FIRE AND RESCUE DEPARTMENTS OF NORTHERN VIRGINIA

FIREFIGHTING AND EMERGENCY OPERATIONS MANUAL

MID-RISE BUILDING FIRES

First Edition

Issued: December 2013

ACKNOWLEDGMENTS

This document was developed through a cooperative effort of the following Northern Virginia fire departments:

- City of Alexandria
- Arlington County
- City of Fairfax
- Fairfax County
- Fauquier County
- Fort Belvoir
- Fort Myer
- Loudoun County
- City of Manassas
- Marine Corps Base Quantico
- Metropolitan Washington Airports Authority (MWAA)
- Prince William County
- Stafford County

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Fairfax County: Battalion Chief Tyrone Harrington, Captain Dan Shaw, Captain David Barlow, Master Technician Matthew Tamillow
Fort Belvoir: Lieutenant Kevin Good
Fort Myer: Assistant Chief Bruce Surette, Captain William Long
Loudoun County: Lieutenant Scott Lantz
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Marine Corps Base Quantico: Captain Robert Helbock
MWAA: Captain Jason Graber, Captain Gary Hubble
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The committee would like to thank the following individuals and organizations for their help in the development of this manual:

AAW Publication Services: Andrea A. Walter (editing and layout)

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PREFACE

This manual is designed for use as a resource and reference for all fire department personnel in Northern Virginia for response to fires and emergencies in mid-rise buildings.

Northern Virginia has hundreds of mid-rise buildings with many more under construction or in the planning stages. Preplanning is critical so that personnel can familiarize themselves with the wide variety of building layouts, sprinkler systems, standpipes, fire detection systems, and fixed fire protection systems used in mid-rise buildings. Many mid-rise buildings have a full complement of fire protection systems while other mid-rise buidings offer no fire protection system at all.

Mid-rise construction began predominately during the World War II and continues to be popular today. Construction of these buildings has placed multiple families, commercial occupancies, or both under one roof. These buildings may be found set back from the street, directly on the street, surrounded by parking lots, or surrounding parking garages or atriums.

The objectives of this manual are:

- To describe the differences between mid-rise buildings compared to other types of occupancies.
- To identify construction features with regard to protecting life and extinguishing fires.
- To describe hazards associated with these structures.
- To establish standard tactics for fires that occur in such structures.
- To establish assignments for engine, truck, and rescue companies for fires that occur in these structures.

DESCRIPTION

A mid-rise building is three to six stories in height but has less than 75 feet from the lowest level of fire department vehicle access to the floor of the highest occupible story. A mid-rise can be a residential or a commercial occupancy with the presence of elevators. Additionally, mid-rise buildings can have a large footprint or unusual design (i.e., shaped like an X or an H) that can result in long hose stretches and significant distances between stairwells.

Mid-rise building construction can allow for more density than garden apartments without the regulations, fire code, and construction requirements of a high-rise. Mid-rise buildings can include commercial or residential occupancies or a combination of commercial and residential occupancies (often referred to as mixed use).

> ***Note:*** *This manual was developed to provide direction for common, multi-story buildings that were not sufficiently covered by other NOVA manuals and that are not special occupancies (e.g., industrial buildings). Readers may note that there is some overlap in the definition of a garden apartment building and the definition of a mid-rise building, mainly the number of stories. When considering this manual in comparison with others, a good rule of thumb is to refer to the NOVA manual on garden apartments and have a solid ability to recognize a garden apartment building; if the building is not a garden apartement, it is likely a mid-rise building that will be covered in this manual.*

Mid-rises vary by construction type and the number of units contained within the structure. The type of construction is dependent on the year it was completed, the intended occupancy, and the building code adopted at time of construction. The number of units on each floor varies based on the physical layout of the structure.

The exterior of mid-rise buildings can be constructed of various materials. These include: solid masonry, brick veneer over wood frame, wood, glass, and various types of siding. Mid-rise buildings will typically have long hallways with apartments or offices on one or both sides.

Mid-rise buildings may be directly on the street or set back from the street. Access may be difficult due to parking lots, parking garages, and limited vehicle access to various sides of the building.

Depending on the terrain, floor levels above ground can vary from front-to-rear and side-to-side. Landscaping, fencing, and setback can limit access for apparatus in some circumstances.

Depending on the era of construction, many mid-rise buildings may have balconies made of combustible or noncombustible materials. These balconies can be extended or recessed.

The roofs vary greatly in design. Most of the commercial and older residential buildings will have flat roofs. Newer style roofs often have large cross gables and dormers. Some buildings use the attic space as a living area.

The lowest floor of a mid-rise building may contain commercial or retail space, hydraulic elevator rooms, occupied apartments, storage areas, utility rooms, laundry facilities, parking

facilities, or trash rooms. Many newer buildings are constructed on a concrete slab and do not have the traditional basement storage areas and laundry rooms.

Preplanning is critical for personnel to familiarize themselves with the wide variety of building layouts, sprinkler systems, standpipes, fire detection systems, and fixed fire suppression systems used in mid-rise buildings. Each firehouse should have preplans for mid-rise structures in their area.

General Characteristics

The characteristics of construction are driven by the time period in which the particular building was built, the building code in place at the time, and the original intent of occupancy (e.g., retail, residential, office space). Residential mid-rise buildings constructed in the 1950s are frequently constructed using ordinary methods of masonry walls with dimensional wood floors and roof. Modern residential buildings are typically lightweight wood construction. Commercial buildings are usually non-combustible construction using steel and concrete. Mixed use buildings with commercial occupancies and residential occupancies typically have mixed construction. The residential portion of the building being ordinary or lightweight wood while the commercial areas are non-combustible steel and concrete.

These structures may have many of the same characteristics of a garden apartment, such as:

- Full, partial, or no sprinkler protection
- No standpipe system
- Ordinary construction (masonry bearing walls/ wood floor and roof)
- Lightweight wood construction
- Large attic space

These structures may also have many of the same characteristics of a high-rise, such as:

- Full, partial, or no sprinkler systems
- A standpipe system
- Firefighter's service to the elevators
- Standby and emergency power systems
- Non-combustible construction – concrete and steel
- Hallways to access work or living areas
- Center core floor plan
- Commercial occupancy on lower levels
- Parking garages

The interior layout of the structure will vary; some buildings have commercial occupancies on the lower levels with residential occupancies above. Lower floors typically have exterior access and may contain apartments, storage rooms, community rooms, trash room with compactors, and/or laundry rooms and loading docks.

Some mid-rise buildings are constructed in a "donut" configuration. The building encircles a swimming pool or court yard, often with parking below, Figure 1.

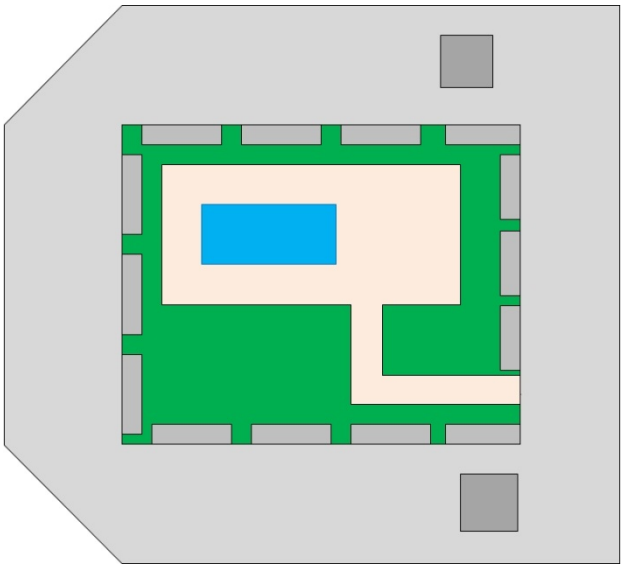

Figure 1: Overhead View of a Donut-style Mid-rise with Above-grade Pool and Courtyard with Parking Below

Some mid-rise buildings have floor plans similar to many high-rise buildings, Figure 2.

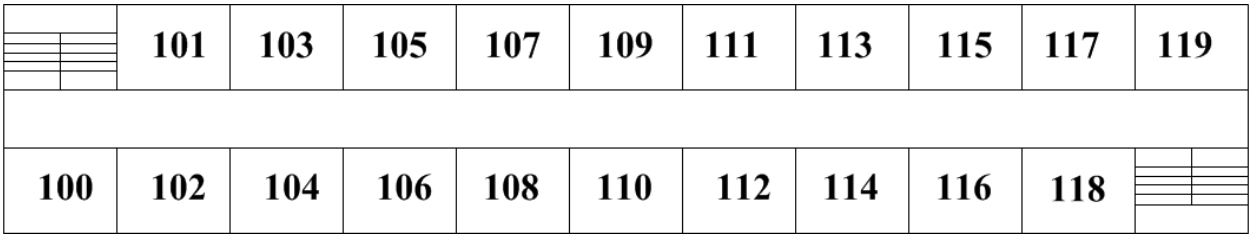

Figure 2: Typical Residential Mid-rise Hallway Floor Layout

Some mid-rise buildings have commercial, office, and retail space with no residential occupancies. The floor plans are typically central hallway or center core, Figure 3.

Figure 3: Typical Commercial Mid-rise Building with Center Core Atrium

Many mid-rise buildings have specialized occupancies that occupy much of the first floor; examples of specialized occupancies that might be found are assisted living facilities or even a fire/emergency service station , Figure 4.

Figure 4: Specialized Occupancies are often Found in Mid-rise Structures

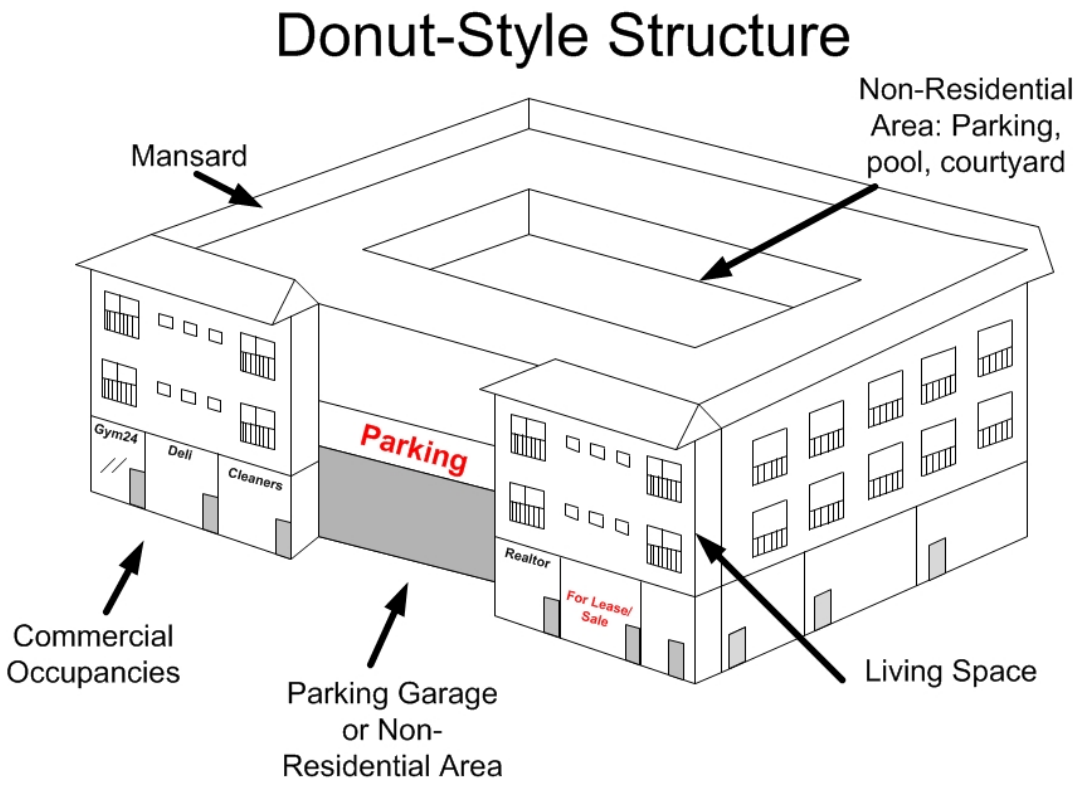

Figure 5: Typical Three-story, Residential Over Commercial Mid-rise Structure

Land in the Northern Virginia area is a commodity so donut-style mid-rises are gaining popularity. First floor and below grade parking are becoming commonplace with retail and commercial occupancies inhabiting much of the first floor and residential apartment and condos above, Figure 5.

Residential mid-rise buildings have floor plans similar to many high-rise buildings in the region but are limited to 75 feet in height on the addressed side and lack many of the fire code requirements found in high-rise buildings, Figure 6.

Figure 6: This Mid-rise Structure Appears Similar to a High-rise from the Outside

Commercial mid-rise buildings may have central hallways or center core floor plans with circuit corridors around the core of the building, Figure 7 and Figure 8. Others have relatively large, open expanses on each floor.

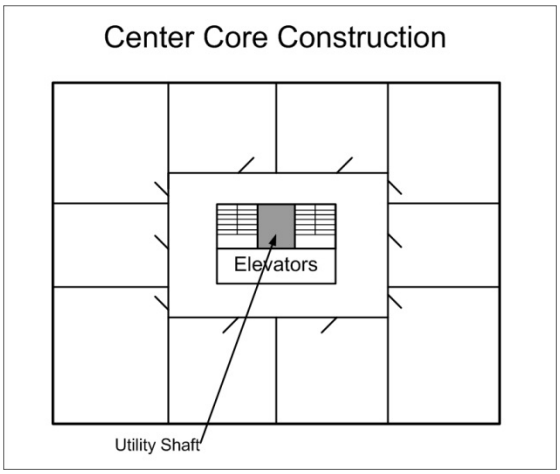

Figure 7: Center Core Construction Occupies the Outer Perimeter of the Structure and Houses the Stairs and Elevators in the Center

Figure 8: Example of Center Core Construction

With the advent of lightweight building materials, lightweight mid-rises buildings occupied as assisted living facilities are seen throughout the region and have an open atrium and stairway in the lobby, Figure 9. The hallways are often similar to a residential mid-rise hallway.

Figure 9: Lightweight Mid-rise Building Occupied as an Assisted Living Facility

The grading surrounding the building may affect the number of stories visible from the addressed side, Figure 10. As an example, the building may appear to have four stories from the front, but is actually five stories in the rear.

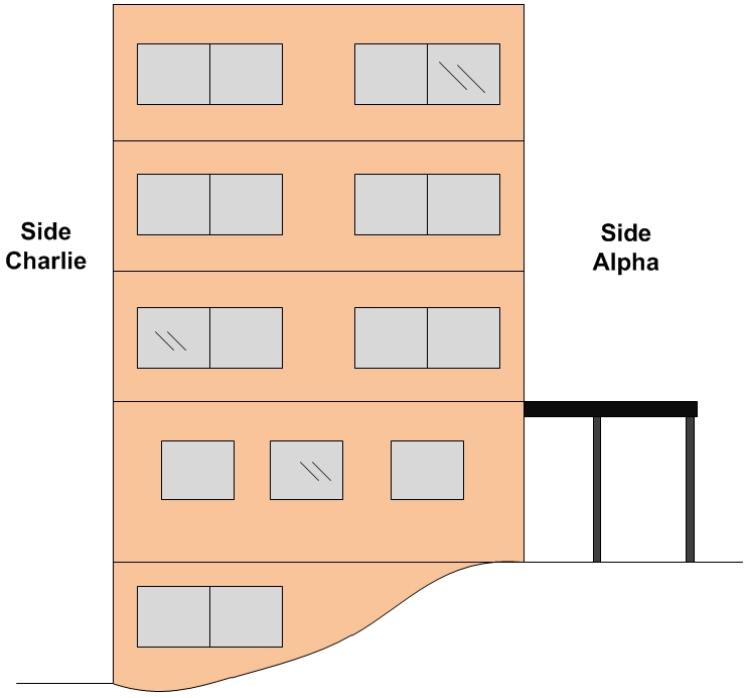

Figure 10: During Size-up, Company Officers should Note Nnumber of Floors Accessible from the Front and Rear of the Structure, if Practical

Mid-rise buildings may have a large footprint with long hallways. Apartments and offices are generally accessed from an enclosed hallway similar in a high-rise building, Figure 11.

