Challenges in Maintaining Regulatory Compliance During Construction

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Safeguarding Construction Activities

- Overview
  - What must be complied with
  - Unique Challenges
  - Referenced Codes and Standards
  - Applicability per State
  - Scoping Language
  - Key Personnel
  - Roles and Responsibilities
  - Developing a plan for compliance
  - What is hot work?
  - What is an impairment?
What Must be Complied With?

- IPC
- OSHA
- National Electrical Code (nec)
- The Joint Commission
- ASHRAE
- ASTM
- International
- CMS
- IBC
- FGI
- NEHES
- NFPA
- Massachusetts Department of Public Health
- NFPA 99
- ADA 29
- Americans with Disabilities Act
  Celebrate the ADA! July 26, 2019
Referenced Codes and Standards

- Nationally referenced standards
  - NFPA 1, *Fire Code*
  - NFPA 13, *Standard for the Installation of Sprinkler Systems*
  - NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems*
  - NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*
  - NFPA 72, *National Fire Alarm and Signaling Code*

- Healthcare referenced Standards
  - LS.01.02.01 Interim Life Safety Measure

- Locally referenced standards (Examples)
  - Boston Fire Prevention Code
  - City of Newton Ordinances - Fire Protection and Prevention
Who’s Going to be On Site

- General Contractor
- Hospital’s Vendors
  - IT Cabling
  - Imaging Equipment Installers
  - Nurse Call Installer
- Hospital’s Staff
  - Facilities
  - Environmental Health and Safety
  - Security
  - Commissioning Agent
- Design Team
- AHJ’s
Key Personnel

- Ownership
  - Project Manager/OPM
  - Facilities Director
  - ICRA Manager
  - Fire alarm/sprinkler system maintenance provider

- Design Team
  - Architect
  - Engineers
  - Consultants

- Construction team
  - Project Manager
  - Superintendent
  - Foreman

- Authorities Having Jurisdiction (AHJ)
  - DPH
  - CMS/Joint Commission
  - Building/Inspectional Services Department
  - Fire Department
Unique Challenges

- Safe working environment for staff in adjacent spaces
- Infection control for patient, staff and construction workers
- Active patient care areas above, below and adjacent to construction zone
- Existing fire rated construction and egress routes running near and possibly though construction zone
- Security concerns for patients, restricted access, materials and equipment
- Preparedness for potential Joint Commission or CMS review
- Limited access to areas within the construction zone requiring off hours work and multiple phases
- Need to comply with hospital’s ICRA policies
- Limited hospital staff available to monitor construction activities
Potential Hazardous Conditions for Workers

- Exposure to bloodborne pathogens and biological hazards
- Potential chemical and drug exposures
- Waste anesthetic gas exposure
- Respiratory hazards
- Ergonomic hazards from lifting repetitive tasks
- Hazards associated with laboratories
- Radioactive material and x-ray hazards
- Fire
Potential Hazardous Conditions for Patients and Staff

- Noise hazards
- Interruption of clinical activities
- Exposure to dust
- Material off gassing
- Security challenges safeguarding materials and equipment
- Restricted movement of patients and materials
- Temporary wayfinding and egress changes
- Fire
What must be maintained during construction?

- Patient safety
- Fire separations
- Existing fire protection/life safety systems
- Existing means of egress
- Negative pressure
- Non-life safety systems
  - HVAC
  - Medical gases
  - Etc.
Maintaining Existing Fire Rated Construction

- What level of noncompliance is uncovered?
- How does it affect your ILSM, PCRA, and ICRA?
- Does your construction fire safety plan need to be updated if you uncover noncompliance?
  - Is construction area appropriately separated?
Building New Fire Rated Construction

- Rated walls should always be given priority
- Firestop system installation may not be able to occur immediately
  - Temporary measures implemented to seal openings
    - Mineral wool
    - FRT plywood
    - Gypsum

8.6 Building Separation Walls.

8.6.1 Fire Cutoffs.

8.6.1.1 Fire walls and exit stairways, where required for the completed building, shall be given construction priority for installation.

