

*Fire and Rescue Departments of Northern Virginia*

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# Fires in Strip Shopping Centers

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Cover Photograph

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# FIREFIGHTING AND EMERGENCY OPERATIONS MANUAL

## VOLUME II - STRUCTURAL FIREFIGHTING

### BOOK V - STRIP SHOPPING CENTERS

#### 1 INTRODUCTION

##### 1.1 BACKGROUND

1.1.1 A fire in a strip shopping center in Northern Virginia can occur in buildings of various dimensions and construction features. The strip shopping center dates from post World War II to the present. During this 50-year span, construction type has ranged from ordinary construction (class 4), to noncombustible (class 2), and even wood frame (class 5).

1.1.2 Fires in strip shopping centers can sometimes be handled quite easily, but experience has shown many to be complex and require multiple alarm assignments to contain.

1.1.3 Members must realize that these structures may or may not have fire protection systems in place, and the construction features may contribute to the rapid horizontal spread of fire. Officers should, therefore, be prepared for a heavy commitment of resources.

1.1.4 The life hazard to the firefighter in these occupancies is high. Collapsing roofs, floors and walls, accompanied by medium and occasionally heavy fire loading, pose a great risk to members.

##### 1.2 THE PURPOSE OF THIS BOOK IS:

1.2.1 To describe the types of buildings that make up the many shopping centers that are found in virtually every neighborhood throughout Northern Virginia. These structures make up a large portion of the commercial occupancies in Northern Virginia.

1.2.2 To identify the construction features and inherent firefighting problems typically encountered in these buildings.

1.2.3 To establish priorities as well as operations that need to be carried out in combating these fires.

1.2.4 To identify known risks or hazards unique to these structures that should be

known by members engaged in fire operations at these buildings.

- 1.2.5 To reduce the loss of life and property by establishing a standard method of operation for companies combating fires in strip shopping centers.

## 2 DESCRIPTION

### 2.1 DEFINITION

2.1.1 The term "strip shopping center" refers to those commercial occupancies that are joined by party walls, covered by a common roof, and house a wide variety of business establishments. These may either be located on a large lot with a large parking lot or may be on a block along the street.

### 2.2 CHARACTERISTICS

2.2.1 Strip shopping centers are vital elements of suburban life. These centers provide neighborhoods with the stores and services necessary for everyday living. Strip shopping centers refer to long commercial structures, housing a variety of occupancies under one roof. They are normally constructed on large open lots. These lots consist of parking to the front and either side of the center with rear access for delivery. While there are small centers containing only specialty shops, the typical center has, as its core, a large supermarket. Some may have a pharmacy-type occupancy as well.

2.2.2 Strip shopping centers in Northern Virginia are typically one-story noncombustible construction of masonry or tilt-up concrete walls with steel bar joists supporting a metal deck roof. Occasionally, two-story structures may be encountered. In older sections of Northern Virginia, ordinary construction may be found (masonry walls with wooden roof support members). The presence of basements is more likely in these older strip shopping centers.

2.2.3 Commonly found in the strip shopping center will be occupancies such as dry cleaning establishments, hair and nail salons, various types of restaurants and pizza or sub shops, stationary stores, video rental stores, medical and dental offices, as well as a wide variety of other merchants.

2.2.4 The dimensions of the stores in a strip shopping center are typically narrow, but deep. The dimensions can vary greatly, but smaller stores may have dimensions on the order of 30' x 75'. The anchor stores, such as a supermarket, will be much wider than and at least as deep as the smaller occupancies. The width of these large stores can easily exceed 150 feet.

2.2.5 It is not unusual for adjacent occupancies to have a common cockloft. There are also instances of old anchor stores being subdivided into several smaller businesses, which share a common cockloft. It is also a consideration that a bowstring-trussed roof covers the original store.

