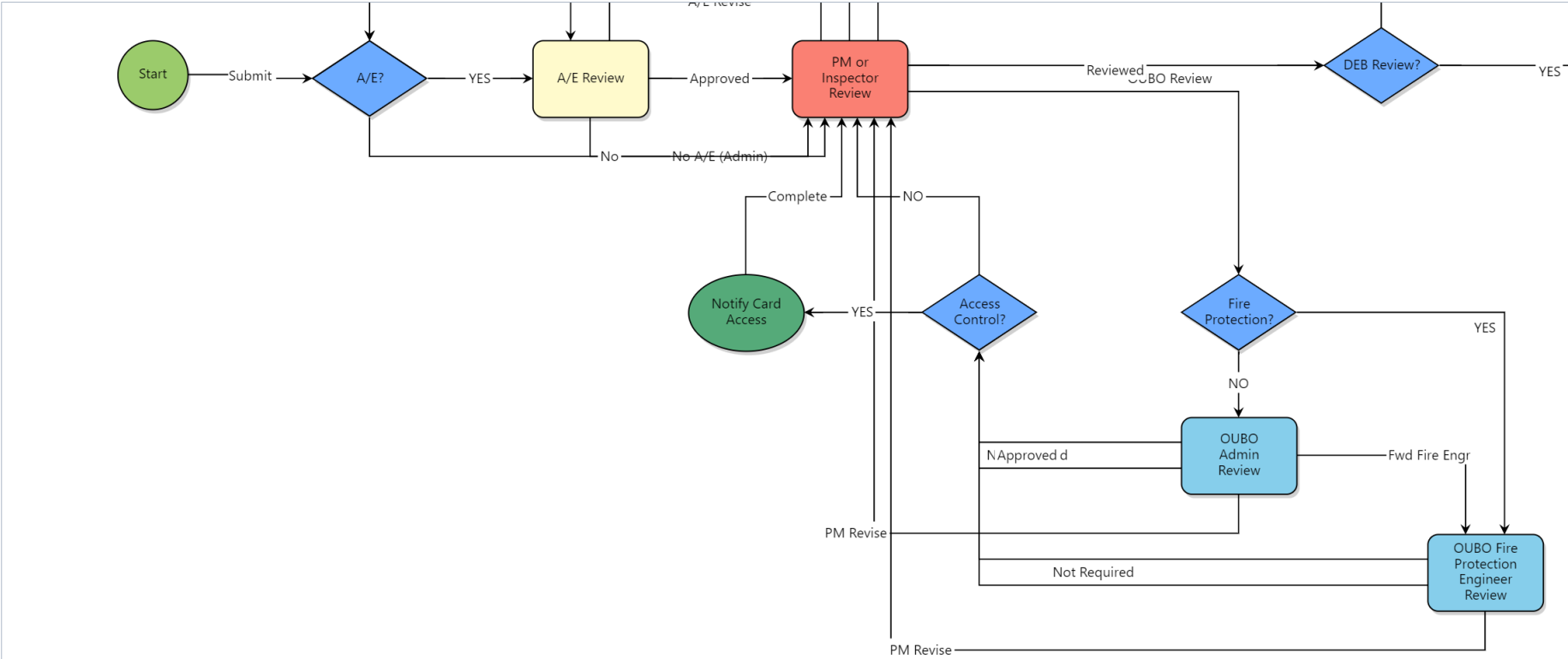
## Code of Virginia – DPOR Regulations

“§ 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...”

# FP Submittal – Flow Chart



### **7.2.13 Fire Safety Reviews:**

Fire Safety reviews shall be conducted by the OUBO for all new construction projects, projects with both additions and/or renovations, and projects with a change of use.

Fire suppression, fire detection, and fire alarm shop drawings shall be reviewed and approved by OUBO prior to the work being installed. Where a complete fire protection system is designed and shown on the construction documents, the drawings and/or specifications shall state that deviations in materials, locations, configurations, or sizes proposed by the Contractor are subject to being reviewed under the provisions of Section 26 of the General Conditions as a “substitution”.