8.6.1.2 Fire doors with approved closing devices and hardware shall be installed as soon as is practicable and preferably before combustible material is introduced.
Risks Exacerbating Fire Spread

- Noncompliant fire compartmentation
- Noncompliant sprinkler systems
- Noncompliant fire alarm systems
- Excess storage of combustibles
- Storage of flammable liquids/gases
- Lack of training/knowledge
- Lack of pre-planning
How to Protect from Fire?
State Specific Construction Safety References - Building

- Massachusetts
  - 780 CMR Chapter 33 (2015 IBC)

- New Hampshire

- Connecticut

- Maine

- Vermont

- Rhode Island
  - Rhode Island State Building Code Chapter 33 (2012 NFPA 1), Rhode Island State Rehabilitation Code Chapter 12
State Specific Construction Safety References - Fire

- **Massachusetts**
  - 527 CMR Chapter 16 (2015 NFPA 1)

- **New Hampshire**

- **Connecticut**

- **Maine**
  - Rules of the State Fire Marshal Chapter 3 (2006 NFPA 1) and Chapter 20 (2009 NFPA 101)

- **Vermont**

- **Rhode Island**
  - Rhode Island State Fire Code Chapter 16 (2015 NFPA 1)
Important Scoping Language

- NFPA 101 Solely references NFPA 241 regarding **means of egress** for the following occupancies:
  - New Healthcare
  - Existing Healthcare
  - New Ambulatory Healthcare
  - Existing Ambulatory Healthcare

### 7.1.10 Means of Egress Reliability.

#### 7.1.10.1* General.
Means of egress shall be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency.

- LS.01.02.01 Interim Life Safety Measures are not referenced by any state building and/or fire code
Differences Between NFPA 241 and LS.01.02.01

<table>
<thead>
<tr>
<th></th>
<th>NFPA 241</th>
<th>LS.01.02.01</th>
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</thead>
<tbody>
<tr>
<td>Fire alarm impairments</td>
<td>8 hours, no fire watch dictated</td>
<td>&gt; 4 hours fire watch required</td>
</tr>
<tr>
<td>Sprinkler impairments</td>
<td>10 hours, no fire watch dictated</td>
<td>10 hours, no fire watch dictated</td>
</tr>
<tr>
<td>Construction Separation</td>
<td>1 hour with no sprinkler</td>
<td>Smoke tight, noncombustible</td>
</tr>
<tr>
<td>Security</td>
<td>Only where required by AHJ</td>
<td>Increased surveillance</td>
</tr>
<tr>
<td>Inspections</td>
<td>General weekly inspections</td>
<td>Daily egress inspections</td>
</tr>
<tr>
<td>Temporary systems</td>
<td>No inspection requirements</td>
<td>Inspected monthly</td>
</tr>
<tr>
<td>Fire Drills</td>
<td>N/A</td>
<td>Additional drill per quarter</td>
</tr>
</tbody>
</table>

Are the requirements different? Comply with the most restrictive!
Who can enforce/audit compliance?

- Authorities
  - Building
  - Fire
  - CMS/DPH
- Ownership
- General Contractor
- Consultants
Ownership Roles and Responsibilities

- Develop a fire prevention program
- Develop a pre fire plan
- Designate an individual responsible for the fire prevention program
- Enforce the fire prevention program
- Be knowledge of fire prevention standards, available fire protection systems, etc.
- Provide inspection records to the AHJ
- Be responsible for guard service/security when provided
- Provide training in the use of fire protection equipment
- Ensure a proper amount of fire protection devices are present
- Establish a self inspection program
- Serve as permit authorizing individual (NFPA 51B Section 4.2)
- Serve as impairment coordinator (NFPA 25 Section 15.2.1)
Who manages all these roles?