Figure 11: Long hallways are common in mid-rise buildings

Many mid-rise buildings with long hallways have self-closing fire partition doors placed to divide the hallway and slow the lateral spread of fire and smoke, Figure 12 and Figure 13. In older mid-rise buildings, these doors may not be self-closing.

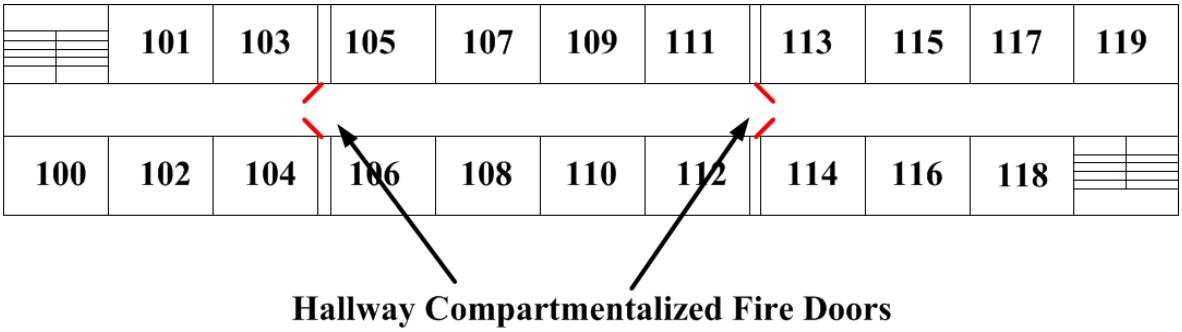

Figure 12: Mid-rise Buildings with Long Hallways Usually have Fire Doors

Figure 13: Example of Fire Doors

Apparatus access may be simple or complex. Buildings, or portions of buildings, may be inaccessible due to parking lots, trees, neighboring buildings, or parking garages, Figure 14. Access may require the removal of fencing and gates or may require positioning at some distance to the structure. All weather surfaces installed to provide fire department access may be concealed by grass or snow.

Figure 14: Vehicular Access in the Rear of a Mid-rise Structure is Often Not Possible

Positioning far from the building results in excess reflex time and additional work loads to accomplish various tasks. Preplanning is very valuable to ascertain the best access points and identify limitations.

Personnel should be aware of weight restrictions for buildings when planning to use a truck company. A posted weight restriction may allow a truck company to drive on the roadway due to the disbursement of the vehicle weight on the axles of the truck. When a truck company deploys the outriggers, the disbursement of weight changes and is focused on a singular spot which may exceed the restriction. For instance, a truck company with an outrigger deployed can concentrate weights over 40,000 lbs. on the spot where the outrigger contacts the roadway, exceeding 400 pounds per square inch. The use of a jack plate can decrease the weight to the singular outrigger to 25,000 lbs or less than 35 pounds per square inch. These statistics require vehicle and building knowledge prior to the incident.

Many mid-rise buildings have a combination of several types of construction and should be treated according to the construction method with the lowest fire rating, Figure 15.

Figure 15: Lightweight Residential Mid-rise Built over a Parking Garage

The lightweight wood area is typically designated for residential occupancy while non-combustible areas combustible areas typically contain parking garages, commercial occupancies, or community areas (e.g., gym, areas (e.g., gym, swimming pool),

Figure 16.

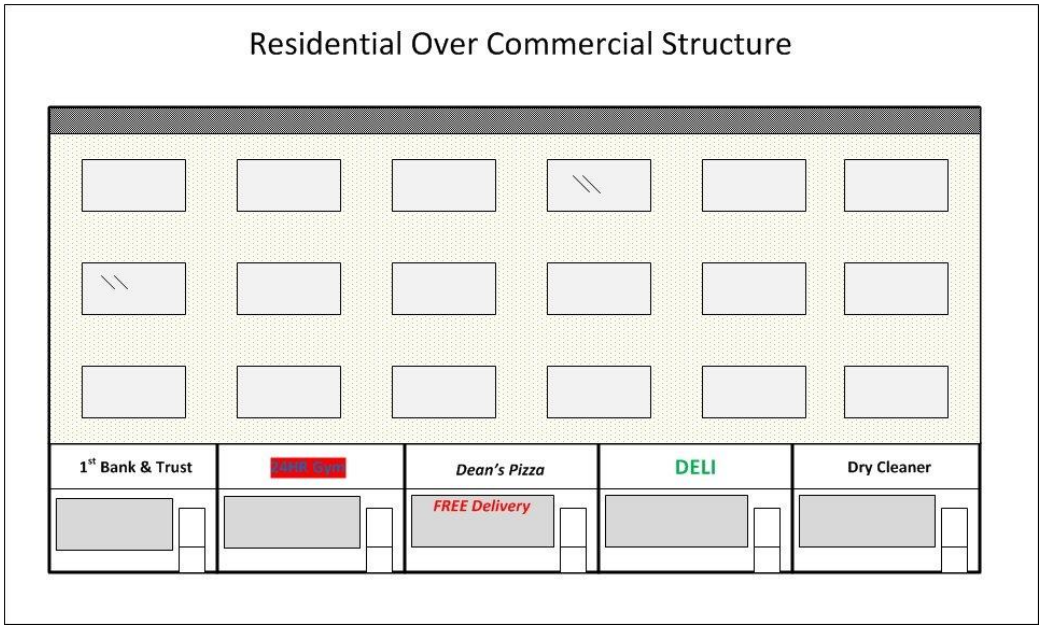

Figure 16: Lightweight Woodframe Construction Over Non-combustible Construction

Construction

Ordinary Construction (Pre-1960s)

Older mid-rise buildings are typically built of ordinary construction, with masonry loadbearing walls and wood floor and roofing components, Figure 17.

Figure 17: Pre-1960s-era Residential Mid-rise Building

Roof/Attic (Ordinary)

The attic is the area located above the ceiling and below the roof deck of a peaked or gable roof. In a building with a flat roof, this space is commonly referred to as the cockloft, Figure 18. These void spaces present different problems depending upon when and how the building was constructed. In some buildings, rather than having an attic or cockloft, there may be a top floor vaulted ceiling or loft.

The flat roof assembly of early mid-rise buildings is most often constructed with 2” x 8” or 2” x 6” joists set 16” to 24” on center using dimensional lumber covered with 1” x 4” planks and sealed with tar and gravel. In many cases the tar and gravel has been replaced or covered with foam insulation and a rubber membrane. Flat roofs are naturally ventilated through cockloft vents, Figure 19. As the flat roof leaks, ages, and begins to decay, owners may cover them with a lightweight gabled rain roof, resulting in multiple void spaces.

Fire breaching the cockloft or attic area may spread throughout the entire roof area.

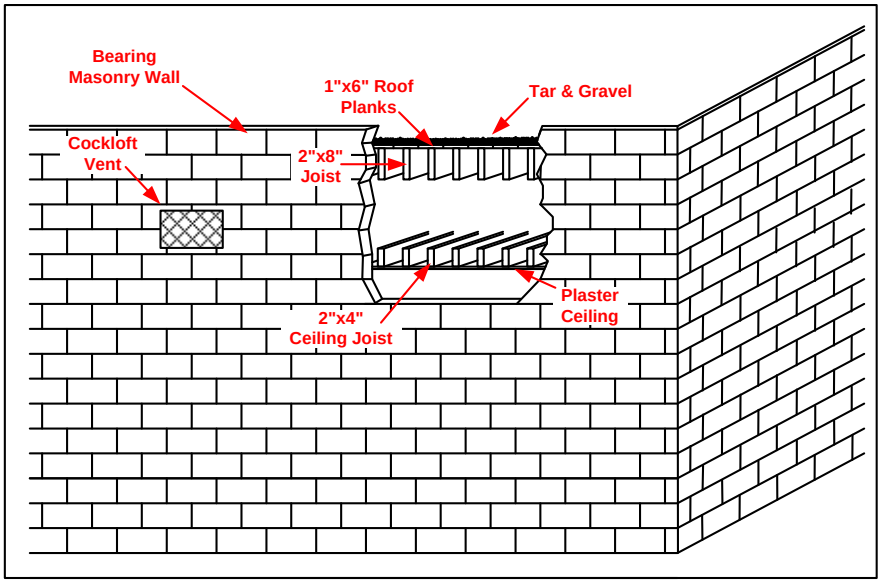

Figure 18: The Cockloft is the Void Space between the Top Floor and the Flat Roof

Figure 19: Cockloft Vent

Gable roofs are typically 2” x 6” joists spanning from the bearing walls to the ridge pole. 1” x 6” planks are sealed with slate or tar shingles. Gable roofs are typically vented at the gable ends, ridge vents, and/or soffit vents. There is normally a scuttle to access the attic or cockloft. In some buildings, a thin layer of concrete is poured over top of the ceiling to add fire protection for the attic and cockloft, preventing vertical fire extension.

Attics, if present, are generally unfinished. Sometimes the space is used to hide HVAC appliances. Interior access is usually achieved through a scuttle or pull-down staircase located on the ceiling of the top floor. Some may be very evident from the hallway while others may be located in a utility closets or hidden from view by a drop ceiling, Figure 20. These pull-down attic staircases are rated to 250 lbs. and should not be used if exposed to heat.

A roof access door or hatch may also be found at the top of a stairway. The stairway(s) containing these access doors must be noted in all building preplans.

Figure 20: Hidden Pull-down Access Staircase

Walls (Ordinary)

Exterior walls are bearing masonry. Many exterior walls have parapets above the flat roofline. Interior walls are normally lathe and plaster.

Insulation (Ordinary)

Insulation was of very little concern when these buildings were completed. Insulation in the attic or cockloft area may be present but is rarely seen in the walls.

Firewalls (Ordinary)

Firewalls of this generation are usually masonry. While some firewalls stop under the roofline, many extended beyond the roofline indicating their location(s) within the building, Figure 21.

Figure 21: The Masonry Firewall that Extends above the Roofline Affords the Greatest Protection

Floors (Ordinary)

The floors are typically dimensional lumber 2” x 6” or 2” x 8” joists supporting 1” x 4” wood planks covered in hardwood or parquet flooring, Figure 22. Joists are normally spaced 16” on

center. The joists typically span the shortest distance to meet bearing walls but the use of girders may increase the span and change joist direction. The decking is usually 1” x 4” wood planks covered with tongue-and-groove or parquet hardwood.

Figure 22: The Mass of Dimensional Lumber Provides Moderate Resistance to Collapse but Keep in Mind that the Metal Joist Hanger (Shown Outlined) is the Weakest Point

Basement (Ordinary)

The basement level may contain utility rooms, laundry rooms, trash rooms, or other service utilities along with apartments or offices. The walls are masonry while the ceiling may be concrete, lathe and plaster, or unfinished dimensional lumber.

Windows (Ordinary)

The residential windows in mid-rise buildings of this era were typically casement or double hung. These metal frame style windows can create a safety hazard for firefighters. Commercial windows are normally plate glass. Many of these aging windows have been updated to insulated vinyl windows in residential buildings and safety or tempered glass in commercial buildings.

Casement windows are prevalent in residential mid-rise buildings constructed in the 1940s and 1950s and pose their own unique hazards, Figure 23. The windows have steel frames set in concrete or masonry. While breaking all the glass in the windows will ventilate the affected area, entrance and exit through the remaining window frame will be physically blocked.

Casement windows are extremely dangerous to egress. The location and status of them should communicated when firefighters are operating in the compartment they enclose. Ventilation should only occur with coordination of interior operations.

Casement windows must be opened by lifting a latch and rotating a crank, making them a poor option for firefighter access and egress. Removing the frame with force will be very difficult under adverse conditions and would require the use of forcible entry tools. Firefighters and officers should make note of these windows during preplanning and in their size-up on arrival at a structure fire. Outside ventilation crews must remove these windows whenever encountered.

Figure 23: Examples of Casement Windows

Balcony (Ordinary)

The majority of mid-rise buildings of ordinary construction do not have balconies.

Doors (Ordinary)

Early residential mid-rise buildings typically have wood doors. Many of these wood doors have a metal center or are covered in light metal. Rim locks and chains are common securing methods. The commercial buildings usually have metal exterior service entry doors with solid wood or glass office doors.

Stairs (Ordinary)

Most of these buildings have one or more elevators and stairways, Figure 24. These stairways typically provide access from the basement to the top floor levels. Some open to the roof with a bulkhead or hatch. Doorways may or may not separate the hallway from the stairway. Standpipes may or may not be present in the stairways. These stairways may exit to the outside, the lobby, or to an interior hallway.

Figure 24: Mid-rise Stairway

HVAC Systems (Ordinary)

In older mid-rise buildings, heat was typically supplied via hot water boiler and radiator. Air conditioning (A/C) was usually not available to residential buildings during this time period. Some owners have added window A/C units or remodeled the building adding ventilation ducts supplying A/C. These A/C units may be found on the roof, in the attic, or near an outside wall. Commercial buildings of this period frequently used cold water chillers mounted on the roof or next to the building. In older construction, the central heating unit may be located in the basement and consist of large oil or natural gas boilers with hot water heat transfer.

It is not uncommon to find window A/C units in older-style buildings that lack central A/C systems, Figure 25. These units may block access and egress from windows.

Figure 25: Window Air Conditioning Units are Common in 1940s-era Residential Buildings

Chimney (Ordinary)

The chimney in older mid-rise buildings usually originated in the boiler room and are of masonry construction. Individual apartments or office areas typically do not have fireplaces.

Older buildings with boiler rooms typically pump hot water throughout the structure to provide heat. These same buildings usually have window A/C units. Lacking central HVAC inherently reduces the amount of void spaces in these buildings.

Fire Protection (Ordinary)

Most residential mid-rise buildings have some type of local fire alarm and smoke detectors. Commercial mid-rise buildings typically have some form of monitored fire alerting system with smoke detectors. Mid-rise buildings may or may not have a standpipe system. If available, the riser may be located in the stairway or hallway.

Non-combustible Construction

Many mid-rise buildings, particularly with commercial occupancies, are of non-combustible construction (steel and concrete), Figure 26.

Figure 26: Non-combustible Commercial Mid-rise Building

Roof and Attic (Non-combustible)

The roof may consist of an insulated metal deck roof and/or concrete, with a weather barrier installed.

A common type of flat roof construction uses a metal Q-deck with a rubberized or tar and gravel top layer supported by steel bar joist, Figure 27. Newer or re-roofed buildings may have several inches of foam used for added insulation.

