MODULE OBJECTIVES

The students will be able to:

- *Identify occupancies in special structures, unique occupancies, and uses that have special requirements.*
- *Identify the unique fire and life safety considerations of occupancies in special structures.*
- *Recognize the limitations of enforcement in existing buildings and vacant buildings.*

INTRODUCTION

Most inspections take place in buildings constructed and maintained in accordance with building codes. Most buildings house some common occupancy such as business, apartment, store, or warehouse. Occasionally, the nature of the structure or the occupancy requires special fire safety considerations. Examples of these types of structures include

- an observation tower at the Gettysburg Battlefield;
- a ship or boat permanently moored and converted to a hotel or gambling casino;
- a subway transit system;
- highrise buildings; and
- a construction site.

The special circumstances may require increased fire and life safety protection, or may permit exceptions to typical fire and life safety protection. It is not practical to add a second exit stairway to the Washington Monument. Airport control towers also have a single exit stairway, and this deviation from what normally would be required is permitted because of the special circumstances. Some structures are so specialized that they are regulated by other agencies. For example, offshore oil platforms are regulated by the U.S. Coast Guard.

TYPES OF OCCUPANCIES IN SPECIAL STRUCTURES

Special Structure Occupancies

When an occupancy's use does not fit into a standard category because of the type of structure in which it is located, it is considered a special structure occupancy according to National Fire Protection Association (NFPA 101, *Life Safety Code*). Check NFPA 101 for the exact definition. The following are examples of special structure occupancies:

- Windowless structures that lack outside openings for rescue or ventilation.

- Underground structures built below the level of exit discharge.

- Structures completely surrounded by water.

- Vessels are ships or barges permanently fixed or unable to move under their own power, and used for purposes other than navigation.

- Towers are independent structures used for the support of equipment or for observation, control, or signaling; they are not open for general use.

- Immobilized vehicles are, for example, trailers, railcars, buses, or similar conveyances that are not mobile, but fixed to a foundation or attached to a building.

- Open structures support equipment and operations not enclosed by building walls. Often these structures are found at oil refineries, power plants, and chemical processing plants.

Open structures and towers are excepted from most requirements related to egress. Single ladders are permitted in place of stairways. Fire alarms, exit markings, and exit illumination are not required. Other special structures generally must meet the same requirements as a standard building for the same occupancy. For example, vehicles and vessels occupied for assembly use must have the correct number and size of properly marked and illuminated exits. Underground and windowless buildings, depending on the number of occupants, have additional requirements for fire suppression systems and emergency lighting.

Special Conditions

A variety of special conditions are covered by the code. NFPA 130, *Standard for Fixed Guideway Transit Systems*, includes all requirements for portions of the transit system, including exiting. Tents, air-supported structures, and membrane structures for temporary use require a permit. They must have adequate egress for the intended use and, if they are for extended use, they generally must be noncombustible or flame resistant. (There are some exceptions such as a plastic greenhouse that is not open to the public.) They must provide the same level of life safety as conventional buildings.

Codes frequently have special provisions or exceptions for treatment plants, generating/power plants, refineries, and chemical manufacturing plants containing large areas with little or no human occupancy.

Vacant structures attract young people and vagrants. Most fire prevention codes define vacant structures as unsafe buildings. The buildings become dilapidated, and the owners are unable or unwilling to maintain them. Correction of problems in vacant structures is difficult.

Most **highrise buildings** constructed after the mid-1970s have features designed to ensure fire safety. Not all jurisdictions require all items, but the following list of features is typical of those generally required for highrise buildings:

- automatic sprinklers;
- voice alarm and communications;
- two-way fire department communication;
- emergency lighting and standby power;
- smoke control and removal;
- elevators large enough for stretchers; and
- central control station for fire emergency system monitoring and communication.

The added safety provided by these systems can be effective only when the systems are fully operational.

Existing buildings cannot be rebuilt each time the building code changes, but they must be maintained to the original level of construction. Older buildings also may be required to be improved as their use changes. Communities may impose some retroactive requirements on existing buildings, but all retroactive requirements must have a valid health or safety justification.

In conclusion, most fire prevention codes have chapters that contain special requirements for selected occupancies. You should check your local code for the occupancies discussed above as well as for lumberyards, woodworking plants, junk yards, dry cleaning plants, or bowling establishments.