- 2.2.6 The vast majority of the occupancies have large plate glass windows across the front of the store. The door is typically steel framed with tempered glass.
- 2.2.7 Entry at the rear is not intended for the general public and can be expected to be heavily secured.
- 2.2.8 The occupancies within the center can be separated by a variety of different methods. Preplanning is necessary in order to be familiar with the fire containment capability of the individual shopping center. It is also important to have the location of primary and secondary hydrants or alternative sources of water indicated on the plan.
- 2.2.9 Fire loading in the strip shopping center is considered to be moderate. That being the case, **fire flow estimates should be based upon a flow of 20 gpm per 100 square feet of involved area.** In order to meet this need, engine companies should be prepared to utilize 2 1/2-inch hose lines. Heavy fire involvement may warrant the use of heavy caliber streams as well.
- 2.2.10 Members should also be aware of the various means by which addresses are posted. Not only should the street number be posted on the front of each store, but also, many tenants post the address of their business on the rear door as well. This can be very helpful in locating a particular occupancy for units operating in the rear. However, two potential problems must also be considered. First, there simply might not be any numbering in the rear, so this should not be relied upon. Second, tenants move in and out of shopping centers. When this occurs, the new tenants sometimes do some remodeling and a particular address that is posted to the rear may no longer lead to the same occupancy that is posted on the front.
- 2.2.11 An additional consideration is that some shopping centers have addresses that face side C as well as side A. Two totally separate occupancies may exist back-to-back. Therefore a particular store may not run front-to-back.

## 2.3 SURROUNDING AREA

- 2.3.1 Most often, there is a large parking lot out front and along the ends with a delivery access driveway at the rear. This allows access to four sides. However, companies must be aware of the limitations and hazards of rear access.
- 2.3.2 The large parking lot, particularly in the front, accommodates staging of incoming apparatus in most cases.

2.3.3 The shopping center will almost always have a front travel lane between the front of the stores and the rows of parking places. This travel lane will also have designated loading areas, particularly in front of grocery stores. Units arriving at an alarm can expect to find illegally parked cars as this travel lane is often marked as an approved fire lane.

## 2.4 REAR DELIVERY AREAS

2.4.1 Utilities serving the stores enter in the rear. Gas meters, propane cylinders, and electrical service drops should be expected to be found at the rear. These elements can also present substantial obstacles and hazards to units operating in the rear. Special care must be taken when laddering in the rear using extreme caution for overhead wires in poorly lighted areas.

2.4.2 Obstacles such as dumpsters, compactors, large potholes, pallets, cardboard, storage bins, and cargo trailers may be encountered in the rear and impede or block access for operations and entry.

2.4.3 Rear entrances to the stores typically pose a greater challenge for forcible entry crews due to metal doors set in masonry walls with drop bars and/or additional locks. Additionally, entrances to basements are often found in the rear and can pose significant forcible entry challenges.

## 2.5 AUXILIARY FIRE PROTECTION SYSTEMS

2.5.1 Typically, the only auxiliary fire protection found in these buildings will be automatic sprinkler systems where required by code. The code does require sprinklers for mercantile and other types of occupancies in certain circumstances. Centers built prior to the 1970s were not required to be sprinklered. During the early 1970s, most jurisdictions required sprinklers for areas of 20,000 square feet or more. Around 1975, this square footage requirement was reduced to 12,000 square feet. Any building that changes its occupancy class or undergoes a major renovation must be brought up to the current code. Therefore in older buildings you may or may not have auxiliary protection. Preplanning is the only way to be sure.

2.5.2 Protection systems are inconsistent. Some centers have full or partial automatic sprinkler systems while others have no sprinkler protection at all. Fire department members throughout the region face a wide variety of construction and protection system features in these commercial occupancies.



- 2.5.3 When strip shopping centers are "set back" from streets carrying public water supply, hydrants will often be spaced throughout the parking lot to serve the center. These may be dead-end hydrants or part of a "loop" system.
- 2.5.4 Automatic sprinkler protection, if present, may be fed by the same main serving the hydrants in the parking lot. Supply layout and flow capabilities must be established during preplanning.
- 2.5.5 Preplanning of fire protection systems must include: 1) the location of the annunciator panel, if one exists; 2) the area of the center that is sprinklered and the specific areas that are covered by that sprinkler system, such as loading docks, cocklofts, etc.; 3) the type of system - wet or dry-pipe; 4) the location of the main riser control valve, which could be hidden in a closet of the tenant space, an adjacent tenant space, or in a separate sprinkler room in the rear; 5) the location of the fire department connection and the areas of the building it supplies; and 6) if a detection system is present.

### 3 CONSTRUCTION

#### 3.1 TYPE

- 3.1.1 Fire resistive construction should **not** be expected to be found in strip shopping centers. We will most typically find these structures to be of either non-combustible or ordinary construction.
- 3.1.2 Most strip shopping centers in Northern Virginia were built during the last 30 to 40 years and are of noncombustible construction. Non-combustible construction means, primarily, that the structure itself will contribute little to the fire load but the building itself does little to contain or limit the spread of fire. However, within each of the "typical" construction types, there are endless unique features that result in potential hazards and obstacles in regard to firefighting operations.
- 3.1.3 Fire companies must become thoroughly familiar with the strip shopping centers in their areas and any other occupancy to which they may have access. Preplanning is the single best method to prepare for fire incidents in your response area.