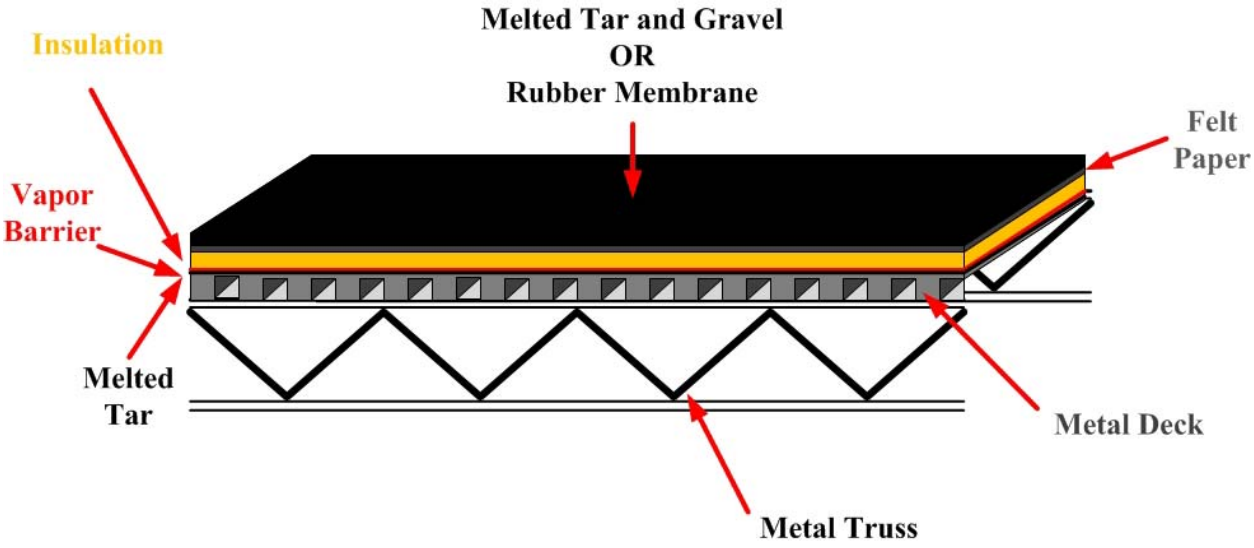

Figure 27: Metal Q-deck Roof Supported by Steel Bar Joist

Inherently, non-combustible buildings do not contribute to the fire load and have moderate overall resistance to collapse under fire conditions. The exception to that standard is the roof. As fire extends to the roof, the tar and rubber roofing and adhesive material are all heated. These hydrocarbon materials release combustible vapors that may ignite and spread fire under the roof area. This is commonly known as a running metal deck roof fire. The subsequent superheated atmosphere within the roof may cause weakening of the metal truss support system leading to collapse. Figure 28 shows a truss system losing its shape and glowing red hot. Unless cooling streams are applied in this situation, collapse is eminent. Firefighters should not operate directly above or below this area.

The underside of the metal truss system often has a spray-on fire resistant coating. If applied correctly, this coating may delay the affects of heat on the metal members. This coating may contain asbestos in older buildings.

Figure 28: Truss System Losing Shape and Glowing Red Hot

Exterior Walls (Non-combustible)

Non-combustible mid-rise buildings may be metal (Figure 29) or concrete (Figure 30) framed and have a brick, block, metal, or glass exterior sheathing.

Figure 29: Non-combustible Steel-framed Building

Figure 30: Non-combustible Concrete Building

Interior Walls (Non-combustible)

Interior walls are usually 2” x 4” metal studs with drywall. Some commercial spaces have open floor plans with cubical dividers.

Insulation (Non-combustible)

Insulation type and location varies greatly with the age and occupancy of the building. Modern buildings typically have insulation in both the attic and exterior walls. Insulation may also be found in interior walls adjacent to parking garages, storage rooms, or other non-climate conditioned areas. Insulation may also be used between occupancies as a sound reduction method.

Firewalls (Non-combustible)

Firewalls in non-combustible buildings are typically masonry. Newer buildings may use multiple layers of drywall to create a firewall. Many buildings will use drywall to create draft-stops in large, open void spaces such as the cockloft or drop ceiling areas.

Floors (Non-combustible)

Concrete floors are the most popular option for non-combustible buildings. In non-combustible construction the concrete flooring may be supported by steel or concrete columns. Steel rebar or tensioned steel cables are usually embedded in the concrete to add tensile strength, Figure 31.

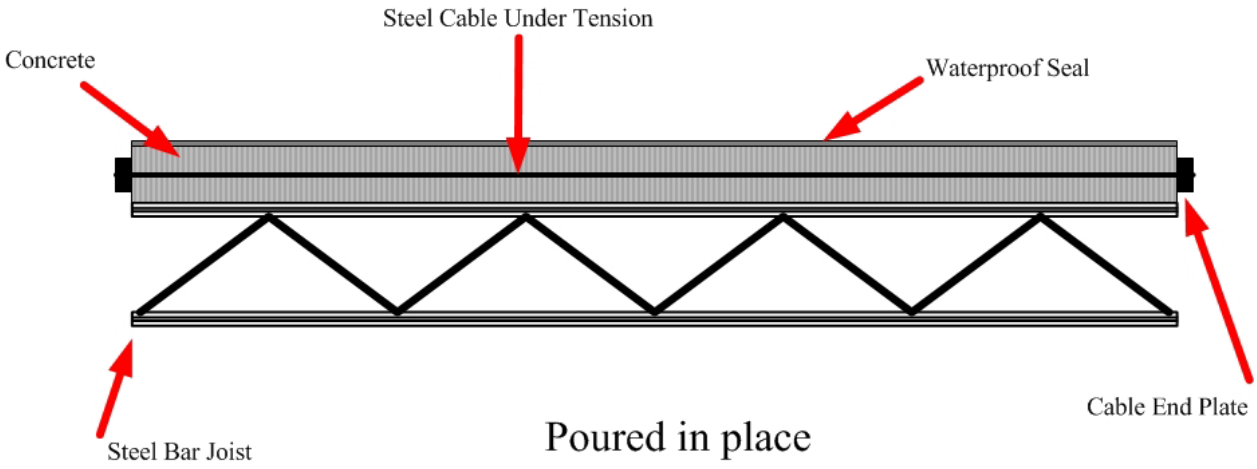

Figure 31: Tensioned Steel Cables Add Tensile Strength to the Concrete Floor

The steel bar joist system which supports the floors is usually protected by a drop or membrane-style ceiling in occupied living and office areas.

Basements (Non-combustible)

Non-combustible construction incorporates brick, cinderblock, or concrete basement walls.

Basements may contain any or all of the following:

- Residential occupancies
- Storage rooms
- Laundry rooms
- Electric and gas utilities for the entire building
- Commercial occupancies such as a hair salon, dry cleaner, rental/management office, restaurant, etc.
- Parking facilities

Basements may have a sidewalk stairway or sidewalk freight elevator access.

Basement fires are serious and labor intensive fires due to limited access, ventilation challenges, exposure to the rest of the structure, and potential for involving the utilities.

Basement, storage, and other non-living spaces may not have drop ceiling protection. In Figure 32, a steel I-beam supports a steel truss system which supports the concrete floor. A fire in this unsprinklered basement would represent a significant collapse hazard and should be noted in the preplan.

Figure 32: Note Significant Collapse Hazards in Building Preplans

Windows (Non-combustible)

Windows in many of the residential non-combustible mid-rise buildings are typical double hung or sliding glass types. Commercial buildings frequently use larger plate glass windows, most of which do not open.

Balcony (Non-combustible)

Balconies in non-combustible mid-rise buildings are usually concrete or metal.

Doors (Non-combustible)

Exterior lobby entry doors of commercial non-combustible mid-rise buildings are usually metal-framed tempered or safety glass. Older buildings may have plate glass. Side stairway, utility, and service entrance doors are usually metal.

Residential non-combustible mid-rise buildings are similar to commercial buildings using glass entry doors at the lobby and metal doors at service entry areas.

Interior doors are typically metal but some buildings use wood doors on the interior.

Stairs (Non-combustible)

The stairways in most non-combustible mid-rise buildings are metal or concrete. Accommodation stairways may also be found in these buildings. When an occupant leases or owns multiple floors, accommodation stairways may be present to allow occupants to traverse floors without using the building's public stairway, Figure 33.

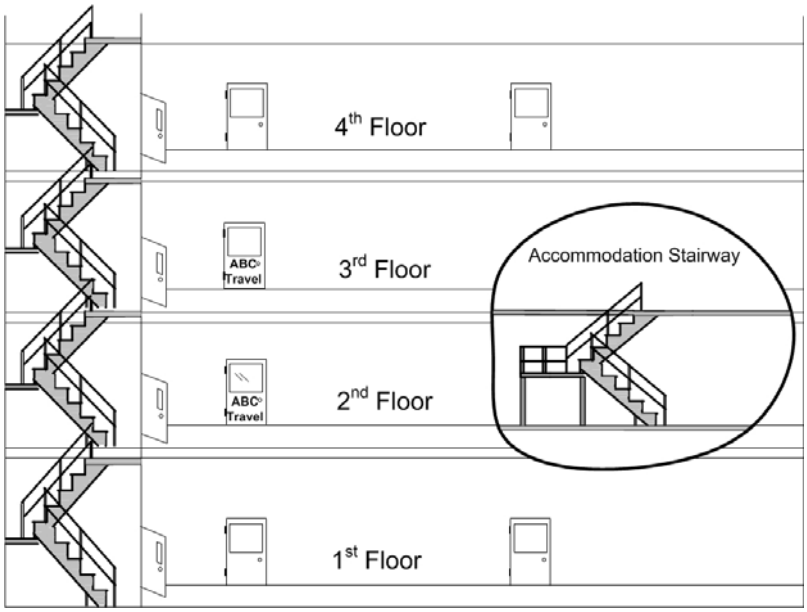

Figure 33: Accomodation Stairway

HVAC (Non-combustible)

Commercial non-combustible mid-rise buildings may have HVAC units on the roof, in the basement, or adjacent to the building. Residential buildings may have large central HVAC units similar to a commercial building or they may have individual HVAC units for each living space.

Chimney (Non-combustible)

Commercial buildings may have a chimney from the boiler room. They may also have chimneys or exhaust stacks for restaurant cooking. Residential units may also have a chimney from the boiler room.

Fire Protection System (Non-combustible)

Both commercial and residential buildings may have a wide range of fire protection systems based on the year of their construction and occupancy. Some of these older buildings may have nothing more than a local alarm (manual pull station) while newer buildings with commercial occupancies may have full sprinkler protection.

Lightweight Wood Frame Construction

To provide reductions in cost and assembly time, lightweight wood construction began replacing ordinary and dimensional wood frame construction in the 1980s and has continued throughout today.

Roof and Attic (Lightweight)

The attic is the area located above the ceiling and below the roof deck of a pitched roof, Figure 34. In a building with a flat roof, this space is commonly referred to as the cockloft, Figure 35. These void spaces present different problems depending upon when and how the building was constructed.

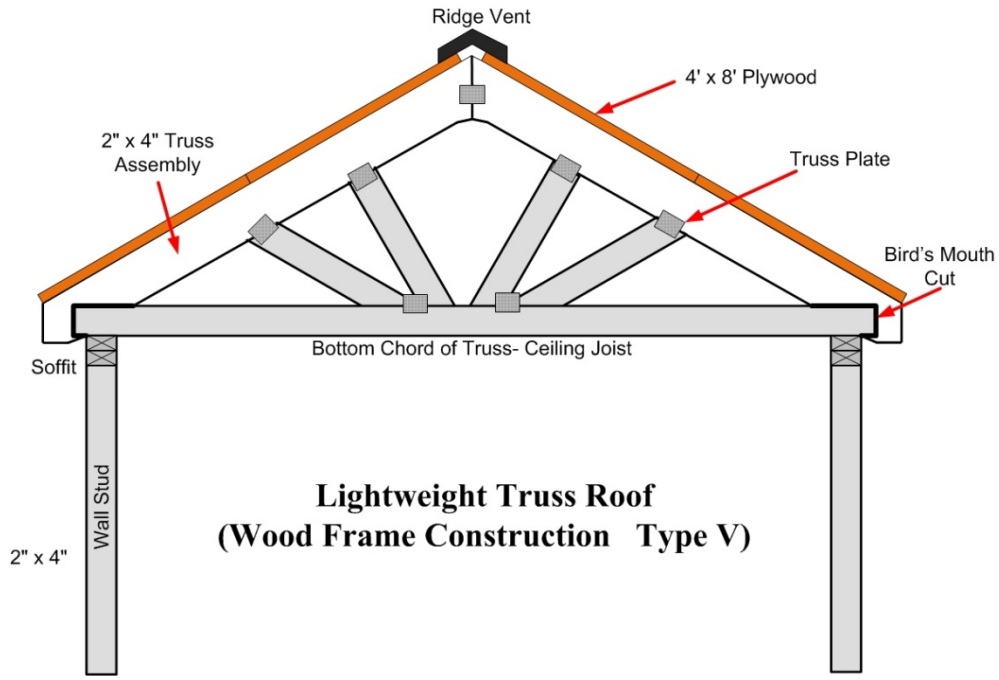

Figure 34: An Attic is the Void Space between the Ceiling and the Gable Roof

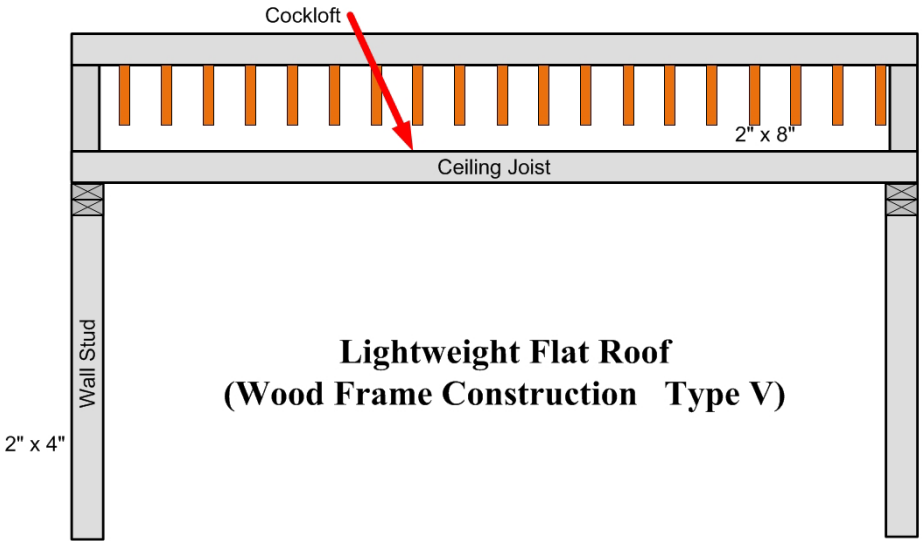

Figure 35: A Cockloft is the Void Space between the Ceiling and the Flat Roof

Dormers may be decorative or indicate that the attic space is utilized as a bedroom, office, or loft, Figure 36. Preplanning during the construction phase will provide companies with this important information.

Figure 36: Example of Dormer Windows

In buildings of lightweight wood frame construction, the roof is typically pitched with lightweight trusses, plywood, and shingles.

Attics, if present, are generally unfinished. Sometimes the space is used to hide HVAC appliances. Interior access is usually achieved through a scuttle or pull-down staircase located on the ceiling of the top floor. Some may be very evident from the hallway while others may be located in a utility closets or hidden from view by a drop ceilings. These pull-down attic staircases are rated to 250 lbs. and should not be used if exposed to heat. Firefighters should access the roof via a portable or aerial ladder and not an interior accessway.

Most attics are loaded with wooden structural members, which may or may not be protected by a sprinkler systems. When involved in fire, personnel should anticipate rapid fire spread and possible roof collapse.

In lightweight wood frame mid-rise buildings with large attics, draft stops may be required. Draft stops are typically gypsum or plywood and act as a partition to help slow the horizontal movement of fire. However, over time, these draft stops may be breached due to renovation or construction, reducing their effectiveness, Figure 37.

Figure 37: Breached Draft Stop

Knee walls may be found in units with lofts and dormers, Figure 38. Knee walls may contain hidden fire and must be opened to check for fire extension. Some dormers are cosmetic and do not indicate a knee wall, Figure 39.