FIRE AND LIFE SAFETY CONSIDERATIONS IN BUILDINGS UNDER CONSTRUCTION, DEMOLITION, OR ALTERATION

Construction and demolition operations create some unique challenges. Fortunately, many of the primary ignition sources are present only during the time the site is occupied. Unfortunately, the sites can be very tempting targets for arson fires. The demolition site is frequently an even more tempting target. In addition, there is generally a much lower level of concern for fire safety at demolition sites. The problem at building expansion and alteration sites can be even more difficult when you add all the problems of a construction site to a partially occupied structure.

Frequently the fire safety staff overlooks the construction and demolition site. One of the most tragic incidents occurred in November of 1988. A

fire at a road construction site involved two semitrailers filled with ammonium nitrate, fuel oil, and aluminum. The original call was for a pickup truck on fire. Arriving firefighters found a second fire and requested assistance. The firefighters did not know the contents of the trailers. The resulting explosion killed six Kansas City firefighters. This was a case of arson that was not closed until 1997.

A very serious demolition site fire occurred on Thanksgiving Day in 1982 in Minneapolis, Minnesota. At the time, it was the costliest fire in Minneapolis history. The damage was not to the department store being demolished, but to the adjacent highrise bank building. The site was unsecured. Together the department store and the bank building filled a city block. At the time of the fire, demolition activity was moving from the street toward the bank. Combustible debris was piled high, and the ends of all six stories of the department store were open. The fire department responded and quickly applied four 1,000-gpm master streams with no visible effect. The heat from the fire went up the lightwell in the bank building like a chimney. Windows failed, and several floors of the bank building were ignited.

In suburban Washington, DC, a Federal security guard reported an early morning fire across the interstate highway from his/her post. Responding firefighters found all 21 townhouses on the construction site involved when they arrived. One of the characteristics of fires in unfinished wood-frame construction is a very intense, fast-moving fire. High levels of radiant heat have damaged more than one piece of fire apparatus.

While construction, demolition, and alteration make up only a very small part of a community's fire problem, it is an important segment that cannot be ignored.

The major problems encountered with buildings under construction, demolition, or alteration include

- reduced fire protection features;
- hazardous materials and processes; and
- lack of access.

Reduced Fire Protection Features

In these structures, the fire sprinkler systems often are not operational. The standpipe system may not be operational. Critical fire-resistive components are not installed, or may have been breached, including

- gypsum board not installed, or broken;
- stairway doors not installed, or removed;
- firestopping not installed;
- drop ceilings not in place, or removed;
- spray-on fire protection not installed, or removed; and
- water supplies not connected.

APPENDIX

SPECIAL STRUCTURE OCCUPANCY FIRE INSPECTION FORM

Property Name: Owner:
Address: Phone Number:

OCCUPANCY

Occupancy Classification: Change from Last Inspection: Yes ► No ►
Occupancy Load: Egress Capacity: Any Renovations: Yes ► No ►
Vehicle or Vessel ► Windowless ► Highrise ► Water Surrounded ► Pier ► Underground ► Other ►

BUILDING SERVICES

Electricity ► Gas ► Water ► Other ► Are Utilities in Good Working Order: Yes ► No ►
Elevators: Yes ► No ► Fire Service Control: Yes ► No ► Elevator Recall: Yes ► No ►
Heat Type: Gas ► Oil ► Electric ► Coal ► Other ► In Good Working Order: Yes ► No ►
Emergency Generator: Yes ► No ► Size: Last Date Tested:
Date of Last Full Load Test: In Automatic Positions: Yes ► No ►
Fire Pump: Yes ► No ► GPM: Suction Pressure: System Pressure:
Date Last Tested: Date of Last Flow Test:
In Automatic Position: Yes ► No ► Jockey Pump: Yes ► No ►

EMERGENCY LIGHTS

Operable: Yes ► No ► Tested Monthly: Yes ► No ►
Properly Illuminate Egress Paths: Yes ► No ► In Good Condition: Yes ► No ►

EXIT SIGNS

Illuminated: Internally ► Externally ► Emergency Power: Yes ► No ► Readily Visible: Yes ► No ►