For smaller hospitals, maybe a handful of people

For larger institutions there may be teams of people

- Planning, Design, and Construction
- Facilities
- EH&S
- Security
- In house architects
- In house engineers

Ownership Roles and Responsibilities - Continued
Design Team Roles and Responsibilities

- Ask for campus Life Safety Plans
- Understand the Current Compliance Conditions
- Understand existing ILSM’s in place
- Understand how phasing may effect means and methods
- Ensure design conforms with all aspects of compliance
- Ensure that infrastructure supports new work
- Review documents with contractor to avoid conflicts during construction
- Monitor construction to ensure design is being implemented
General Contractor Roles and Responsibilities

- Develop a fire prevention program specific to the project
- Development of impairment plans
- Coordinate impairments with ownership
- Coordinate hot work with ownership
- Maintain inspection records
- Conduct construction in accordance with PCRA, ICRA and ILSM requirements
- Abide by ownership construction rules/regulations and policies
General Contractor Roles and Responsibilities - Continued

- Who manages all these roles?
  - Depends on project size
Developing a Construction Fire Safety Plan

- What is covered in a construction fire safety plan?
  - Housekeeping measures
    - Dumpster placement, trash removal
    - Combustible material storage
  - On site security
    - Owner provided?
    - GC provided?
  - Fire Protection systems
    - What is provided?
    - What is impaired?
    - How does that affect occupied areas?
  - Organization and training of on site fire response
    - Fire extinguisher placement
    - Emergency response
Developing a Construction Fire Safety Plan - Continued

- Development of a pre fire plan in conjunction with local fire department
  - Fire department access
  - Fire protection system locations
  - Points of contact
    - Ownership and contractor

- Communication of events
  - To construction personnel
  - To building occupants
  - To the fire department

- Special Hazards
  - Fuel storage
    - OSHA vs. NFPA 241

- Construction area separation

- Protection of adjacent buildings and existing properties
What is an impairment?

- **Definition**: A condition where a fire protection system or unit or portion thereof is out of order, and the condition can result in the fire protection system or unit not functioning in a fire event (NFPA 13)

- **Types of Impairments**:
  - Emergency
  - Preplanned

- **Lengths of impairments**
  - Sprinkler - 10 hours (NFPA 25 Section 15.5.2(4))
  - Fire alarm - 8 hours (NFPA 72 Section 10.21.4)
    - Greater than 4 hours requires a fire watch (LS.01.02.01 EP2)
  - In reality - 1 “shift”

- **What systems could be impaired?**
  - Sprinkler System
  - Fire alarm system
  - Smoke control system
  - Means of Egress System
What is covered in an Impairment Plan

- What systems are effected?
- Where the impairment is occurring?
- Who is effected?
  - Construction areas?
  - Occupied areas?
  - Patient care areas?
- Mitigation for the impairment?
- What ILSM’s are put in place?
- Likely will need input from the design team and facilities
  - When can impairments occur?
  - Where are valves, panels, etc. located and what do they serve?
  - Who needs to be notified and how far in advance?
Daily Sprinkler Impairments

- Governed by NFPA 25 Section 15.5.2(4))
  - Requires the owner to designate an Impairment Coordinator (IC)
    - All preplanned impairments to be approved by the IC
  - Requires the impaired system/component to be tagged as impaired
  - Impairments of 10 hours or less in 24-hour period allowed by right
  - Impairments over 10 hours requires the following:
    - Evacuation of building/portion thereof
    - Establishment of a fire watch
    - Establishment of a temporary water supply
    - Establishment of an approved program to eliminate potential ignition sources and limit the amount of fuel
**Typical Sprinkler Impairment Process**

- Sprinkler permit obtained from the AHJ
  - Previously approved systems being impaired always need AHJ approval
- Impairment permit/notification to owner
- Sprinkler impairment is logged
- Ceiling remains intact until permit obtained
  - Upon ceiling demo sprinkler system reconfigured to provide coverage based on new ceiling height
    - Sprinklers reconfigured and replaced where necessary
  - Deflector located between 1” and 12” from ceiling (unobstructed construction)
- Sprinklers reconfigured in upright orientation to align with new ceiling grid
- Sprinklers reconfigured to pendant position upon ceiling install
- Log is updated
Removal of Ceilings without sprinkler impairment

Existing Condition

Code compliant with sprinklers at drop ceiling
Removal of Ceilings without sprinkler impairment

Ceilings removed during construction

Code compliant without drop ceiling (within 12" of deck in pendant position)
Non-code compliant (not within 12" of ceiling or deck). Compliant alternative required.
Removal of Ceilings without sprinkler impairment

Ceilings removed during construction

Code compliant without drop ceiling (within 12" in upright position)
Ceilings installed for finished condition without reflected ceiling (within 12" in upright position-grid only installed)
Sprinkler system removed with temporary heat detection installed.