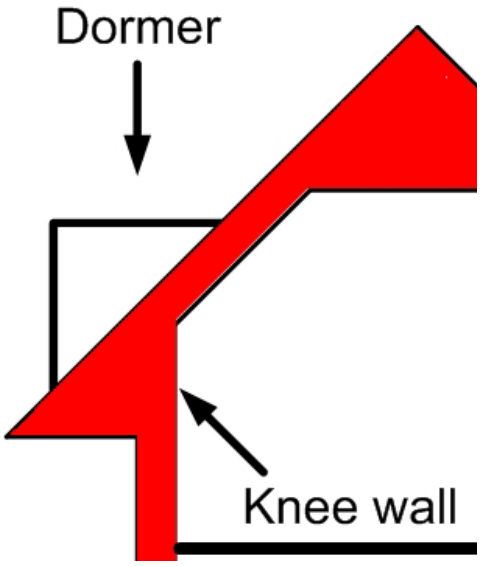

Figure 38: The Red Area Denotes the Void Space Present with Knee Walls

Figure 39: Companies should Inspect Dormer Windows while Conducting Building Familiarization to Determine if they are Cosmetic or Indicate Living Space

Exterior Walls (Lightweight)

Exterior walls are typically oriented strand board (OSB) covered in an insulating material which is covered by some type of siding, either masonry or a mix of both. Lightweight wood frame construction typically use the platform construction method, with wood studs built on a platform from the floor below, Figure 40. Heights of greater than three stories can be obtained using 2” x 6” wall studs on lower floors. New steel (weight-bearing) 2” x 4” and 2” x 6” studs may also be found in structures greater than three stories in height.

With the use of wide spanning trusses, interior columns, and girders, it is often difficult to determine the bearing walls within these large mid-rise structures.

OSB and insulation found under the vinyl siding may contribute to rapid fire spread on the exterior of the building. These types of fires often spread quickly to the attic and upper floors.

Figure 40: Residential Mid-rise Constructed Using the Platform Frame Method

Interior Walls (Lightweight)

Interior walls are 2" x 4" lumber or metal studs covered with gypsum or drywall. In three-story structures and larger, the first floor will be constructed using 2" x 6". Commercial occupancies may contain large open spaces with few interior walls and partitioned workstations, cubicles, etc.

Most residential ceilings are plaster or drywall while most commercial occupancies use the drop ceiling system. When commercial, utility, or storage areas have residential occupancies above, they typically have concrete or multiple layered drywall ceilings to provide the needed fire rating.

Insulation (Lightweight)

Insulation type and location varies greatly with the age and occupancy of the building. Modern buildings typically have insulation in both the attic and exterior walls. Insulation may also be found in interior walls adjacent to parking garages, storage rooms, or other non-climate conditioned areas. Insulation may also be used between occupancies as a sound reduction method.

Fiberglass insulation, being non-flammable, can help slow the spread of fire into the attic space around lights, wires, and other access points. Blown-in insulation, shredded and treated newspaper, or cellulose may smolder and rekindle.

Combustible insulation may be found behind exterior siding and contribute to the fire's intensity and the rate of fire spread. Fires of this nature may spread to the attic and upper floors rapidly.

Fire Walls (Lightweight)

Depending on when a building was constructed and which building code was in effect at that time, firewalls may be:

- Located between each address;
- Located between every other address;
- Located between the living spaces (occupied floors) only, with no extension into the attic or basement;or
- Non-existent.

There are two material types of firewalls:

1. Masonry (concrete block or reinforced concrete), generally found in older buildings.
2. Multiple layers of drywall.

Newer construction typically encompasses firewalls within the structure, with no extension through the roofline. However, the roofline may be offset at each address to separate the attic spaces.

Generally, personnel should be aware of the following:

- Firewalls may stop at the exterior bearing wall, leaving the soffit/ overhang unprotected.
- Firewalls may stop at the interior ceiling leaving the attic/ cockloft area unprotected.

- Firewalls might be penetrated or significantly compromised due to construction faults and/or renovations.
- Firewalls might be penetrated to allow the running of utilities.

The presence or lack of firewalls should be included in the building preplan.

Floors (Lighweight)

To achieve wider spans, builders often use wood, masonry, or metal columns to support a girder, Figure 41. The removal of these columns during remodeling or damage from fire has led to catastrophic collapse in past fires.

Figure 41: This Metal Column Supports the Overhead Girder

Steel girders and lally columns often support the floor from below. If the metal support system (I-beam/column) is exposed to fire for extended periods of time, a serious catastrophic collapse hazard exists.

Lightweight construction often uses parallel chord trusses or plywood I-beams. These trusses, or Ply-Is, are typically spaced from 16” to 24” on center, Figure 42. Due to their low mass, when exposed to fire they are prone to rapid collapse. They are often breached to run pipes, wires, and other service utilities. Breaching multiple floor joist creates a plane of weakness and allows for horizontal fire spread through the truss bays.

Figure 42: Plywood I-beams, Commonly Called “Ply-Is”

In lightweight construction the floor joists may run from side-to-side or front-to-rear. Floor joists directly exposed to fire present a rapid localized collapse hazard.

In lightweight construction, floor decking is typically plywood or OSB. Floor coverings include carpet, masonry tile, vinyl tile, hardwood, or other finished floor material.

Basements (Lightweight)

Many modern buildings rest on a concrete slab and avoid basements due to their construction cost. In lightweight wood frame construction, basements or below-grade areas are typically concrete including floors, walls, and often the ceiling.

Basements may contain any or all of the following:

- Residential occupancies
- Storage rooms
- Laundry rooms
- Electric and gas utilities for the entire building
- Commercial occupancies such as a hair salon, dry cleaner, rental/management office, restaurant, etc.
- Parking facilities

Basements may have a sidewalk stairway or sidewalk freight elevator access.

Basement fires are serious and labor intensive fires due to limited access, ventilation challenges, exposure to the rest of the structure, and potential for involving the utilities.

Basement, storage, and other non-living areas may not have drywall or drop ceiling protection, exposing structural members and leading to early collapse.

Windows (Lightweight)

Windows in residential mid-rises are commonly double-hung or horizontal sliding type. The glazing may be of single, double, or triple thickness. Commercial occupants may have double-hung, sliding, or fixed glass windows. Ground level commercial occupants may have large showcase-style glass.

Balconies (Lightweight)

Balconies are of three general types: cantilevered, recessed, and hinged. The floor of the balcony, its support system and the railings, can be constructed of wood, metal, concrete, or a combination.

Older, ordinary-constructed mid-rise buildings frequently used regular hinged doors on the balconies rather than the more modern sliding glass. In newer construction, balcony assembly doors are typically aluminum- or vinyl-framed, insulated tempered glass units that are either sliding or French opening.

Cantilevered balconies generally project out over the load-bearing walls; the balcony is open to the exterior on three sides and extends away from the building, Figure 43.

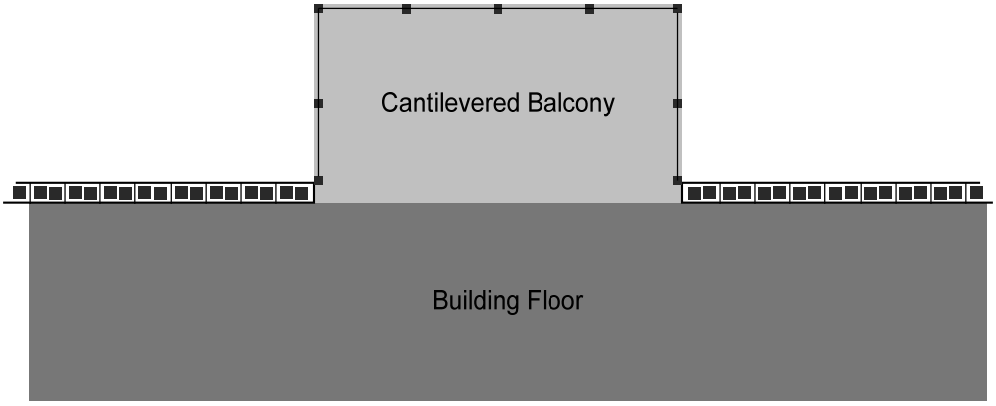

Figure 43: Cantilevered Balcony

Recessed balconies are supported on three sides by bearing walls; there is a railing between the two walls and the balcony is open on only one side, Figure 44.

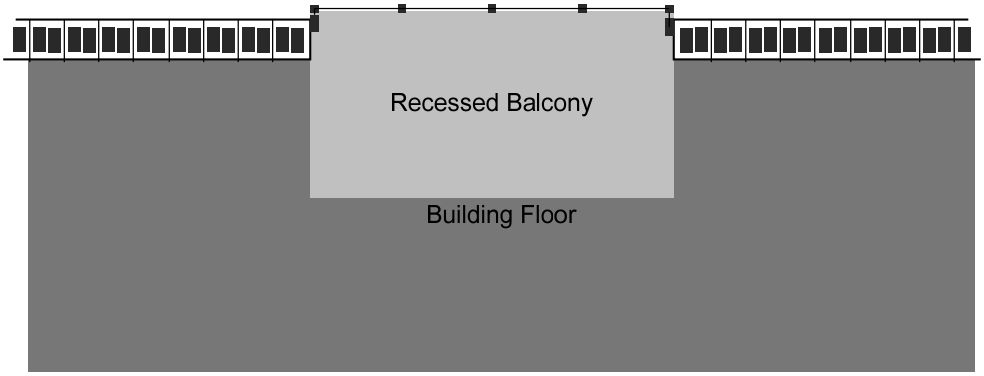

Figure 44: Recessed Balcony

Some corner units have hinged balconies which are supported on two sides by bearing walls and columns on the corner from the ground to the roof, Figure 45.

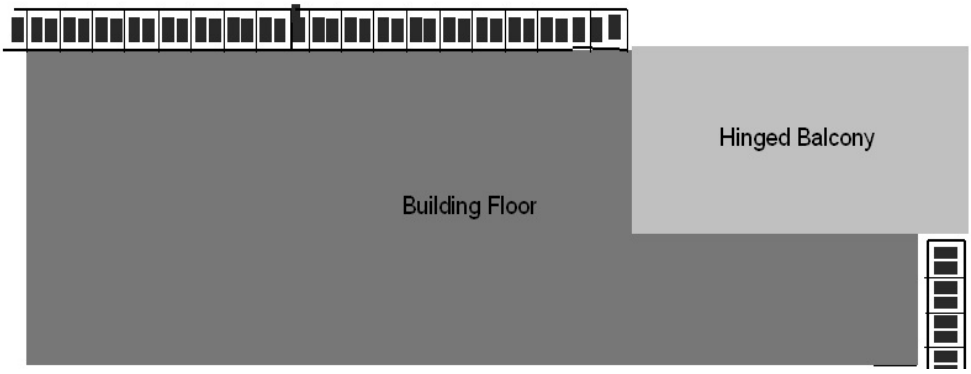

Figure 45: Hinged Balcony

Doors (Lightweight)

Most of the residential mid-rise doors found in Northern Virginia will be solid wood, wood covered in metal, or metal. Most will have a two-hour or greater fire rating.

Locks may be rim or mortise depending on the door. It is not uncommon to encounter multiple lock cylinders on one door. Commercial occupancies will typically have aluminum-framed tempered glass doors with mortise style locks.

Stairs and Stairways (Lightweight)

Mid-rises generally have one or more stairways. Stairways are usually enclosed with masonry or thick fire rated drywall with concrete or steel steps and risers, Figure 46. Most are not required to have stairway pressurization systems. They may or may not have fire department standpipe connections. Stairways with or without standpipes and roof access should be indicated in building preplans.

Figure 46: The Stairway is One of the Strongest Portions of the Lightweight Building

Some mid-rise structures may have two-level apartments. The stairs within these apartments are called accommodation or convenience stairs and will only serve that one individual apartment, Figure 47. These two-level apartments are normally found on the ends of the structures. Unless the arriving companies have prior knowledge of these multi-level apartments, they may mistakenly believe that multiple floors are involved.

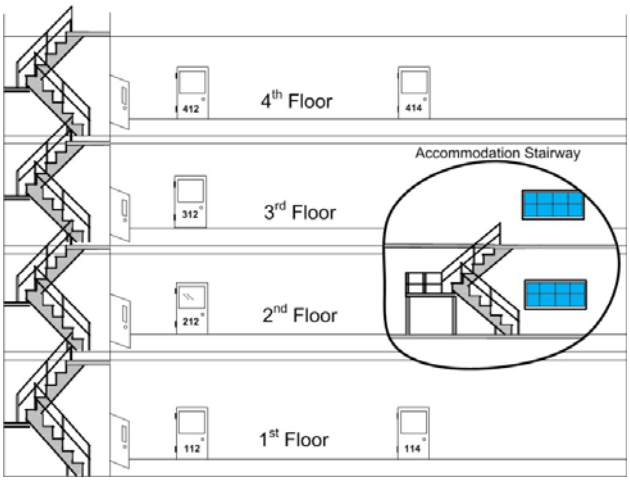

Figure 47: Accomodation Stairway

Certain stairways allow companies to access the roof and should be identified on building preplans. Roof top bulkhead doors, located over the stairway, provides direct stairway access to the roof, Figure 48. Other stairways do not provide direct stairway access to the roof; rather, companies must climb a ladder located at the top of the stairway, accessing the roof through a roof hatch, Figure 49. This hatch may be at the top of the stairway, top floor hallway, or hidden in a top floor closet.

Figure 48: Roof-top Bulkhead over Stairway

Figure 49: Roof Hatch Access to a Flat Roof

HVAC (Lightweight)

The HVAC may be large central units found on the roof or in the basement. In some buildings, each apartment may have an individual HVAC unit in a closet, commonly found on the balcony.

Chimney (Lightweight)

Many newer buildings, particularly residential apartments, will have fireplaces installed. Zero-clearance fire places are very common, Figure 50. Fire escaping a zero-clearance fire place and entering lightweight floors, walls, and attic spaces will present a serious fire and collapse hazard.

Figure 50: Zero-clearance Chimney

In these zero-clearance systems, the firebox is vented via triple-lined metal piping to the roofline or short horizontal piping directly to the closest exterior wall of the structure, Figure 51. These systems are especially common in lightweight construction.

Figure 51: Zero-clearance Chimneys Create Potential for Fire Extension

The presence of fireplaces and chimneys create a potential for fire extension. Improper installation or age may compromise the integrity of the components contributing to fire spread to surrounding combustible members.

Commercial occupancies, particularly restaurants, may have large cooking ventilators. These may vent out a side wall to the roof line or travel up the interior of the building to the roof line.

Garages (Lightweight)

Parking garages may be above or below ground, attached to the building, or in the middle of the building (donut-style), Figure 52. Fire protection systems may or may not be present. Doors from the common areas or stairways into the garage may be fire rated.

Figure 52: Parking Garage Access

Generally, there are two types of garages found in mid-rise structures. For a parking garage under or centered in the structure, depending on the age of the building, the garage may be sprinklered and have a wet or dry standpipe. The garage may be accessible for residents from inside the building by a stairway or elevator; one or both may be enclosed in a lobby within the garage, Figure 53. Mechanical, utility, and trash rooms or other service-related areas of the building may also be located in the garage area. A vehicle or contents fire in a garage may allow for rapid fire and smoke extension into other areas of the structure. The presence of a finished living area over the garage presents a serious life hazard.

Figure 53: Garage Access via the Interior of the Mid-rise Building

The second type of garage that may be found in this type of construction is a detached parking structure, ranging from freestanding multi-story garages, to individual parking garages or carports. These may or may not have fire protection systems.

Fire Protection (Lightweight)

Early, lightweight-constructed mid-rise buildings may have no more than a local pull station alarm system. Many newer buildings have a full complement of protection systems such as sprinklers, monitored alarms, and standpipes in the hallway or stairway. This information must be noted in the preplan.

Buildings may be completely sprinklered, partially sprinklered, or not sprinklered at all. If sprinklered, mid-rises of lightweight construction may have wet systems fed off of domestic water with no fire pump or a fire pump supplemented system. They may be equipped with a single 2½" or large diameter fire department connection (FDC), Figure 54.

Figure 54: Large-diameter FDC

Many buildings use NFPA 13R residential sprinkler systems. These sprinkler heads are designed to contain the fire but may not completely extinguish it. They are constructed using (usually orange) PVC plastic pipes.