When the fire suppression, fire detection, and fire alarm systems are not complete on the construction documents, then shop drawings or submittal data shall first be reviewed and approved by the A/E of record. The reviewed documents, with any added notations by the A/E, shall be submitted to the appropriate OUBO Fire Safety reviewer and/or responsible State Fire Marshal Office) for final review and approval.



# Construction Drawings v. Shop Drawings

## 907.1 General.

This section covers the application, installation, performance and maintenance of fire alarm systems and their components.

### [F] 907.1.1 Construction documents.

*Construction documents* for fire alarm systems 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, the [International Fire Code](#) and relevant laws, ordinances, rules and regulations, as determined by the fire code official.

### [F] 907.1.2 Fire alarm shop drawings.

Shop drawings for fire alarm systems shall be prepared in accordance with [NFPA 72](#) and submitted for review and approval prior to system installation.



### [F] 907.1.3 Equipment.

Systems and components shall be *listed* and *approved* for the purpose for which they are installed.



# 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





# Design Manual

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	<a href="#">SITEWORK.pdf</a>	6/28/2013
3.2.1	General	<a href="#">Chap 3/3.2.1 GENERAL INTERIOR SPACE STANDARDS.pdf</a>	6/28/2013
3.2.2	Classrooms	<a href="#">Chap 3/3.2.2 CLASSROOMS.pdf</a>	6/28/2013
3.2.3	Laboratory Facilities	<a href="#">Chap 3/3.2.3 LABORATORY FACILITIES.pdf</a>	6/28/2013
3.2.4	Office Facilities	<a href="#">Chap 3/3.2.4 OFFICE FACILITIES.pdf</a>	6/28/2013
3.2.5	Study Facilities	<a href="#">Chap 3/3.2.5 STUDY FACILITIES.pdf</a>	6/28/2013
3.2.6	Special Use Facilities	<a href="#">Chap 3/3.2.6 SPECIAL USE FACILITIES.pdf</a>	6/28/2013
3.2.7	General Use Facilities	RESERVED	RESERV ED
3.2.8	Support Facilities	RESERVED	RESERV ED
3.2.9	Health Care Facilities	RESERVED	RESERV ED
3.2.10	Residential Facilities	RESERVED	RESERV ED
3.2.11	Unclassified Facilities	RESERVED	RESERV ED
3.2.12	Circulation Areas	RESERVED	RESERV ED
3.2.13	Building Service Areas	RESERVED	RESERV ED
3.2.14	Mechanical Areas	RESERVED	RESERV ED
3.2.15	Retail Subtenant Spaces	RESERVED	RESERV ED
3.3	Building Systems	See Below	6/28/2013
3.3.1	HVAC Systems	<a href="#">Chap 3/3.3.1 HVAC SYSTEMS.pdf</a>	6/28/2013
3.3.2	Electrical Design Criteria	<a href="#">Chap 3/3.3.2 ELECTRICAL DESIGN CRITERIA.pdf</a>	6/28/2013
3.3.3	Plumbing Systems	<a href="#">Chap 3/3.3.3 PLUMBING SYSTEMS.pdf</a>	6/28/2013
3.3.4	Fire Suppression Systems	<a href="#">Chap 3/3.3.4 FIRE SUPPRESSION SYSTEMS.pdf</a>	6/28/2013
3.4	Environmental Standards	<a href="#">Chap 3/3.4 ENVIRONMENTAL STANDARDS.pdf</a>	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	<a href="#">Chap 3/3.5 SECURITY AND LIFE SAFETY STANDARDS.pdf</a>	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	<a href="#">Chap 3/3.6 ACCESSIBILITY STANDARDS.pdf</a>	6/28/2013
3.6.1	Barrier Free Design	See Above	6/28/2013