Ceilings removed during construction.

Removal of Ceilings without sprinkler impairment.
Ceilings installed for finished condition

Sprinklers downturned into drop ceiling (>12”) with temporary heat detection installed
Daily Fire Alarm Impairments

- Governed by NFPA 72 Section 10.21
  - Requires the system owner to be notified if a system, or part thereof, is impaired
  - Requires the supervising station to notify AHJ if system monitoring has been terminated
  - Requires the service provider to notify the AHJ if system is out of service for more than 8 hours, i.e. disabling smoke detectors for a shift
  - Permits the AHJ to require mitigating measures for the period the system is impaired.
Fire Alarm Impairments (cont.)

- Removal of smoke detection for duration of construction
  - Requires a fire alarm permit and approval from the FD
- Disabling of master box/putting Panel in Test Mode
  - Qualified person needs to remain at panel in this instance
- Auxiliary functions controlled by fire alarm
  - Elevator Recall
  - Smoke Control
  - Are these reasonable to disabled?
Typical Fire Alarm Impairment Process

- Fire alarm permit obtained from AHJ
- Impairment permit/notification to owner
- Smoke detectors remain enabled until approval is granted from FD and ownership

Typical process:
- Smoke detectors disabled prior to dusty construction activities
  - Physically bagged, physically removed, electronically disabled, etc.
- Impairment is logged
- Construction activities occur
- Smoke detectors cleaned, if necessary
- Smoke detectors enabled
  - Bags removed, smokes re-installed, points enabled, etc.
- Logs updated
Impairments to Auxiliary Functions

- **Smoke control systems**
  - May be initiated by pull stations, smoke control, waterflow (system/building dependent)
  - Impairing actuation by means of a fire alarm impairment is impairment of the smoke control system
  - What is reasonable mitigation?

- **Elevator recall**
  - Initiated by smoke detectors located in elevator lobbies
  - Impairing these detectors impairs an important life safety function
  - Individuals may be brought to an untenable environment
  - What is reasonable mitigation?
Means of Egress Impairments

- Governed by local building code
  - Requires all means of egress which are required in a building or structure be maintained in good working order
  - Alterations or impairments to these systems required
- Egress obstructed or reconfigured?
  - What is the difference?
  - Stair replacement vs. handrail modifications?
  - Occupied vs. construction?
  - Construction Area Separation?
- What is the justification?
  - Sufficient egress elsewhere?
  - Provide temporary egress features?
Means of Egress Impairments (Cont.)

- Items to consider during preplanning
  - Occupied portions of floor/building provided with appropriate number of exits
  - Location of temporary construction separation
    - Occupied portions of building can’t egress through construction (780 CMR 1017.1(5))
  - Exits from construction area
    - Should swing in direction of egress
    - If swinging into corridor swing open 180 degrees
  - Temporary stairs
    - Minimum 36” width (780 CMR 1011.2 Exception 2)
    - Compliant tread and riser dimensions (7”x11”)
  - Temporary exit signage location
Construction Fire Safety Timeline

- During Design
  - Review any proposed impairments/alterations and phasing
  - How will this effect means and methods
- Prior to permitting
  - Develop fire safety program
  - Develop impairment plans
  - Review plans with AHJ, Owner, GC
- During Construction
  - Implement plan
  - Schedule impairments
  - Schedule hot work
  - Perform inspections
How to Maintain Compliance with Fire During Construction

- Demonstrate compliance with State/Local Building & Fire Codes
- Comply with ICRA, PCRA, and ILSM policies
- Utilize recognized/referenced standards as guidance
- Put the correct staff in the correct roles
- Audit your plan and make updates where necessary
- Document everything!
Risks Associated With Noncompliance

- Insurance claims after an event
- New AHJ’s coming from other jurisdictions
  - Wasn’t enforced in the past and holding up projects now
- Project costs associated with phasing not planned
- Ignorance isn’t bliss
Take a Balanced Approach

- Be proactive - don’t hope for the best

- Be realistic - understand what you don’t know and identify someone that does

- Pick your battles

- Include AHJ’s as part of the team
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