Standpipes may or may not be present in mid-rises. The location of standpipe riser outlets in stairways can vary depending on the stairway type and location.

Depending on the floor area and stairway location, standpipe riser outlets may be located at midpoints in the hallways. Due to the level of protection provided by the stairway landing door, where feasible, preference should be given to using risers in the stairway. Personnel should refrain from using the riser located in hallway unless absolutely necessary.

Elevators (Lightweight)

Elevators in mid-rise buildings are normally hydraulic, but electric traction types may also be found. Control rooms for hydraulic elevators are normally found on the lowest floor while control rooms for electric traction elevators are normally found on the top floor or in the penthouse on the roof.

Some newer buildings have elevators that do not require a conventional elevator room. These elevators employ a flat belt design that allows the machinery to be mounted in the elevator shaft

and/or on top of the elevator car. For further information on elevator use reference the NOVA *Elevator and Escalator Emergencies* Manual.

Utilities (Lightweight)

Mid-rise buildings may be serviced by all standard utilities. In rental units, the service meters are usually combined for all occupancies into a single meter found in the basements or garage areas. In condominiums, each unit will normally have a separate meter, generally found in a utility closet or in a bank in the basement or exterior.

High voltage electrical vaults or gas meter rooms may be present anywhere in a mid-rise building. Firefighters operating in obscured visibility must be careful not to inadvertently enter one of these rooms.

Unlike older natural gas installations using iron pipe, newer gas lines are soft flexible metal that is readily damaged by the occupants and fire. By observing the gas meter, firefighters can detect the bright flexible yellow gas lines entering the building, Figure 55.

Figure 55: Flexible Light Metal Yellow Gas Pipe

HAZARDS

This section covers the wide variety of hazards that may be present during high-rise fires and emergency incidents.

Life Hazards to Occupants

There is the potential for a high loss of life during mid-rise fires, regardless of occupancy. Smoke will travel through stairways, utility shafts, or almost any vertical or horizontal opening. Smoke entering any floor will likely cause occupants to attempt self-evacuation. Victims are often found in a normal egress pathway (e.g., near windows, doorways, elevator lobbies, hallways).

It is imperative that personnel quickly identify and establish evacuation routes to enable the safe and orderly movement of building occupants to locations below the fire. Personnel should also consider that the best way to control occupants and maintain their safety may be to have them protect in place.Rather than a complete evacuation of the building, a protect in place strategy will evacuate only occupants on certain floors or areas and leave the remainder in place if not in hazard areas. This is done because large numbers of occupants moving down the stairs can pose a significant challenge to fire crews who are trying to move up the stairs. Firm direction from the fire department is crucial and should be preplanned and practiced prior to an emergency incident.

Fire Hazards

Mid-rise buildings have many of the same hazards associated with high-rise buildings, such as long hallways and hundreds of occupants, but, because of their relatively low height, mid-rise buildings may not have all or any of the fire safety equipment found in modern high-rise structures. It is common to find lightweight wood constructed mid-rise building without standpipes, sprinkler systems, HVAC control, a fire control room, communication systems, or stairway pressurization fans.

Mid-rise buildings may also have many of the same fire hazards associated with garden apartments such as large open attic/cockloft areas, utility shafts with void spaces, combustible exterior walls, and lightweight construction. These hazards may be exaggerated in a mid-rise due to the increased occupancy load and the larger footprint of the building. Interior vertical fire extension to the attic/cockloft or the apartments above is common in this type occupancy. Vertical voids, such as pipe chases in kitchens and baths, are one of the primary means by which fire extends. Vertical and horizontal openings allow smoke and fire to enter and attack the structure itself. Fire that has entered these voids will necessitate the opening of floors, ceilings, and walls. Fire in the void space will frequently extend to the attic regardless of the floor of origin.

Smoke spread is another serious concern. Many mid-rise buildings have common hallways similar to high-rise buildings which are several hundred feet in length. Relatively small fires, particularly on lower floors, can spread toxic smoke contaminating hundreds of apartments or offices.

Residential mid-rise buildings are considered to have a low fire loading. Fire flow estimates are based on a flow rate of 10 GPM per 100 square feet of involved area; 1¾-inch attack lines should be adequate for most single unit fires.

The fire load in commercial occupancies is considered moderate and requires a fire flow of 20 gpm per 100 square feet of involved area. If a fire occurs in a commercial occupancy, engine companies may be paired up to use a 2½-inch attack line. Another option would be to operate two 1¾-inch lines side-by-side. This requires the same amount of personnel, but provides greater flow and maneuverability.

The presence of combustible siding and insulation in newer construction can greatly affect fire spread and create an exterior exposure problem. When an exterior fire is encountered on arrival, a quick knock down of the fire from the exterior must occur prior to enetering the building to slow the spread of the fire.

Vertical fire extension can occur by several means:

- Fire lapping out of windows and extending into windows above;
- Fire extending upward through unprotected or compromised void spaces;
- Fire extending upward through holes created by the fire;
- Fire extending upward within a unit that occupies more than one floor and has an accommodation or convenience stairway; and/or
- Exterior fires originating from a patio, balcony, vehicle, electrical transformer, flammable liquid, etc., can spread upward into the building and attic.

The presence of interior void spaces may also contribute to fire spread. Vertical and horizontal openings allow smoke and fire to enter and attack the structure itself. Fire that has entered these voids necessitates the opening of floors, ceilings, and walls.

Collapse

Buildings of ordinary and wood frame construction tend to resist collapse better than lightweight wood frame buildings. Once the roof and interior wood floors burn away, exterior masonry walls become unstable cantilevered walls and are subject to collapse. Personnel must remain cognizant of the collapse hazard and monitor the structure accordingly.

Historically, non-combustible concrete buildings can withstand a significant amount of fire without the fear of collapse. However, modern lightweight concrete construction is much thinner. Fire rapidly spalls the concrete exposing the vital metal reinforcements where the concrete receives its tensile strength. Firefighters should expect modern lightweight non-combustible concrete structures to collapse, unlike older concrete buildings that can withstand longer burn times, Figure 56.

Figure 56: Lightweight, Non-combustible Concrete Floor that Collapsed Early in a Fire (View from Below)

Lightweight wood frame construction is subject to early failure and has two distinct factors with regard to the potential for collapse:

1. The presence of lightweight trusses AND
2. Fire entering the void spaces degrading the wooden structural members.

As mentioned earlier, HVAC equipment, heat pumps, and water heaters are often located in the attics of mid-rise buildings, Figure 57. A/C units are also being installed on the roof areas over the common stairways. This additional loading on the trusses and roof assembly can contribute to early collapse.

Figure 57: HVAC Unit in the Attic

Partial collapses are not uncommon and personnel should be prepared for this occurrence. Veneer masonry walls may collapse completely or be left standing in a dangerous, unsupported position. The use of dormers and cross gabled roofs also increases the collapse potential.

Other Hazards Found in Mid-rise Buildings

Vertical Shafts

Utility shafts often run the entire height of the building. Fire or smoke entering these areas can be expected to travel upward or downward. In particular, fires involving vertical shafts originating in commercial occupancies on lower floors pose a significant threat for vertical fire spread.

Unfortunately, open shafts have led to serious injuries and firefighter fatalities. Extreme caution must be exercised when visibility is significantly reduced or non-existent.

Laundry, Mail, and Trash Chutes

These building features exist for the convenience of building occupants. However, they also provide an unobstructed path for smoke movement and fire extension and may or may not be protected by sprinklers. Smoke may be reported on a floor far removed from the actual location of the fire, which is most likely in the basement or first floor loading dock area.

An additional problem with trash and laundry chutes is the possibility of a bag of burning trash or laundry becoming suspended in the shaft, Figure 58. If this occurs at or below the access door to the shaft, fire could enter the floor area if the door is opened to investigate. Personnel should check the trash chute doors on each floor to determine the location of the obstruction. An effective suppression method for chute fires with an object lodged along the chute is to drop a heavy object from a level higher than the lodged object. The burning object will become dislodged and travel down to the end of shaft so it can be extinguished and removed. Communication is paramount for this operation to occur safely. Firefighters should **never** insert their head or other body parts into the shaft for inspection.

Figure 58: Trash Chute

Dumpsters and Compactors

These containers can be a particular hazard when attached to or inside the building. Often, trash chutes allow rubbish to be deposited from any floor level and the shaft leads directly into the dumpster or compactor, Figure 59. Smoke from a fire in such a container can contaminate a large part of the building with smoke and toxic gases. While the possibility for fire extension exists, smoke and gas emanating from the chute into the structure is the greatest concern. Firefighters should disconnect the compactor power, disconnect the dumpster from the building, and extinguish the fire. In some situations, pulling the dumpster away from the building may be necessary to complete extinguishment and overhaul of the dumpster. Some dumpsters have a 1½-inch outlet for drainage, which may be used for fire suppression if it has the proper threading.

Figure 59: Many Trash Chutes Exit into a Dumpster or Compactor

Hazardous Storage

Storage rooms may be present anywhere in the building. They may contain flammable or hazardous materials and may be inaccessible from the exterior. Storage room locations should be indicated on building preplans.

Renovations/Alterations

It is not uncommon to witness an entire building being updated with modern conveniences. During these renovations, void spaces and utility shafts may have been added and some of the building's original structural components may have been altered or removed. This can significantly contribute to the rapid spread of fire, which may result in collapse.

Parking Garages

Many mid-rise buildings encircle a parking garage, Figure 60. This relatively new design has been nicknamed the donut style. Other mid-rise buildings may have vehicle parking garages under them or attached to one or more sides. In many cases, a doorway directly connects the occupied living areas with the vehicle parking areas. Although normally a fire-rated door, it is not uncommon to find the door propped open with a chock. A relatively minor vehicle fire could spread large amounts of toxic smoke into the stairways, hallways, and occupied areas of the building.

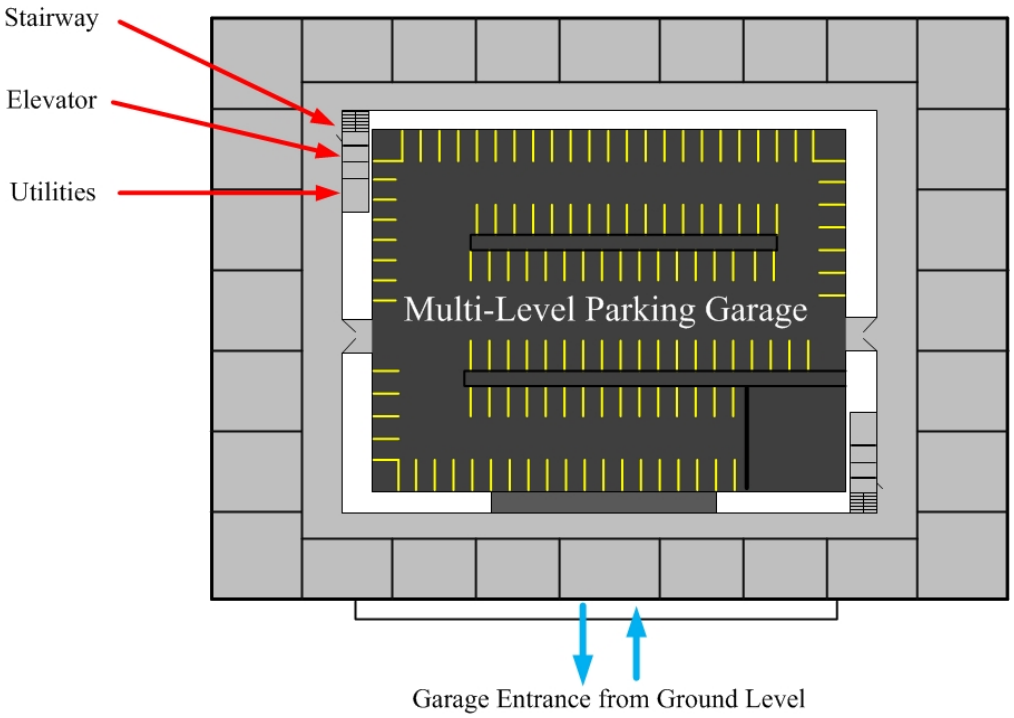

Figure 60: Donut-style Buildings Encircle the Parking Garage

FIRE OPERATIONS

The acronym RECEO-VS is an easy way to remember incident strategies:

- Rescue
- Exposures
- Confinement
- Extinguishment
- Overhaul
- Ventilation
- Salvage

Note: Some structures, because of their unique construction, design, location, and layout features will lend themselves to the use of high-rise firefighting tactics rather than those recommended for mid-rise buildings. The key to this decision-making process is aggressive pre-planning so that personnel are familiar with the structures in their response areas.

It is incumbent on the first due engine company officer to communicate via the radio if the building is or is not equipped with a standpipe system. If the building has a standpipe system an engine company shall supply the system. The supplying of the standpipe system must occur regardless of whether the initial hoseline is deployed from the engine company or off of the standpipe.

If the first due engine company officer makes the tactical decision to deploy the initial handline from the standpipe, a declaration via the radio must be made for all responding personnel to assume their respective high-rise assignments. If the decision is made to use high-rise assignments, the officer should request an additional engine company.

Life safety and the location of the fire will drive the tactical decision-making process. Determine the fire floor from the dispatch information, information gathered from building occupants, obvious smoke or fire showing from the structure, and by checking the annunciator panels or fire control room indicators (if present).

Units must investigate to verify the exact location of the fire, including the specific location on the fire floor and the extent of fire involvement. It is critical that personnel correctly identify the lowest floor/level of fire involvement.

If necessary, evacuation of the immediate fire area may be needed as well as facilitating movement of people already in the stairways. Size-up may also indicate that control of occupants will best be accomplished by protecting in place.

Due to the high degree of compartmentation in residential mid-rise buildings, fires are less likely to involve the entire floor. Even though compartmentation helps control fire spread, extreme caution must be exercised when advancing down a hallway as fire can move rapidly down a corridor if an entrance door to an involved occupancy is open.

Exposure protection not only involves checking the floor above, but also requires companies to be assigned to check areas extremely remote from the fire floor. Fire and smoke can extend via hidden voids and break out several floors away from the original fire.

Ventilation, forcible entry, and fire attack must be coordinated. A significant fire may be present on a floor that has confined itself to that floor but also prevented any heat and smoke from venting to the outside. When entering a reported fire floor, units should proceed cautiously.

Forcible Entry

The purpose of forcible entry is to gain access to perform primary search, advance attack lines, and check for fire extension. Hydraulic forcible entry tools are effective on inward opening metal doors in metal frames. Conventional forcible entry tools are preferred for any door set in a wood frame. Both door/frame types may be present so knowledge of the response area buildings is paramount when deciding upon the correct tools for the forcible entry challenges you will face.

Keep in mind that commercial occupancies may have additional security features that make forcible entry more difficult. Storage rooms and ground-level apartments may be secured with barred windows and doors. Units may have more than one entry door. Occupants may block the door with furniture or it may have been covered from the interior with drywall. Additionally, cypher locks and automatic/magnetic locks may be present based upon the type of occupancy, such as a government facility. These types of locks may be present throughout the entire floor space of the structure and not just the main entry door.

If the engine company arrives prior to the truck or rescue, personnel must be prepared to force entry into the fire unit.

Occupants may sublet a bedroom(s). It is not unusual to find padlocks on bedroom doors inside the occupancy.

Initial Attack Line

If the building is equipped with a standpipe, personnel may use the standpipe packs to deploy attack lines, Figure 61. Once the exact location of fire is determined, the attack will normally begin from the stairway closest to the fire that contains a standpipe. Conditions and the location of the fire will dictate whether the standpipe connection is made on the fire floor or on the floor below. The stairway used for fire attack shall be designated as the *attack stairway* and conveyed to command.

Fire location will determine whether the initial attack line is stretched from the engine directly to the fire area or from a standpipe, if available. Companies may consider using other means (a balcony, window, or patio) for advancing line(s) to the fire.