#### 3.2 COCKLOFTS

- 3.2.1 The cockloft is the area that is located above the ceiling and below the roof deck. Cocklofts present different problems depending upon when and how the building was constructed.
- 3.2.2 In older shopping centers, expect to find the cockloft extending across the entire shopping center with no fire breaks. The exception may be where the center meets the "main" or anchor store, such as the supermarket, if one exists. Other than that, fire may be able to spread through this open area and involve the entire row of stores.
- 3.2.3 In older strip shopping centers the construction method used is most likely of ordinary, meaning that the exterior walls are of masonry materials, while the roof assembly is of wood. In some cases, the roof will be supported by wood trusses, while in others, roof rafters will be supported by columns.

- 3.2.4 In newer construction, the division between the occupancies extends up through the cockloft and in some cases, penetrates the roofline. This has had a most positive effect in limiting fire spread over the shopping center through the cockloft area. The separations that extend up to the roof but do not penetrate will be of either drywall materials or masonry. Those that penetrate the roofline are almost always of masonry.
- 3.2.5 In some larger strip shopping centers built either of ordinary or wood frame construction, draft stops may have been required. The draft stops are not required to be fire rated and may be of gypsum or plywood. The intent of the draft stop is to slow down the horizontal movement of fire and keep it to a confined area. These stops help to buy time for firefighting forces to get ahead of the fire. (See attachment 1 at the end of the document).
- 3.2.6 Draft stop requirements have changed over the years. Currently, draft stops are not required to limit the size of cockloft areas in noncombustible construction. Therefore, there is no guarantee that draft stops will be present.
- 3.2.7 When properly installed, draft stops aid fireground activities. However, they are often compromised by holes (“poke-throughs”) made to run utilities.
- 3.2.8 Preplanning is the only sure way to determine the presence of draft stops or other cockloft or attic construction characteristics in these structures.

### 3.3 ROOFS

3.3.1 **SAFETY DURING ROOF OPERATIONS IS OF PARAMOUNT IMPORTANCE! MEMBERS MUST IDENTIFY ROOFS USING TRUSS CONSTRUCTION. OFFICERS MUST ENSURE THAT ONCE FIRE HAS ENTERED THE COCKLOFT SPACE OF A BUILDING WITH TRUSS ROOF CONSTRUCTION, THE ROOF OVER THAT AREA MUST BE EVACUATED AS WELL AS THE SECTION OF THE BUILDING THAT IS BELOW THE INVOLVED AREA!**

- 3.3.2 Strip shopping centers built of ordinary construction will have a wooden roof assembly. Generally, the roof will be supported by either wood joists covered with tongue and groove boards or plywood. Alternatively, the supporting members can be a variety of truss designs, most commonly parallel chord.

- 3.3.3 If bowstring trusses were used, they are most often identified by a curved roofline. Bowstring trusses were commonly used over bowling alleys, lumber yards, and auto repair shops, but certainly not limited to those occupancies. Members must be aware of changes in occupancies and that this type of construction may be present in buildings that originally housed these types of occupancies. Renovations are common to these older centers and false mansard roof fronts can hide these curved roofs. It should be recognized that the larger the span, the deeper the truss will have to be. Therefore, the cubic feet of area in the cockloft will grow substantially as the spanned area increases. The larger the cockloft, the more fire load will be exposed, should fire enter that space.
- 3.3.4 Roofline appearances can be misleading. An arched roof should raise a caution flag indicating the possibility of bowstring truss roof construction. However, in some cases, this appearance is a result of the use of laminated wood arches supporting the roof. Sometimes referred to as "glulam," these support members are used to span wide areas and were commonly used in Safeway supermarkets for a number of years. **Members must assume that trusses are present when the arched roofline is encountered and extreme caution must be exercised when roof operations are being considered.**
- 3.3.5 Waterproofing the wood roof is done by use of "built up" tarpaper and may be covered with gravel. This is sometimes referred to as slag roofing.
- 3.3.6 The roofs on noncombustible construction can be expected to be supported by steel bar joists with a metal deck roof above. The metal deck roof assembly presents a problem in and of itself. Fires burning below heat up the oil-based materials above the metal deck. As this occurs, combustible gases are released. Since the roof is watertight, the gases are forced downward and out between the weld joints on the metal deck. These gases can then be ignited and the fire then perpetuates itself, even if the fire in the contents below is extinguished. The metal deck roof fire must be extinguished from underneath by applying streams to cool the underside of the metal deck.
- 3.3.7 Members operating on the roof should be aware that flat roofs using wood joists can have a series of wood rafters running perpendicular to the main joists. This is done for air circulation on the underside of the wooden roof deck, but allows fire to spread horizontally in four directions.

