



# Fire Alarm Systems

## Level III Content Outline

*The skills and knowledge listed under each task are suggestive of those involved in that task, but are not intended to constitute an exhaustive listing.*

### 3.1 Submittal Preparation and Layout Tasks

*Questions related to these tasks 23-28% of the exam.*

#### 3.1.1 Analyze project requirements for the subject occupancy type.

**Knowledge:**

- IBC, IFB, IRC
- NFPA 1, 70, 101

**Skills:**

- Read and interpret codes and standards.
- Communicate with architects, engineers, clients, AHJs, and the layout team to establish compliance needs.
- Verify project requirements.
- Verify proper compliance of the project's requirements with codes and standards.

#### 3.1.2 Identify contractual criteria.

**Knowledge:**

- Contract terminology
- NFPA 72, 101

**Skills:**

- Read and interpret contract documents.
- Review documentation for compliance with requirements of the AHJ and applicable fire and life safety codes and standards.
- Identify the scope of a contract.
- Identify conflicts in project documents.
- Document conflicts and offer corrected or alternate approaches.
- Navigate through documents to find system requirements.

#### 3.1.3 Coordinate project requirements with customer.

**Knowledge:**

- Purpose of various project documents
- Responsibilities of various project stakeholders for project documents

**Skills:**

- Communicate with customer to verify project requirements.
- Coordinate documentation with customer.
- Review plans with the customer and contractors.

#### 3.1.4 Coordinate project requirements with design professionals.

**Knowledge:**

- Purpose of various project documents
- Roles of architects and engineers
- Contractual relationships
- AIA A201

**Skills:**

- Communicate with all design professionals to verify project requirements.
- Coordinate the implementation of the design.
- Obtain approval for the submittal.
- Propose any alternative approaches or substitutions.

#### 3.1.5 Identify site conditions.

**Knowledge:**

- IBC, IFB, IRC, IMC
- NFPA 70, 72, 101
- Occupancy classifications

**Skills:**

- Identify and record site conditions and any existing fire alarm detection equipment that may affect the fire alarm system.
- Establish contact with stakeholders who have a role in the site visit or project.
- Confirm current, specific site conditions for proper functionality of existing and/or newly proposed equipment of the fire alarm system.
- Identify any conflicts between as-built drawings and/or current site conditions and the new drawings.

#### 3.1.6 Identify the AHJs and approval process for a project.

**Knowledge:**

- IBC, IFB, IRC, IMC
- NFPA 70, 72, 101

**Skills:**

- Identify appropriate AHJs.
- Communicate with the appropriate AHJs.
- Recognize and apply all relevant code enforcement requirements of specific AHJs.
- Explain system design criteria to appropriate AHJs.



### 3.1.7 Coordinate the creation of shop drawings.

**Knowledge:**

- NFPA 72
- Fire Alarm Signaling Systems Handbook
- Contents of shop drawings

**Skills:**

- Exhibit supervisory responsibility over the creation of shop drawings.
- Review drawings for compliance with codes, standards, manufacturers' specifications, AHJ requirements, and contractual requirements.
- Coordinate the revisions and requirements with the CAD operator.
- Develop fire detection and signaling system architecture.
- Prepare shop drawings for submittal to AHJs.
- Apply the project requirements to the creation of shop drawings.

### 3.1.8 Calculate power, battery, and other requirements.

**Knowledge:**

- NFPA 72
- Basic electricity
- Power calculations
- Ohm's and Kirchoff's laws

**Skills:**

- Calculate power requirements and battery standby times for all types of fire alarm systems.
- Calculate voltage drops, resistance, and current loads.
- Identify required primary, secondary, and trouble power supply sources.

### 3.1.9 Analyze specifications and drawings for installation criteria.

**Knowledge:**

- NFPA 70, 72
- IBC
- Construction Specifications Institute (CSI) MasterFormat®
- AIA A201

**Skills:**

- Recognize and apply knowledge of adopted building codes and fire alarm codes and standards to shop drawings.
- Apply manufacturers' specifications for equipment operation and system installation.
- Determine fire alarm system requirements by performing an analysis of the specifications and drawings.
- Identify conflicts between the project requirements and the project documents.
- Apply drawing conventions.
- Select fire alarm system equipment for compliance.