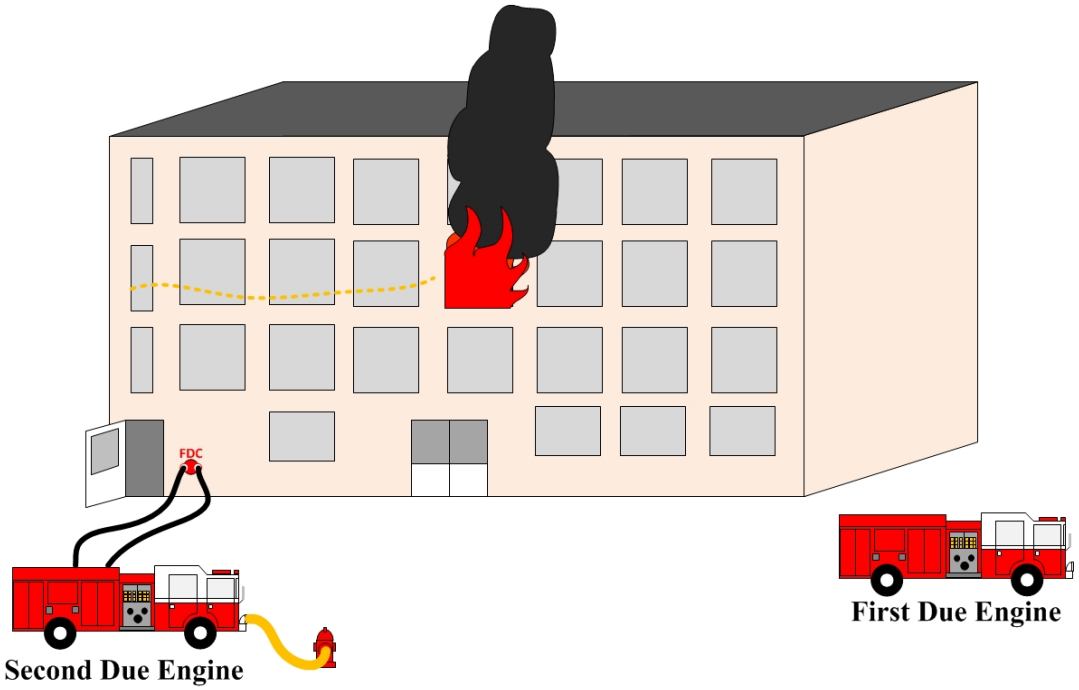

Figure 61: Standpipe Used for Fire Attack

For fires that are located below grade, or on the first, second, or third floor, personnel may choose to stretch pre-connected lines from the engine, as they are faster to deploy and place in service. Often, the engine can be positioned at or near an entrance that provides quick and easy access to the fire, without taking the time to find and connect to a standpipe inlet. Personnel must know the location of the fire prior to committing to pre-connected hoseline stretches; ideally, when smoke or fire is visible to the exterior from a specific window, Figure 62. Whenever the stretch will be made from the apparatus and not the standpipe, this must be communicated to other units and command. Also, when this tactic is employed, the engine operator must remain at the pump panel rather than abandoning the apparatus and assist with standpipe operations on the fire floor.

It is imperative that the standpipe system still be supplied, even if the initial attack is made with handlines stretched directly from the apparatus, Figure 63. Later, hoselines may be deployed from the standpipe if needed. All other roles and responsibilities outlined in this manual shall be assigned regardless of how the initial handline is deployed.

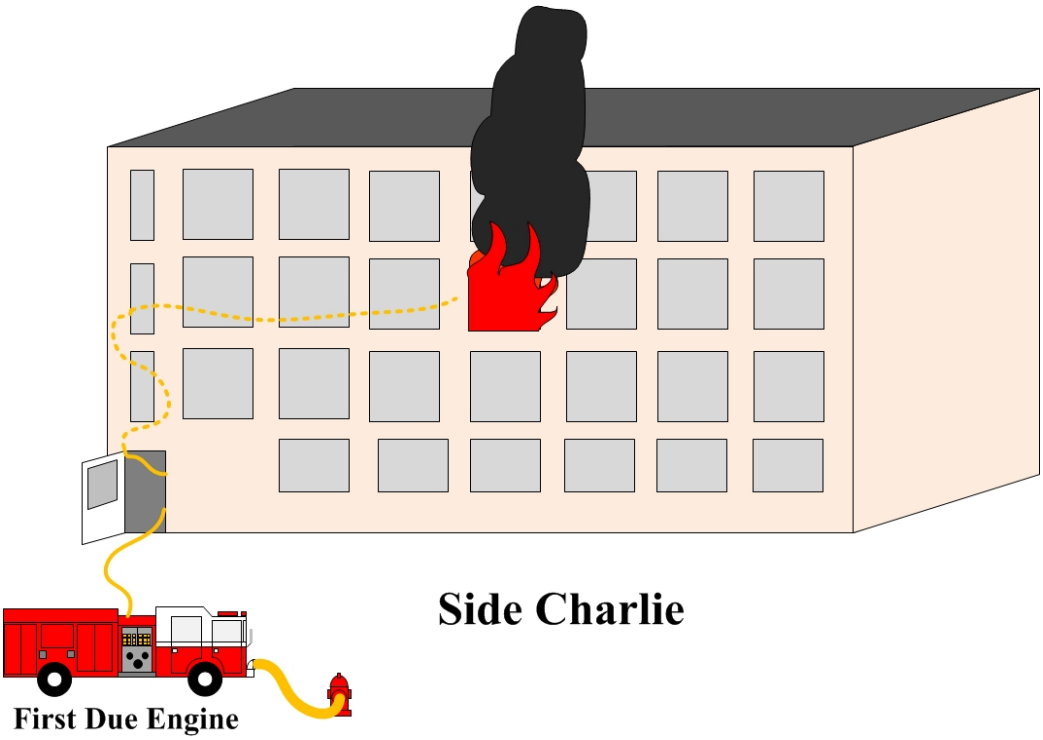

Figure 62: Direct Access to the Fire Via Deployment of Pre-connected Lines

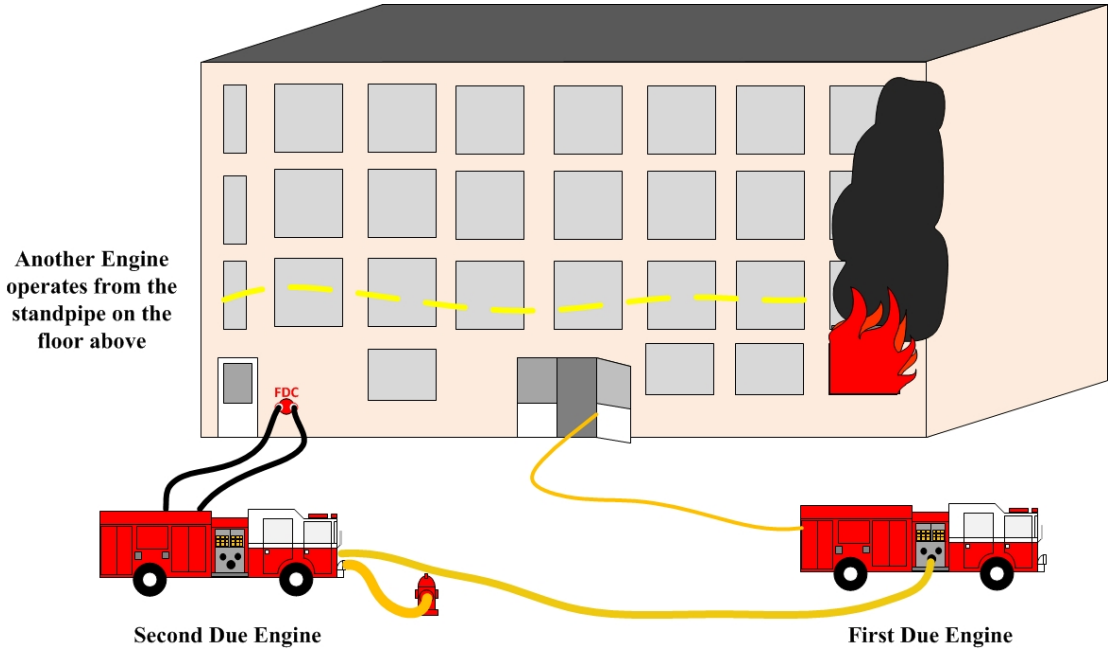

Figure 63: Standpipe Connections Must be Supplied Regardless of the Attack Method

In buildings without standpipes, companies must pre-plan their attack operations. Personnel may need to use leader lines or hoist lines up the exterior with ropes or over ladders, Figure 64. Depending upon the volume and location of the fire, personnel should consider the use of the pre-piped aerial waterway and perform a quick knock of the fire.

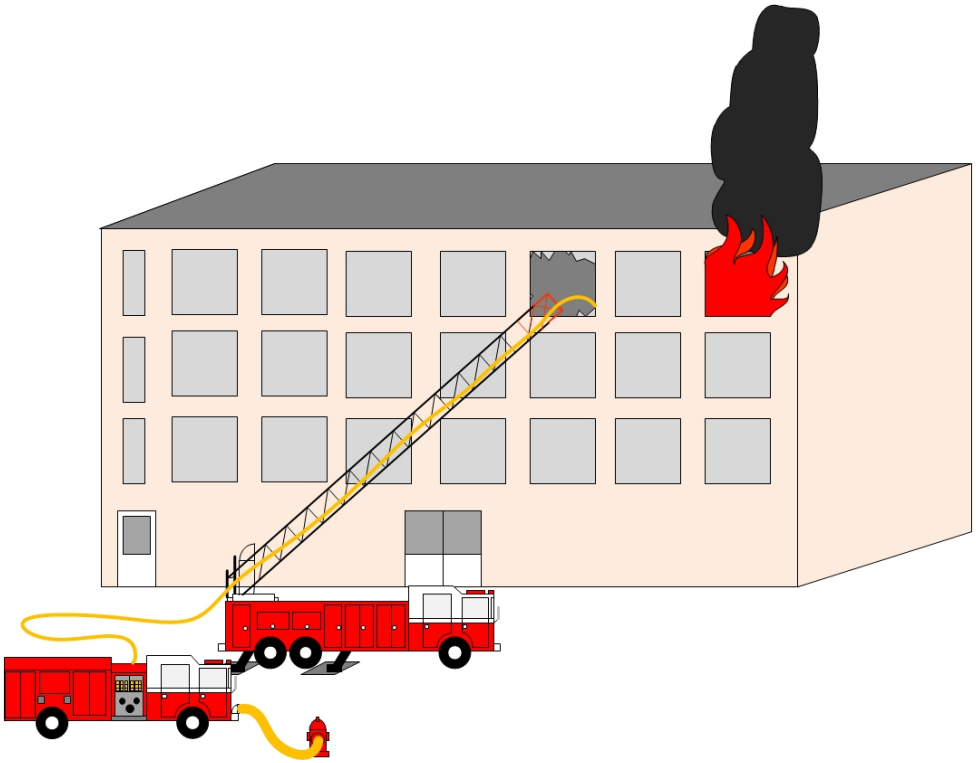

Figure 64: Leader Line Deployed up the Ladder for Structure without Standpipe

In most cases, the initial hoseline will enter the fire unit from the public hallway. Several alternatives for entry include:

- In the involved unit at ground level through a patio door.
- In the involved unit over a ladder and onto the balcony.
- Via a rear entrance.
- Through an adjoining unit to gain access to the involved unit.
- Through a large window.

In residential mid-rise buildings, all floors above the first floor normally have an identical layout and floor plan. Companies must inspect the floor below the fire floor to learn the layout prior to entering the fire floor. This is only practical if the fire is located on the third floor or higher, as the first floor (and lobby) often has a different layout than all floors above.

Second Line

The second line should be of sufficient length to reach the location of the initial attack line or area above, if necessary. The second-due engine company will usually be responsible for deploying this line and shall make sure the initial hoseline on the fire floor(s) is in place and making progress.

Before committing to the position of the initial line, the second line's crew should check the basement or floor(s) below the fire to ensure the fire did not originate below the unit where smoke or fire is evident.

The second line must be capable of equal or greater flow than the original line. The need for advancement will be determined by the progress of the initial attack line.

Line Above the Fire

There are two purposes for the line above the fire. The first is to protect the company performing the primary search of the floor above and the second is to extinguish any vertical extension.

The line assigned to the floor above the fire in these types of structures will generally be the 1¾-inch line, allowing for speed, mobility, and fire flow.

This line should be of sufficient length to reach the area above the fire and into the attic or cockloft, if required. Often the third-due engine company will be responsible for this task. The location from which this line is deployed will be determined by the Incident Commander or the assigned unit officer.

Exposure Lines

The purpose of the exposure line(s) is to prevent or extinguish fire spread into any exposure and to prevent exterior spread or auto-exposure.

Areas to be checked include the attic/cockloft, basement, and the surrounding units. A hoseline shall be available for this task. The 1¾-inch line is normally sufficient for this task because of its flow and mobility. The company officer shall ensure that it is of sufficient length.

Narrow fog streams are more efficient in exterior exposure protection. The narrow fog offers moderate reach, additional surface area coverage, and is not as damaging to the structure as smooth bore nozzle streams. High wind conditions will negatively affect fog streams; the officer and nozzle person must assess conditions and deploy/adjust the stream accordingly.

With limited access to many of these buildings, the rapid deployment of master streams will be difficult. An effective tactic is to rapidly deploy a mobile ground monitor or handline to the affected exposure and begin cooling the building while other crews set-up a master stream.

When buildings are closely spaced, the streams deployed for exposure protection may be used for fire control as well, Figure 65. Working the stream back and forth from the burning building to the exposure can be effective.

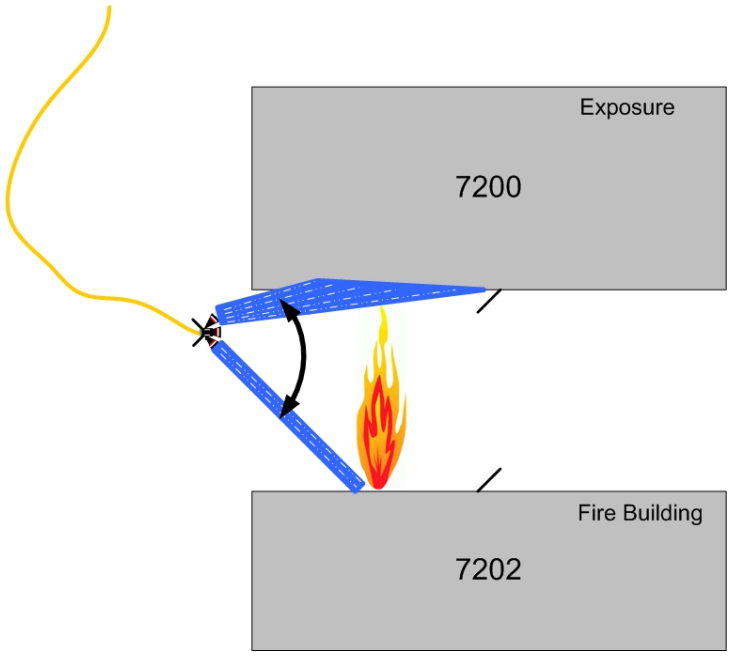

Figure 65: Using Ground Monitor for Fire Attack and Exposure Protection

Even when operating outside of the collapse zone, due to high radiant heat it may be necessary to apply cooling streams to firefighters, apparatus, and exposures.

Basement Fires

Basements may contain occupied living/working spaces and service areas such as laundry rooms, utility rooms, storage areas, and elevator control rooms. Utility rooms may contain numerous electrical and gas meters. As such, mid-rise basement fires may involve a combination of electrical and combustible liquids. A priority would be to shut the power down and consideration should be given to attacking the fire with foam lines and dry chemical extinguishers.

There may be multiple access points to the basement. Because of this, officers must ensure that they do not flow attack lines in opposing directions.