- 3.3.8 Many older strip shopping centers have been undergoing renovations. Part of those changes can include the construction of a new roof over the original one. This practice forms an additional cockloft over the structure, which is most likely not subdivided, even if the cockloft below the original roof was. The practice can severely hamper topside ventilation, if not totally negate any roof ventilation efforts.
- 3.3.9 Steel bar joists, also referred to as steel, open web joists, have no fire resistance. These depend upon membrane fire protection in most cases in strip shopping centers. The "membrane" is the typical drop ceiling using metal "T" supports with drop-in tile panels. This feature, however, is most often only found in the retail portion of the occupancy and the storage area to the rear will not have the ceiling in place.
- 3.3.10 Fires occurring in the rear storage area expose the roof assembly early after ignition. Since the storage area typically does not have a finished ceiling, fire can quickly extend into the cockloft. Members must consider the possibility of roof collapse after only 5 or 10 minutes of burn time particularly when steel joists are not protected.
- 3.3.11 Roofs may have some or all of the following penetrations on strip shopping centers: skylights, scuttles, ventilators, and exhaust ducts.
- 3.3.11.1 Skylights provide an easy way for members to ventilate a particular area quickly. Members should remember to check for additional security measures covering the opening once the skylight is opened, whether it has been removed or broken out. Once the skylight is opened, the interior needs to be checked for sidewalls to ensure that the cockloft is indeed vented.
- 3.3.11.2 Scuttles are sometimes provided to allow access to the roof from the interior. The scuttle cover should be expected to be secured, sometimes quite substantially. When members open the scuttle from the roof, a determination must be made as to what area has been vented. If venting is needed in the cockloft, it may be necessary to penetrate sidewalls inside the vertical area below the scuttle. Members should be aware that interior ladders for roof access, may or may not be present.
- 3.3.11.3 Ventilators and exhaust ducts may also penetrate the roof. The purpose of these penetrations may be helpful in determining which, if any, to open. A grease duct fire, for instance, should be vented on the roof by removing the duct cover, if that duct vents through the roof.

## 3.4 WALLS

- 3.4.1 Building codes require a fire-rated separation between different occupancy types. The walls, which must completely separate the occupancies, can be one, two, three, or four-hour rated, depending upon the type of occupancies being separated.
- 3.4.2 A higher fire rating is required as the hazards and threat to life safety of the specific types of occupancies being separated increases.
- 3.4.3 Depending upon the code, the installation of automatic sprinklers can reduce the required fire rating of the wall assembly. For example: a two-hour wall might be substituted by a one-hour wall if sprinklers are installed.
- 3.4.4 Often there will be no rated separation between a group of stores if all are the same occupancy type.
- 3.4.5 Building code provisions limit the size and height of the building based upon the type of construction and occupancy. Therefore, a firewall may be present, depending upon the size and occupancy of the shopping center.
- 3.4.6 Firewalls are usually concrete block and more substantial than occupancy fire separation walls. They will have up to a four-hour rating, and must allow for collapse on either side without pulling down the wall.
- 3.4.7 Firewalls that run from the foundation through the roofline are the most effective. However, some codes allow for the firewall to terminate on the underside of the roofline.
- 3.4.8 If tilt-up construction was used for exterior walls, members must be cautious about wall collapse should integrity of the roof be lost. The stability of walls in tilt-up construction depends upon the roof assembly essentially "tying" the building together. The roof will most likely be a metal deck roof supported by steel bar joists. Should the roof assembly collapse down into the structure, the walls can be expected to fall outward.