Mason Design Manual

Table of Contents

Section	Title	Link/File Name	Date
Div 27 15 00	Inside Plant Structured Cabling System for Non-Residential Buildings	<a href="#">Chap 4/DIV 27 15 00 Inside Plant Structured Cabling System for Non-Residential Buildings.pdf</a>	6/28/2013
Div 28	Electronic Safety and Security	<a href="#">Chap 4/DIV 28 ELECTRONIC SAFETY AND SECURITY.pdf</a>	6/28/2013
Div 31 Div 32	Earthwork Site Improvements	<a href="#">Chap 4/DIV 31 EARTHWORK.pdf</a> <a href="#">Chap 4/DIV 32 SITE IMPROVEMENTS.pdf</a>	6/28/2013 6/28/2013
Div 33 Div 33 42 99	Utilities Pipe Sewer TV Inspection	<a href="#">Chap 4/DIV 33 UTILITIES.pdf</a> <a href="#">Chap 4/DIV 33 42 00 PIPE SEWER TV INSPECTION.pdf</a>	6/28/2013 6/28/2013



# OUBO Process & Tips for Success



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

Facilities Administration Building  
4400 University Drive, MS 1E4  
Fairfax, Virginia 22030  
Email: [oubo@gmu.edu](mailto:oubo@gmu.edu)  
© 2023 George Mason University



- 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 alarm and signaling systems are defined as any work involving the addition or relocation of less than a total of 5 initiating or supervisory devices, and/or notification appliances on renovation projects. Work related to minor fire protection projects cannot have an adverse effect on the integrity of the existing fire protection system, including power supplies (primary and secondary). 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.

The “Minor Fire Protection Project” statement (i.e., separate letter or construction drawings documentation), prepared by the A/E of Record, must include the following information: Project name and address, number and type of devices added, moved, or deleted, and indicate that the installation and materials shall be in accordance with NFPA 72, and a **statement indicating there will be no adverse power supply effects on the system’s circuit demand (battery supply or power demand on existing NACs).** All installations require an AHJ rough-in and final inspection regardless of the number of heads altered or

installed. Contractors are required to call for inspections prior to work being covered. This excludes minor repairs and maintenance issues (refer to NFPA 72) associated with existing systems. FYI, for intelligent addressable devices added on software-controlled systems, a test of 100% of the new devices and an additional 10% or a minimum of 50 devices on the existing circuits including a variety of initiating devices and notification devices will be required.

	Permit Application	Full Plan Review Submittal	Small Project Statement	Minor Fire Protection Project Drawing (Details provided only on A/E Construction Documents)
New Fire Alarm System	X	X		
6 or more Devices/ Appliances	X	X		
Small Project (5 or fewer Devices/Appliances) Renovations	X		X	X



### Fire Alarm Review Tips

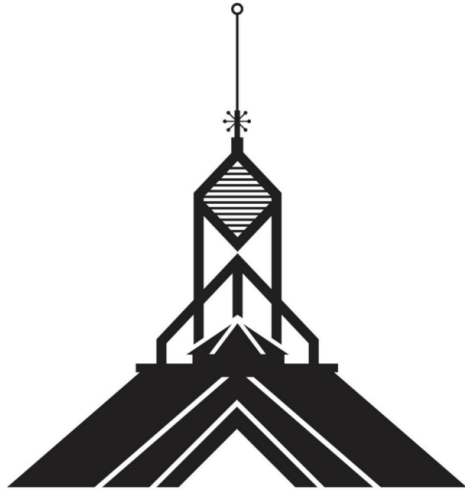
- 1. Sprinkler Electric Outside Alarm:** An electric alarm-sounding device is permissible in lieu of a mechanically driven water motor-operated device. Such approved audible devices shall be connected to every automatic sprinkler system through waterflow device(s). They shall be provided on the exterior of the building in an approved location. Where fire alarm systems are installed, actuation of the automatic sprinkler system shall actuate the building fire alarm system. *(USBC - 903.4.2, NFPA 13 6.8.1, 8.17.1.5)*
- 2. Emergency Voice/Alarm Communication System:** All new fire alarm systems shall be tone and voice evacuation systems with a digital message repeater and microphone allowing for local paging from the control panel/annunciator. All acoustically distinguishable spaces (ADS) shall be identified in the drawings for purposes of voice intelligibility. *(NFPA 72 24.4)*
- 3. Systems Control Center:** All building fire alarm systems shall communicate with University FM Systems Control Center via Keltron transceiver. The cost of transceiver and its installation shall be included in the project budget. It is recommended you coordinate the requirements early in the project.
- 4. Mass Notification Systems:** A mass notification risk analysis is required for any new building with 1,000 or more occupants in accordance with NFPA 72. This risk analysis to be completed during schematic design and a determination be made for the need of a mass notification system. *(USBC 907.1, NFPA 72 24.3.11)*
- 5. Fire Alarm Design/Shop Drawing (Submittals):** Shop drawings for the fire alarm system shall be submitted to the A/E of record for review and approval prior to submittal to OUBO. Approval from OUBO is required PRIOR to installation. *Shop drawings must include all applicable information indicated in NFPA 72 and the VUSBC to be considered acceptable. Requirements for construction documents prepared by A/E of record to meet HECOM provisions for each phase of design work. (USBC 907.1, NFPA 72 7.4)*
- 6. Smoke Detectors:** Where smoke detection (partial or full) is required, verify that rooms without smooth ceiling or with beam depths exceeding 10% of ceiling height are provided with smoke detection in accordance with *NFPA 72 17.7.3.2.4*.
- 7. Wiring:** Fire alarm conductors are to be installed in metallic raceway (i.e., conduit, MC cable, etc.). *(NFPA 70 Article 300)*