Where an exterior door to the fire area is accessible, officers should consider initiating the attack through that door in order to prevent smoke, heat, and fire from entering the common hallway and potentially trapping the remaining occupants in their units. Before initiating fire attack, personnel must confirm that the door from the fire unit to the public hallway is closed.

In buildings without exterior basement access, attack line deployment may require an advance down the interior stairway/hallway into the involved area. Firefighters should realize that opening the doorway from the involved basement area will contaminate the stairway/hallway with smoke and heat.

Fires in below-grade areas are difficult to ventilate with much efficiency or speed. This being the case, the stream for the attack must be a solid or straight stream. Use of a fog stream in advanced

fire situations may lead to burn injuries to the attack crew or the attack crew being driven out of the area.

When fire has taken possession of a large area in a basement completely underground, personnel may consider employing a defensive, indirect attack introduced from the exterior or inserting a cellar nozzle from the floor above. The door(s) between the basement and the common area(s) must be located and closed. When using this tactic, the attack line should change to a fog stream. Coordination/notification to other companies on the scene is essential to prevent entry into the basement until initial knockdown is complete. Once initial knockdown is complete, a line should enter from the stairway to effect final extinguishment.

Garage Fires

Access to some parking garages may be hindered due to metal security gates, Figure 66. If there is no Knox box allowing access, these gates can be disengaged manually at the motor, if accessible, or cut with a saw. During size-up, the interior of the building must be assessed to determine if fire has spread to the living area. If fire has spread to the living area, the attack should begin from there. The objective when attacking fires that originate in an attached garage is to confine and extinguish the fire from the unburned area of the structure, secure the overhead door in the open position, and prevent extension of the fire to the living area. A second hoseline must also be advanced through the closest hallway connecting the garage to the building to prevent extension.

Figure 66: Mid-rise Parking Garage Secured with Large, Metal, Automatic Gate

The garage may be located under or adjacent to a living area. The need for quick assessment of extension into the living area is imperative. The attached garage fire has the potential to extend to adjoining floors. It is crucial for companies to check these areas and have charged hoselines ready to support them. Companies operating in this area should be cautious, as the fire below may compromise the floor system supporting them.

Operations may commence from a standpipe (if equipped), using a pre-connected hoseline, or lowering/ hoisting a hoseline from/ to an upper floor.

- Companies can use the FDC and standpipe for fire attack but this option is the slowest and least desirable for above grade floors, Figure 67.
- Pre-connected hoselines can be stretched directly from the engine company, as this is often the quickest method of placing attack lines in service, Figure 68. The FDC must still be supplied.

One of the fastest ways to advance hoselines to above grade floors of a parking garage is to use a portable to use a portable ladder or the garage stairway to asecend and either lower hose down or hoist hose up with a hoist hose up with a rope,

- Figure 69.

Regardless of the methods used for hoseline advancement, communicate these tactical decisions to command. Consider using a tagline and other available tools (i.e., thermal imager) to locate the fire before committing hoselines to a specific location.

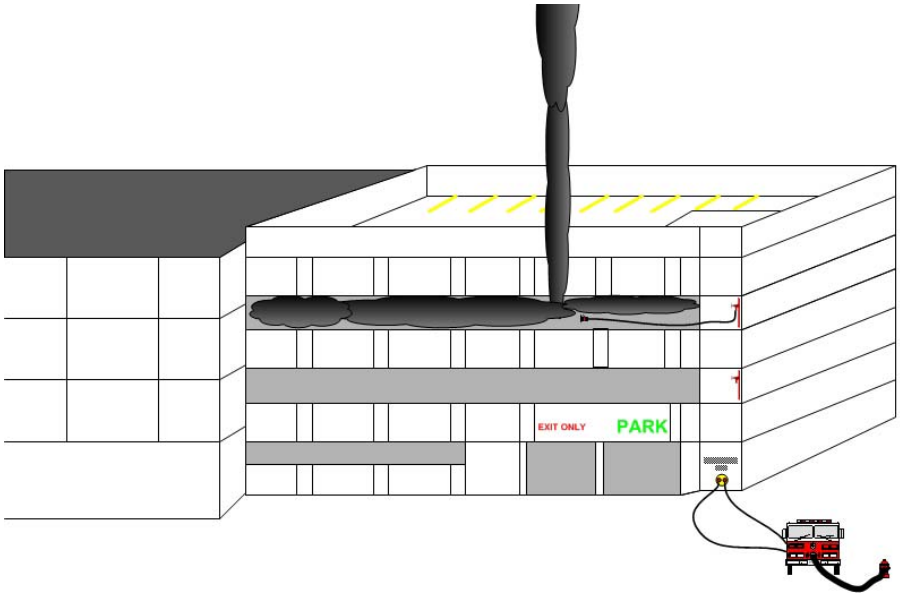

Figure 67: Standpipe Use in Parking Garage

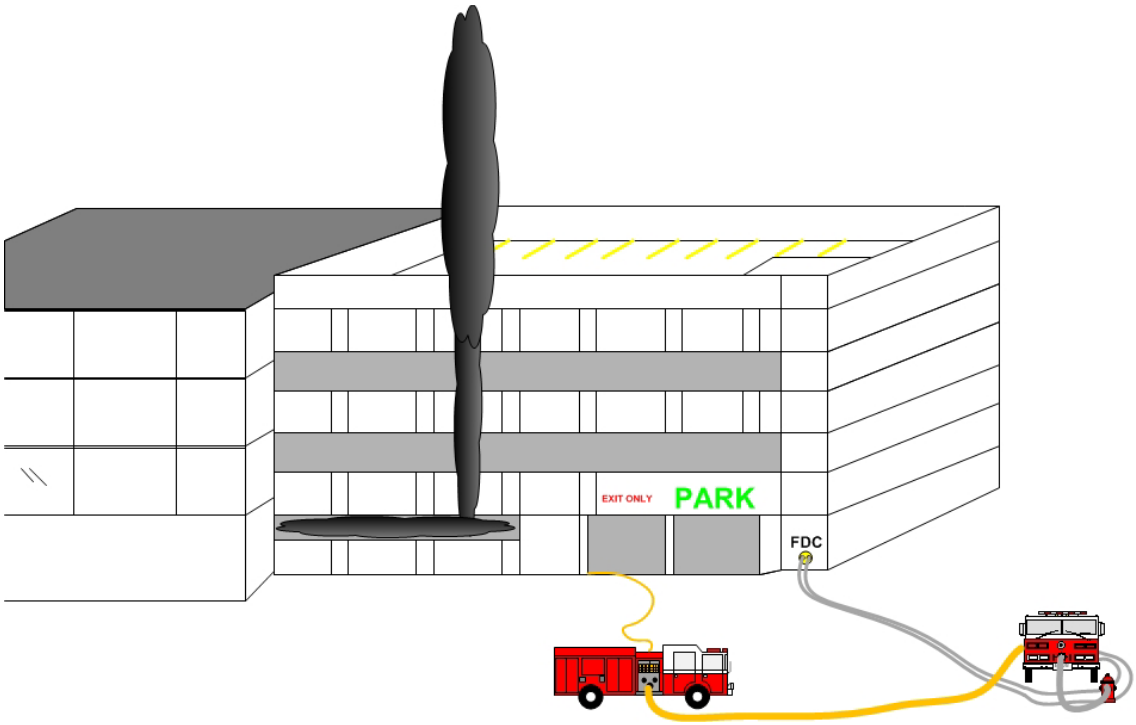

Figure 68: Pre-connected Hoselines Deployed in Parking Garage

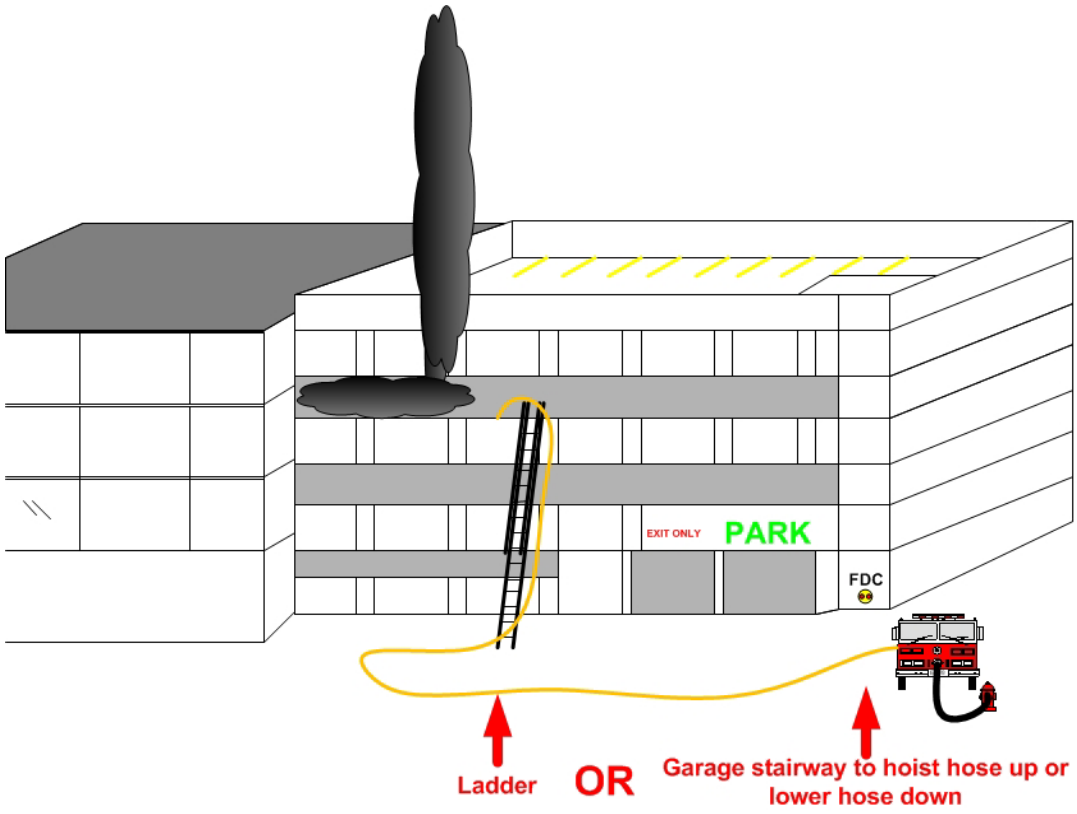

Figure 69: Use of Portable Ladders in Parking Garage

When entering through an overhead exterior garage door, whatever the size, secure it in the open position to maintain the means of egress for crews. Securing may consist of removing power, chocking open with locking pliers (Figure 70), bending the track (preferred), or pulling the manual release to disengage the motor. Use caution if the fire has compromised the door/ track assembly. If this has occurred, the entire door and rail assembly could collapse on firefighters operating underneath it.

Figure 70: Securing an Overhead Door Using Vice Grips Placed High on the Track

Attic Fires

Attic fires often result from vertical extension through void spaces (Figure 71) and/or exterior fire spread. Fires that originate in the attic are typically caused by equipment located in the attic (such as HVAC equipment) or lightning strikes. Many top floor units have cathedral ceilings. These ceilings can be greater than 10 feet in height. Fire may easily spread to other areas of the structure due to the amount of built-up roofing materials above the ceiling in older construction.

Figure 71: Cockloft Void Space

Some mid-rise attic fires can be managed from the interior. Crews should be sent well ahead of the fire to remove the ceiling and directly attack the spreading flames. Personnel must be cognizant of collapse hazards due to exposure of structural members to fire, lightweight construction, over-sized decorative dormers and cross gables, water heaters, and HVAC systems in the attic along with double-layered drywall. The officer must recognize these hazards and make a reasonable risk assessment.

Crews should use an attic scuttle or poke a small hole for placement of the nozzle and flow the fog pattern for several seconds. The fire should darken down through steam conversion (if the attic has not been vented). The interior officer should request a report from the exterior for observation of steam production. Depending on the amount of water used, the ceiling can become saturated and collapse into the living area. During attic-only fires, primary search and aggressive salvage operations should be considered prior to pulling the ceiling.

If the attic fire has vented through the roof, companies should get ahead of the fire, access the attic area, and place the nozzle inside the attic, using a straight stream or narrow fog pattern to extinguish the fire.

In situations where fire is visible from the soffit area, personnel should first perform a quick sweep of the soffit and eave line with a hose stream. Steam conversion drawn into the attic area can help slow fire advancement before an attack on the seat of the fire.

In those instances where elevated master streams are required, streams should be directed through or at the top-floor level, into the involved space. Avoid flowing streams down onto the roof, as roofs are meant to shed water. This method will not only fail to extinguish the fire, but may collapse the roof. Also, personnel in the affected area must be relocated to a safe area within the structure prior to initiating a master stream operation.

Large Volume Fires

If a large volume of fire is encountered, it may be appropriate for the first arriving officer to address the most severely threatened exposures immediately after life safety concerns are addressed. It may be necessary for the first engine company to perform a holding action or a quick knockdown on the unit(s) of origin by using the engine company’s deck gun.

An elevated stream may be required for extinguishment of large volume fires; if a tower ladder is not on the assignment, consideration should be given to requesting one. Officers shall keep this in mind while positioning apparatus and addressing associated water supply requirements. If the fire building has an adjoining exposure, the Incident Commander must position another aerial device to stop extension. An additional water supply will be required.

Before any water is allowed to flow from a master stream, all personnel operating in the involved area must be relocated and accounted for in a safe area. This does not mean the entire structure is evacuated, just the area where the master stream is operating.

The most effective means of directing the flow from elevated streams is from the tower bucket or ladder tip, Figure 72. A crew member should to be assigned to a safe position to supervise the effectiveness of the stream. Streams can send debris to the area opposite from the apparatus position. This may pose a serious safety hazard to crews operating on the exterior of the affected side.

Figure 72: Tower Ladders Provide the Most Effective Elevated Streams

Ventilation

The three basic ventilation tactics used in mid-rise buildings include: horizontal, vertical, and mechanical.

Ventilation of the fire unit, fire floor, and the unit above are high priorities. A primary goal is the removal of smoke and heat from the public hallways early in the operation to assist with crew safety and safe occupant removal. When crews enter the fire area for a primary search, they should control door they enter to cut off the path of the fire to their location. Additionally, they should remain vigiliant of fire conditions along with location of secondary egress points. If the tactical decision is made to to search above the fire, searching personnel should strongly consider advancing a hoseline with them.

Ventilation is most often accomplished horizontally via windows and balcony doors.

Observation of smoke conditions from the attic or cockloft may indicate that early vertical ventilation will be necessary. Vertical ventilation may be accomplished by opening roof scuttles, stairway, and bulkhead doors; existing openings in roofs, of any kind, may provide a quick means of vertical ventilation. Where this is not possible or ineffective, holes should be cut at the highest point as close to or directly over the fire area.

The following factors must be considered prior to assigning crews to perform roof top ventilation:

- The roof support system: lightweight or conventional.
- The height of the building; operating on roofs of buildings above four floors without aerial assistance is questionable.
- The actual pitch of the roof support system.
- Extent of fire in the attic space.
- Availability of support equipment (e.g., hoselines, ladders, etc.)
- Progress made on the top floor below the involved attic.
- Condition and integrity of the roof structure.

For vertical ventilation on a roof supported by lightweight trusses, members shall be supported via the aerial device, preferably a tower ladder bucket.

Trucks or rescue companies may be directed to pressurize the stairway using fans and/or the building's system, if present. Only stairway doors on affected floors should be opened.

The exhaust stairway should have the pressurization system shut down if its use will have a negative impact on operations.

HVAC in the affected area should be shut down or placed in exhaust mode.

All crews operating in the building must be made aware of the ventilation strategy. The location of the ventilation and pressurization stairways must be identified and announced to all units operating on the fireground.

Search and Rescue

The fire unit and the unit above are the highest priority areas for search. Primary search of these areas takes priority over all other tasks. Other tasks may be done simultaneously as staffing allows.