FIRE ALARM

Yes ► No ► Location of Panel:
Coverage: Building ► Partial ► Monitored: Yes ► No ► Method:
Type of Initiation Devices: Smoke ► Heat ► Manual ► Water Flow ► Special Systems ►
Date of Last Test: Date of Last Inspection:
Notification Signal Adequate: Yes ► No ► Fire Department Notification: Yes ► No ►

FIRE EXTINGUISHERS

Proper Type for Hazard Protecting: Yes ► No ► Mounted Properly: Yes ► No ►
Date of Last Inspection: Adequate Number: Yes ► No ►

FIRE PROTECTION SYSTEMS

Type: Sprinkler ► Halon ► CO_2 ► Standpipe ► Water Spray ► Foam ► Dry Chemical ► Wet Chemical ► Other ►
Coverage: Building ► Partial ► Date of Last Inspection:
Cylinder or Gauge Pressure(s): 1 psi.,2 psi.,3 psi.,4 psi.,5 psi.
Valves Supervised: Electrical ► Lock ► Seal ► Other ► Are Valves Accessible: Yes ► No ►
System Operational: Yes ► No ► Sprinkler Heads 18" from Storage: Yes ► No ►

FIRE-RESISTIVE (FR) CONSTRUCTION

Stairway FR: Yes ► No ► Hourly Rating:
Corridors FR: Yes ► No ► Hourly Rating:
Elevator Shaft FR: Yes ► No ► Hourly Rating:
Major Structural Members FR: Yes ► No ► Hourly Rating:

Floor-Ceiling Assemblies FR: Yes ► No ► Hourly Rating:
All Openings Protected in FR Walls and Floor-Ceiling Assemblies: Yes ► No ►

HAZARDOUS AREAS

Protected by: Fire-Rated Separation ► Extinguishing System ► Both ►
Door Self-Closures: Yes ► No ►

HOUSEKEEPING

Areas Free of Excessive Combustibles: Yes ► No ►
Smoking Regulated: Yes ► No ►

INTERIOR FINISH

Walls and Ceilings Proper Rating: Yes ► No ► Floor Finish Proper Rating: Yes ► No ►

MEANS OF EGRESS

Readily Visible: Yes ► No ► Clear and Unobstructed: Yes ► No ►
Two Remote Exits Available: Yes ► No ► Travel Distance within Limits: Yes ► No ►
Common Path of Travel within Limits: Yes ► No ► Dead-Ends within Limits: Yes ► No ►
50% Maximum through Level of Exit Discharge: Yes ► No ►
Adequate Illumination: Yes ► No ►
Proper Rating on All Components: Yes ► No ►
All Exit Enclosures Free of Storage: Yes ► No ►
Door Swing in the Direction of Egress Travel (when required): Yes ► No ►
Panic/Fire Exit Hardware Where Required: Yes ► No ► Operable: Yes ► No ►
Doors Open Easily: Yes ► No ► Self-Closures Operable: Yes ► No ►
Doors Closed or Held Open With Automatic Closures: Yes ► No ►
Corridors and Aisles of Sufficient Size: Yes ► No ►
Stairwell Re-Entry: Yes ► No ►
Mezzanines: Yes ► No ► Proper Exits: Yes ► No ►

VERTICAL OPENINGS

Properly Protected: Yes ► No ►
Atrium: Yes ► No ► Property Protected: Yes ► No ►
Are Fire Doors in Good Working Order: Yes ► No ►

HIGHRISE

Central Control Station

Voice Fire Alarm Panel: Yes ► No ►
Fire Department Two-Way Telephone Communications: Yes ► No ►
Fire Alarm System Annunciators: Yes ► No ►
Elevator Floor and Control Annunciators: Yes ► No ►
Emergency Generator Status Annunciator: Yes ► No ►
Controls for Stairwell Unlocking: Yes ► No ► Fire Pump Status Annunciator: Yes ► No ►
Telephone for Fire Department Use: Yes ► No ►

Emergency Power

Emergency Lights: Yes ► No ► Fire Alarm System: Yes ► No ►
Electric Fire Pump: Yes ► No ► Central Control Station Equipment and Lighting: Yes ► No ►
At Least 1 Elevator Serving All Floors: Yes ► No ► Transferable: Yes ► No ►
Mechanical Equipment for Smoke Control: Yes ► No ►

OPERATING FEATURES

Fire Drills Conducted: Yes ► No ► Employees Trained: Yes ► No ►