### 3.1.10 Research codes and standards.

**Knowledge:**

- NFPA 70, 72, 101
- IBC
- Aspects of projects for which government agencies have special requirements

**Skills:**

- Identify appropriate codes and standards.
- Guide subordinates in identifying appropriate codes and standards.
- Understand the development process for codes and standards.
- Review plans for compliance with the jurisdiction's fire and life safety code requirements.
- Identify special requirements of governmental agencies and other AHJs.
- Identify any requirements for variances to the applicable codes and standards.

### 3.1.11 Prepare written technical reports.

**Knowledge:**

NFPA 72

- Standard business communications practices

**Skills:**

- Accurately convey fire alarm science, technology, codes, and standards in technical reports.
- Review plans for compliance with applicable jurisdictions' fire and life safety code requirements and summarize findings.
- Develop correspondence for dissemination to stakeholders and the AHJs.
- Evaluate and follow standard business communications practices.

### 3.1.12 Implement contractual requirements.

**Knowledge:**

- Contract concepts, practices, and terminology
- Typical contract sections and provisions
- Contract processes, including but not limited to submittal procedures

**Skills:**

- Interpret contract requirements.
- Coordinate documentation as determined by requirements.
- Direct and/or assist in application of the contractual requirements during the production of submittal documentation.
- Write and/or assist in the creation of the scope of work.
- Identify inclusion and exclusions to meet contract requirements.



### 3.1.13 Develop a project schedule.

**Knowledge:**

- Common factors that can impact a project schedule (including but not limited to sequence of construction, labor regulations, and so forth)
- Project schedule formats
- Labor estimation standards
- Project budgets and payment schedules (for example, schedule of values)

**Skills:**

- Identify sources of information required for job scheduling.
- Identify critical milestones for the project, including but not limited to construction schedule, labor requirements, deliverables, and payment schedule.
- Identify project-specific factors that impact project scheduling.
- Develop a project schedule based on relevant information.
- Coordinate project schedule with all relevant trades.

## 3.2 Installation Tasks

*Questions related to these tasks 28-33% of the exam.*

### 3.2.1 Develop an installation strategy for a project.

**Knowledge:**

- NFPA 70, 72
- Project management concepts
- Sequence of construction
- Project budgeting processes

**Skills:**

- Review shop drawings and project specifications for development of installation strategy.
- Identify the type, location, and quantities of equipment required for the project.
- Develop a strategy for all phases of project.
- Coordinate proposed strategy with the project schedule.

### 3.2.2 Order installation materials.

**Knowledge:**

- NFPA 72
- Equipment and materials distribution logistics
- Phases of an installation project and the materials required for each
- Purchasing procedures
- Project management concepts

**Skills:**

- Identify specified equipment and materials.
- Identify supplier policies (such as pricing, repair, replacement policies, and technical assistance options).
- Confirm equipment and materials available meet project requirements.
- Resolve any conflicts with availability of equipment and materials.
- Coordinate delivery of equipment and materials with the job-site schedule.

### 3.2.3 Establish installation criteria for fire alarm system components.

**Knowledge:**

- NFPA 70, 72
- Installation procedures
- Manufacturers' requirements for specific equipment
- Project specifications and shop drawings

**Skills:**

- Ensure that relevant personnel are familiar with the products ordered.
- Identify sequence for pulling cables, mounting devices, and running conduit that comply with codes and standards.
- Determine the type of wire, cable, or conduit required for the fire alarm system application.
- Define and use the correct method for field wiring of system components.

### 3.2.4 Coordinate programming of the system.

**Knowledge:**

- NFPA 72
- Programming concepts
- Boolean logic
- Fire alarm system types
- Methods for inputting programs to fire alarm systems

**Skills:**

- Identify specified sequence of operation.
- Determine programming strategy to meet project specifications.
- Confirm correct software version and compatibility with site.
- Identify qualified technician to perform on-site programming.