The first-arriving truck or rescue squad will report to the fire unit to conduct a primary search. This does not relieve the first-arriving engine company from conducting this task while advancing the attack line in situations where a truck or rescue is not yet on the scene.

If victims are found while searching, the Incident Commander will be notified immediately, and a decision will be made regarding the safest, most effective means of removing or protecting them. Options include:

- Protect in place.
- Removal to an uninvolved unit or balcony.
- Removal via the interior stairs.
- Removal over a portable ladder or aerial device.
- Drywall breach to an uninvolved area.

Other affected areas of the building must be checked and evacuated, if necessary. The objective is to have the entire building and any exposures evacuated should significant fire progression occur.

If the location of the fire is not obvious and there are no known rescues, search efforts should be focused on locating the fire. The first-arriving truck or rescue may be responsible for this task. Once found, the location of the fire and best access for the hoseline must be communicated to the first engine company.

Ladder Deployment

Initial ladder placement is based on the location of the fire, location of occupants in immediate danger, and the need to facilitate emergency egress for interior crews, Figure 73. Ladders for rescue and egress should be placed at:

1. The fire unit.
2. The unit above the fire unit.
3. Adjacent to the fire unit.
4. Any other unit where smoke is evident.

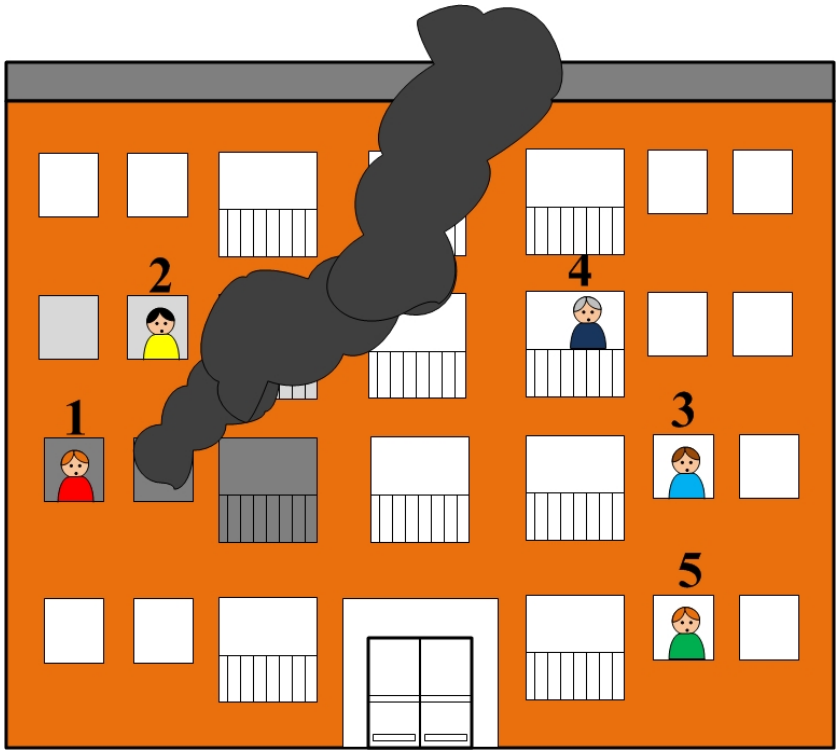

Figure 73: Victims Should be Removed on a Priority Basis

Except for immediate rescue, there are two instances when bedroom windows should not be laddered first:

1. When fire is showing from the window, and
2. If the ladder would be exposed to flame impingement from below.

In these cases, the balconies or living room windows will be used for laddering.

Any ladder that is raised to a window MUST be positioned so that the tip of the ladder is NOT extended into the window opening, but is located at or just below the sill.

Laddering bedroom windows shall be done to the front and rear of all floors at and above the level of fire involvement. Priority shall be given to the side of the building in which the fire is located. Bedrooms with windows on the front and one side, or the rear and one side, will still require ladder placement to the front and rear. This does not preclude ladders from being thrown to side windows for a specific purpose or request.

Additional ladders should be placed in the same fashion on the opposite side. Due to the height of these structures, ground ladder access to the upper floors may not be possible, and aerial ladder access may be limited depending on the setback.

In a situation where crews are operating in an IDLH environment out of the reach of ground ladders, and aerial ladder access is available, the truck operator must remain at the turntable ready to position the aerial as needed to effect rescues from upper floors. The aerial device may be used to ladder windows and/or balconies that are out of reach of ground ladders. This may take priority over laddering the roof.

RESOURCES FOR FIRES IN MID-RISE BUILDINGS

The minimum initial alarm assignment for a mid-rise building fire consists of:

- 4 engines
- 2 trucks
- 1 rescue squad
- 1 EMS unit
- 2 Battalion Chiefs
- 1 Command Aide
- 1 EMS Supervisor

The unit assignments outlined in this document are based on typical common tasks in a logical order. Officers may need to make adjustments to any assignment as deemed necessary based upon the specific problems encountered at an incident.

Unless otherwise directed by the Incident Commander, companies shall position and report as follows.

First Due Engine Company

The first due engine shall:

- Position in proximity to the building so as to not block access by other apparatus.
- Determine method of water supply.
- View as much of the structure as possible. Take note of fire/ smoke location, number of floors and persons in distress.
- Bring rapid entry keys (i.e., Knox) and retrieve building keys in fire control room or other designated location.
- Check the status of elevators and HVAC systems, if present.
- Check the annunciator panel (if present) before proceeding to the reported fire floor/area to verify location and extent of the fire.
- Proceed to the fire floor and commence firefighting operations.

The first due engine may choose to lay supply line(s) to establish the water supply. The location and method of the hose lay shall be communicated to the second due engine company.

Also, the first due engine must determine whether fire attack will be from the apparatus or standpipe system. If the first due engine decides to establish their own water supply and deploy handlines from the apparatus, they should position accordingly and the driver/operator must remain with the apparatus.

If the first due engine decides to use the building's standpipe and fire protection system for fire attack, the engine should be parked out of the way and abandoned; the entire crew proceeds in together. The officer must announce that all units will take their respective highrise assignments.

The first due engine company officer must communicate their position and action plan for hoseline advancement and water supply as soon as possible. This will allow the other responding companies to prepare for their assignments.

The officer should also advise if the entry level is other than the first floor, or if the floors have an odd configuration. Taking a moment to gather this pertinent information quickly will save time in the long run.

In addition to the hoseline, the first due engine shall take radios, handlights, a thermal imager, and a set of forcible entry tools.

The first due engine, along with the first due truck crew and rescue, shall proceed together to the reported fire floor. If the first due truck or the rescue will be delayed, the first engine shall proceed to the fire floor alone.

Elevators shall not be used by first arriving companies. Later arriving companies shall not use elevators until the first engine, truck, or rescue squad has climbed the stairs and has assessed the fire floor situation. The first engine officer will advise Command if the elevators can be used.

If smoke conditions are found in the lobby, personnel must determine if the fire is located on the lobby level or possibly on a floor below, or in the elevator pit. Elevators equipped with automatic recall will stop at an alternate floor above this area. The location of these cars must be determined and the car checked for occupants. If the first engine is unable to quickly accomplish this then it must be assigned to another company.

If smoke and heat are encountered in the stairway, personnel must determine its origin before continuing upward.

If the standpipe system is used, the officer of the first engine, in conjunction with the officer(s) of the truck and/or rescue, shall identify the standpipe outlet that is closest to the fire. The stairway that contains this outlet shall be announced as the “attack stairway.” All companies and chief officers must know which stairway has been identified as the attack stairway. Those assigned to evacuation must then use a different stairway that shall be clearly identified as the *evacuation stairway*.

If the building’s standpipe connections are not located in the stairways but are present in the hallways, it is best to use the hallway connection on the floor below the fire floor, if possible.

Second Due Engine Company

The second due engine shall:

- Establish water supply – driver/operator must remain with the apparatus.
- Remaining crew reports to the fire floor to assist the first engine in placing the first hoseline in service.
- Prepare to deploy a second hoseline, depending on fire conditions, only after ensuring that the initial line is in place and making progress.

Upon arrival, the driver shall establish water supply and stretch three inch or larger lines into the FDC. **Note:** Refer to the NOVA *Engine Company Operations* Manual for further details on pressures and when lines are to be charged. All connections, except test connections, at the FDC in use shall be supplied, Figure 74. If there are FDCs at other locations on the building, Command must ensure they are also supplied.

Figure 74: Supply all FDC Connections

Once the first line is operating, members of the second engine may be used in different roles, depending on the needs of the situation. They may:

- Continue to staff the first line if a 2½-inch hoseline is in service.
- Standby in the stairway, preserving their air supply and remain ready to relieve the first crew.
- Provide a rescue team until another crew is assigned to this duty. To comply with OSHA and NFPA requirements, the officer and a firefighter from the second engine should be stationed at the standpipe outlet in the stairway as a rescue team in the event that they are needed. These two firefighters must not be committed to tasks that could not be stopped if the initial hose team called a Mayday. At that point, hoseline advancement would be stopped and these two personnel could move in to assist.

- Assigned to advance their own hoseline onto the fire floor as a second attack line or back-up line.

Third Due Engine

The third due engine company's responsibilities are as follows:

- Position on the opposite side of the building from the first due engine. If the rear is not accessible, position apparatus at the end of the structure closest to the involved unit to allow for hoseline deployment to Side Charlie. Do not block access of incoming units.
- The officer shall report conditions from the side opposite the first engine.
- Obtain a secondary water supply. Advise Command if an additional engine will be required to complete the water supply.
- Supply the rear FDC, if present.
- Advance a hoseline to the floor above the fire, or as directed.

- For top-floor fires, personnel should be prepared for an aggressive attack on fire that has extended into the attic or cockloft.

Fourth Due Engine

The fourth due engine company's responsibilities are as follows:

- Complete a secondary water supply, if necessary.
- If the vehicle is not needed for water supply, position out of the way.
- Assume the role of RIT. The equipment and procedures to follow shall be obtained from the NOVA *Rapid Intervention Team Command and Operational Procedures* Manual.

First Due Truck or Rescue Squad

Note: The truck company's and rescue squad's functional duties closely parallel one another. Tasks such as searching for victims, locating the fire, forcible entry, ventilation, and control of utilities may be carried out by either of these units. Certain assignments are specific to the apparatus (e.g., laddering, use of extrication tools, or specialized equipment carried on the apparatus).

The first due truck should park on side alpha or the side with fire showing, if accessible. Rescue squads must park out of the way of other incoming apparatus and proceed with their complement of tools to their assigned location.

If smoke, fire, and/or victims are evident and within reach of the aerial device, the aerial shall:

- Be raised to access the unit/area involved.
- The ladder should NOT be placed to a window or balcony showing fire unless there is someone at such a location in need of rescue or the elevated mater stream tactic is being used for fire attack.
- If the apartment or unit is totally involved, then the aerial should be raised to an adjoining unit.

If there is no need for the aerial or if the fire floor is out of reach, the entire crew should enter the building together.

Several factors should be considered when the officer makes the decision whether to use the aerial:

- The irregular shape (H, T, Y, L, etc.) of the building makes it extremely difficult to locate the apparatus near the involved unit without some exterior indication of smoke or fire.
- The information normally provided by occupants regarding reports of smoke on one or more floors may be inaccurate and should not be relied on until verified by fire department personnel on the interior.
- The truck's responsibilities on the fire floor are critical and in most cases require at least three personnel. If only three personnel are assigned to the apparatus, leaving the driver/operator at the vehicle could impede the crew's ability to perform necessary tasks.

Command must be advised whenever the aerial will be placed in operation, whether to affect an obvious rescue or for fire attack. If immediate rescues are indicated and within reach of the ladders, one or both truck crews may have to engage in removal operations.

The crew of the first arriving truck company (or tower ladder) may climb the aerial ladder/ ride the bucket to enter upper floors, if quicker than using the public stairway. Depending on conditions, the officer will determine whether to enter the involved unit directly or by way of an adjoining apartment. This MUST be communicated to the first engine and the Incident Commander.

Personnel will bring the minimum tool complement of radios, hand lights, a set of irons, a hydraulic door opener, hooks, a 2½-gallon water can, a thermal imager, and a lifeline pack.[1] Crews should be prepared to force entry in the event the entrance doors are not equipped with electronic locks that open upon activation of a fire alarm.

Personnel shall initially proceed to the floor below the reported fire floor with the first engine. Generally, crews will be responsible for the following:

- Determine and communicate the location of the fire. If the location of the fire is not readily apparent on that floor, the truck or rescue crew should advance to determine the location, while the engine prepares the line to be stretched. At this point, the engine crew is the rescue team for the truck, if needed.
- Forcible entry on the fire unit, when the charged hoseline is in place.
- Initiating primary search in the fire unit.
- Coordinating the evacuation of the fleeing occupants.
- Removing obstructions hindering fire attack and hoseline deployment.

As in any structure, it is hazardous to open a door that is separating personnel from the fire without a charged line.

The truck or rescue squad shall open the ceiling on the fire floor to expose the plenum area, if one is present, to check for fire before the engine begins their attack. Crews should not advance under fire in this area. It must be knocked down as the attack commences.

Once the fire is located and crews prepare to advance the hoseline, the truck or rescue crew must begin to search the rest of the floor for victims. Crews should consider utilizing a search line; use of a tag line is a necessity in commercial occupancies with large open areas to search.

[1] For the purposes of this manual, the term lifeline will apply to the rope, webbing, and hardware used for emergency escape and/or rescue.

Second Due Truck

The second due truck shall:

- View as much of the structure as possible. Take note of fire/smoke location, number of floors, conditions evident, and persons in distress.
- Position opposite the first truck. If inaccessable, position on side alpha in front of the uncovered portion of the structure.
- Assess the need for elevated master streams.
- Take note of wind direction and strength.
- Bring rapid entry keys (i.e., Knox).
- If not yet identified, the officer should ensure that a stairway has been identified as the *evacuation stairway* and that it is clear of smoke.
- Communicate any previously unreported conditions.
- Proceed to the floor above the fire

If the fire and/or victims are within reach of the aerial, it should be raised to the fire floor. Otherwise, the entire truck crew should enter the building together.

Personnel will bring the minimum tool complement of radios, hand lights, a set of irons, a hydraulic door opener, hooks, a 2½-gallon water can, a thermal imager, and a rope lifeline pack. They will proceed to the floor above the fire, report conditions on that floor, and commence search, ventilation, and other activities, starting in the area directly above the fire unit.

Rescue Squad

The rescue squad must park away from the building and entire crew proceeds to the fire floor with the first due engine. The rescue squad must NOT park close to the building to avoid interfering with access for engines getting in to supply systems, trucks positioning for aerial use, and ambulances moving in and out of the area with patients.

The rescue squad will perform the same initial functions as the first due truck company until personnel reach the fire floor. Once on the fire floor, the rescue squad is responsible for the following:

- Deployment of a tagline from the attack stairway.
- Forcible entry on the adjacent units for primary search and possible alternative fire attack options.
- Coordinating the evacuation of occupants.
- Assessment of fire extension into the adjacent units.
- Horizontal ventilation.
- Depending on the number and type of hoselines deployed, personnel may assist in the movement and operation of hoselines.

EMS Units

The EMS unit should park away from the building in an area that allows for rapid egress if a patient needs to be transported. The crew should assemble their EMS equipment on a stretcher and report to Command. If the EMS unit is staffed with personnel trained as firefighters, the crew should don their protective clothing to include SCBA. If an EMS supervisor has responded and will not function as the command aide, he or she shall report to the Command Post in full protective clothing and SCBA as well.

Command Officers

The first due chief shall immediately gather all available information from companies already at the scene and assume command. The chief must exchange information with the initial Incident Commander and then determine the location of the Command Post.

The second due chief shall don protective clothing and SCBA and proceed to the Command Post for briefing and assignment.