**8. Labeling:** Junction box covers shall be painted red with letters "F/A" using a permanent marker on the cover. All fire alarm initiating devices, control modules, speaker, horn, and strobe circuits shall be labeled to identify the device address, circuit origin and function, as applicable on the device. *Identification of branch circuit shall be permanently identified at the control unit. (NFPA 72 18.5.2)*

**9. Visual Notification Devices (Strobes):** Candela level for all strobes must be indicated on the drawings. *(NFPA 72 18.5.2.3)*

**10. Dedicated Circuit:** Provide dedicated circuit and lockable circuit breaker with redmarking for fire alarm circuits. *(NFPA 72 10.6.5.2, 10.6.5.4)*





Vice President of Facilities

### 7.11.1 Fire Detection and Alarm Systems

#### Validation of the Fire Alarm Systems

Fire alarm 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 72. The A/E and Contractor shall certify that the fire alarm 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.~~

# 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 [3<sup>rd</sup> 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 Alarm Systems Inspection Guide

- \*Location and installation of devices (control/annunciator panels, smoke detectors, audible/visible devices, pull stations, sprinkler flow and tamper devices, voice communications, etc.).
- \*Operational test of fire alarm system, including interconnection with other building systems such as fire suppression, electrical/mechanical, elevator, smoke exhaust systems, etc. Also, see certification checklist for documentation required.
- \*Operational test of system using secondary power supply.
- \*Fire alarm interconnection with monitoring company.
- Area of rescue assistance communication and ventilation systems.
- Label, red color and lockout means on FACP circuit breakers.
- Test plan documentation has been prepared in accordance with NFPA 72.

\*[NFPA 72 record of completion form](#) required, prior to demonstration of system to OUBO. For additional information go to [NFPA Codes and Standards](#) free access.

### NFPA 72

#### 14.4.2\* Reacceptance Testing.

##### 14.4.2.1

When an initiating device, notification appliance, or control relay is added, it shall be functionally tested.

##### 14.4.2.2

When an initiating device, notification appliance, or control relay is deleted, another device, appliance, or control relay on the circuit shall be operated.

##### 14.4.2.3

When modifications or repairs to control equipment hardware are made, the control equipment shall be tested in accordance with **Table 14.4.3.2**, items 2(a) and 2(d).

##### 14.4.2.4

When changes are made to site-specific software, the following shall apply:

- (1)All functions known to be affected by the change, or identified by a means that indicates changes, shall be 100 percent tested.
- (2)In addition, 10 percent of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, also shall be tested and correct system operation shall be verified.
- (3)A revised record of completion in accordance with **7.5.6** shall be prepared to reflect these changes.



# QUESTIONS?

Learn More at [OUBO.GMU.EDU](https://oubo.gmu.edu)

# More Training

**Next Month is Building Safety Month**