### 3.2.5 Resolve on-site scheduling conflicts.

**Knowledge:**

- Scheduling responsibilities of individuals in the job-site chain of command
- Knowledge of typical construction contracts and schedules
- Basic understanding of meetings and meeting conduct
- Communication documents (for example, Letter of Transmittal, Request for Information, Change Order forms, Request for Proposal, and so forth) and protocols
- Understanding of other trades and their roles on the job site

**Skills:**

- Follow and distribute written policies and procedures for project scheduling conflicts.
- Communicate with stakeholders to resolve issues.
- Use proper documentation for specific tasks.

### 3.2.6 Establish the procedures for inspection and testing of a fire alarm system.

**Knowledge:**

- NFPA 13, 25, 72, 90A, 90B, 92A, 92B
- ASME A17.1
- Project specifications documents
- Testing tools and procedures

**Skills:**

- Establish procedures for the inspection and testing of a fire alarm system in accordance with adopted building and fire codes and standards.
- Coordinate testing with other trades.

### 3.2.7 Document test completion.

**Knowledge:**

- NFPA 13, 25, 72, 90A, 90B, 92A, 92B
- ASME A17.1
- Project specifications documents
- Standard inspection and testing form
- Record of Completion form

**Skills:**

- Document testing and completion in accordance with adopted building and fire codes, standards, and the AHJ.
- Properly organize documentation and records of testing.

### 3.2.8 Direct the development of as-built documents.

**Knowledge:**

- NFPA 72, 170
- Installation practices and procedures
- Requirements and procedures for developing and recording as-built documents
- As-built drawings (terminology, symbols, notes, and so on)
- Purpose and function of as-built drawing information

**Skills:**

- Collect the necessary data from the installers to create as-builts.
- Convey technical information to the CAD operator.
- Translate and record all necessary changes from original design onto as-built documents.
- Review and approve the final version of as-built documents.

### 3.2.9 Identify fire-stopping requirements.

**Knowledge:**

- NFPA 70, 101
- ICC
- Characteristics and applications of fire-stopping materials and devices
- Building construction
- Fire ratings of walls and fire-rated assemblies

**Skills:**

- Identify conditions that require fire-stopping.
- Confirm that firestop devices, materials and methods used comply with adopted building codes and AHJ requirements.

### 3.2.10 Supervise work-site safety.

**Knowledge:**

- 29 CFR Parts 1904.1 and 1926
- Army Corps of Engineers EM 385-1-1
- Safety documentation, including records and reports

**Skills:**

- Communicate effectively the safety standards, procedures, and practices.
- Supervise and/or delegate supervision of work-site safety.
- Identify situations that may require additional resources, such as specialists to manage unusual risks (for example, fall protection).
- Follow and enforce specific safety standards and requirements.
- Create, organize, and maintain safety records.
- Recognize when improvements in practice are needed and implement those improvements.



### 3.2.1.1 Interface with other systems and trades.

**Knowledge:**

- NFPA 72, 101
- ICC
- ASME A17.1
- BACnet® (Building Automation and Control Network)
- Computer port protocols
- Engineered smoke control systems (UL 864, UUKL listing)
- Project schedule

**Skills:**

- Identify and analyze other building systems, and select compatible interface(s) to use with those systems.
- Communicate with other trades to coordinate the project schedule among different trades.
- Coordinate with other trades and/or contractors, or both, to test and implement the interface(s) to meet the project schedule

### 3.3 Testing and Maintenance Tasks

*Questions related to these tasks 15-20% of the exam.*

#### 3.3.1 Establish maintenance and testing procedures and standards.

**Knowledge:**

- NFPA 72
- Manufacturers' published instructions
- How to use test equipment

**Skills:**

- Communicate testing procedures and requirements to technicians.
- Identify system deficiencies and/or issues reported by subordinates.
- Coordinate testing results documentation and reporting.
- Communicate testing results to stakeholders.

#### 3.3.2 Oversee troubleshooting and repairing of system deficiencies.

**Knowledge:**

- NFPA 70, 72
- Manufacturers' published instructions
- System functions and operations
- Procedures for troubleshooting equipment and circuit problems

**Skills:**

- Recognize and respond to indicators of problems in equipment or the system.
- Investigate the feasibility of repair(s) or replacement(s).
- Identify and investigate abnormal test results.
- Resolve system deficiencies and/or issues reported by subordinates.

### 3.4 Education and Communication Tasks

*Questions related to these tasks 5-10% of the exam.*

#### 3.4.1 Train and mentor Level I and Level II coworkers.

**Knowledge:**

- Basic methods for planning, conducting, and evaluating training
- Characteristics of effective mentors
- Adult learning principles
- Performance appraisal and feedback principles

**Skills:**

- Communicate effectively with subordinates.
- Convey proper company and job-site procedures and the requirements of codes and standards to subordinates.

#### 3.4.2 Determine basic training needs of subordinates.

**Knowledge:**

- Preparation of basic shop drawings and installations
- Requirements for performing work-site tasks

**Skills:**

- Analyze skill gaps of subordinates.
- Develop and organize training to meet needs of subordinates.

### 3.5 Management and Supervision Tasks

*Questions related to these tasks 17-22% of the exam.*

#### 3.5.1 Manage simultaneous projects.

**Knowledge:**

- Resource management and potential trade-offs among multiple and/or simultaneous projects
- Principles of project management
- Project specifications for each project
- General construction principles
- Project scheduling methods using documentation and/or software
- Documentation and/or software used to measure progress

**Skills:**

- Multitask to manage multiple projects.
- Analyze and maintain project schedules (for example, quantify and record progress and delays).
- Coordinate on-site staff regarding project schedules.



### 3.5.2 Manage staff.

**Knowledge:**

- Principles of project management
- Basic labor cost concepts
- Project specifications
- Resource management principles
- Safety management principles
- Labor wage regulations

**Skills:**

- Coordinate with other trades.
- Communicate with project teams.
- Communicate staff and resource needs to management.
- Communicate safety requirements to project teams.
- Analyze and document labor costs to project budget.
- Document labor wage regulations.
- Report project progress including labor and material costs.

### 3.5.3 Oversee the technical aspects of a job.

**Knowledge:**

- NFPA 70, 72
- ICC
- ASME A17.1, ANSI A117.1
- Current fire alarm systems technology
- Codes, standards, specifications, and applications of fire alarm systems
- Manufacturers' published instructions
- Project specifications

**Skills:**

- Analyze and resolve technical issues.
- Identify resources necessary when resolving technical issues.
- Confirm and communicate proper application of codes, standards, specifications for project requirements.

### 3.5.4 Resolve interpersonal conflicts.

**Knowledge:**

- Best practices for handling and documenting interpersonal conflicts
- Basic principles of negotiation

**Skills:**

- Communicate with affected parties.
- Negotiate settlements of conflicts.
- Document conflicts and actions taken to resolve them.

### 3.5.5 Communicate ethical standards and resolve ethics-related issues.

**Knowledge:**

- NICET Code of Ethics
- NFPA 72
- Employer code of ethics
- Government regulations regarding ethics

**Skills:**

- Communicate ethical standards and expectations to subordinates.
- Review personnel issues and recommend action.
- Respond to possible ethical or legal violations in a fair and ethical manner.
- Communicate and document personnel issues with Human Resources and/or management, or both.

### 3.5.6 Oversee adherence to rules promoting safe work environment.

**Knowledge:**

- 29 CFR Parts 1904.1, 1904.7, 1910, 1926, 1960.28
- Army Corps of Engineers EM 385-1-1
- Manufacturers' safety requirements
- Employer's safety requirements
- Safety documentation, including records and reports

**Skills:**

- Follow safety procedures and protocols to ensure safety requirements are met.
- Communicate safety procedures and processes to subordinates.
- Oversee and enforce adherence to safe practices.
- Alert proper parties to unsafe situations.
- Instruct subordinates in ways to promote a safe working environment.
- Recognize and correct unsafe work practices.

### 3.5.7 Monitor adherence to budgets.

**Knowledge:**

- Basic budget concepts
- Basic math skills
- Budget tracking methods
- Costs of labor, material, and other resources needed
- Project specifications

**Skills:**

- Calculate a preliminary budget estimate, including projected labor and material costs.
- Monitor project expenditures and compare with budget projections.
- Calculate actual labor and material costs.
- Communicate budget status via project reports.
- Calculate costs for project changes and the impact on the budget and schedule.
- Alert proper parties to any budget changes or modifications to the scope of work.