- 3.4.9 Exterior bearing walls are most likely to be of concrete block if tilt-up construction was not used. The bearing walls of strip shopping centers will almost always be the walls that run from front-to-back of the shopping center, since it is upon these walls that beams and/or joists will rest. These supports for roofs, and occasionally second floors, can expand and push out on the wall during fire situations. It is these supports in particular which should be monitored for signs of this expansion, and can lead to wall collapse. Bulges, new cracks and smoke seeping from these cracks are all indicators of possible wall collapse. When any of these are observed, the area outward from that wall for a distance at least one and a half times the height of the wall, must be cleared. This is the area known as the “collapse zone.”
- 3.4.10 Parapet walls extend upward above the edge of the roof. The front of the strip shopping center will almost always have some sort of parapet. The parapet creates a drop that will require a ladder to descend down to the roof if access is made from the front. There is normally no parapet on the rear of the building and members could easily step off the edge of the roof.
- 3.4.11 Members should be cognizant of changes in the depth of the individual stores along the rear of the shopping center. As an example, one store may be 90 feet front to back and the adjoining store only 75 feet front to back. Caution must be exercised when operating on the roof near the rear of a shopping center.
- 3.4.12 Parapets running front to rear are often used to separate occupancies. Members must be aware that the roofline on either side of these parapets may not be at the same level.

### 3.5 FACADES

- 3.5.1 Some building codes require fire stopping at 20-foot intervals in combustible facades (cornices, mansards, overhangs, etc.). This fire stopping can prevent fire from doing an “end run” on the outside of the building around the fire attack. Check these areas during preplanning for the locations or presence of these fire stops.

### 3.6 FLOORS

- 3.6.1 The majority of strip shopping centers in Northern Virginia are of non-combustible construction with concrete floors. This is the case even in most shopping centers that have basements.

3.6.2 Preplanning is necessary to identify those locations that may have floors constructed of wood. Where wood supports are found, members must be cognizant of the type of support used. This may range from solid dimensional lumber, such as 2 x 10 joists with plywood or 1-inch thick boards to parallel chord trusses or plywood "I" joist members.

### 3.7 BASEMENT AREAS

3.7.1 Basement areas are most often used for storage. However, offices and other functions may be found in basement areas.

3.7.2 Basement areas are confined areas with little or no opportunity for ventilation. Members can expect heat conditions to be severe. Since heat and gases will have a difficult time escaping, fog should not be used in basement fire situations. The only exception will be when firefighters are operating from a protected area outside the basement and no members are operating inside.

3.7.3 Access to basement areas will normally to be from the interior. When an exterior entrance to the basement is present, it will normally be at the rear of the store. Some occupancies may not have need for the basement space immediately below. Alterations to the structure are sometimes made to allow for the use and access of this space by a neighboring occupancy.

3.7.4 In urban settings exterior basement entrances may be provided in the sidewalk at the front or on one of the sides of the building. These entrances are usually under steel doors or grates. These entrances may simply be a set of steps but can also contain conveyors, slides or chutes for delivery of supplies into the basement. Conveyors, slides, or chutes are very good for ventilation but should not be used for entering the basement.

3.7.5 The contents of strip shopping center basements will include many different materials. Firefighters should expect to find items not necessarily related to the business occupying the store above. Stock may be piled from floor-to-ceiling making sprinkler systems less effective.

3.7.6 Preplanning will provide critical access information and companies must be aware of the location of basement entrances.



## 3.8 ROLL-UP SECURITY DOORS

- 3.8.1 Crime has caused occupancies in jurisdictions across the country to become more and more security conscious. One common method of securing a business after hours is the use of steel roll-down security doors. These doors cover the entire opening and several may be used to completely cover the storefront. While most shopping centers in Northern Virginia have not had to use these devices, members must be prepared in the event they are encountered.
- 3.8.2 Not only do the steel doors themselves present entry problems, but the means of locking the door itself is also a major concern for firefighters. The use of multiple case hardened locks is common. Often, these locks can only be opened by cutting them with an abrasive blade power saw, or a torch.
- 3.8.3 The use of these doors will add a significant amount of weight to the front wall of the building, a weight which the building was not originally designed to support. Fires can burn undetected for extended periods of time, severely weakening these support members. Wall collapses at the front are common in these situations.
- 3.8.4 Departments that have been faced with steel roll-down security doors for some time have learned to expect several circumstances:
- Delay in discovery of the fire leading to more severe fire conditions with the entire floor area being involved.
  - Fire may communicate to exposures via cocklofts, utility voids, partitions, or other concealed spaces.
  - Early collapse of the structure or portions of the structure is possible.
  - A backdraft situation can easily be encountered with the smoke explosion occurring once members have made entry through the doors.
- 3.8.5 Water application and ventilation operations can be expected to be delayed due to difficulty in gaining entry.
- 3.8.6 Backdraft and flashover situations can develop and extreme caution must be exercised when arriving units prepare to begin operations! Units must take the time to observe fire and smoke conditions and attempt to provide vertical ventilation, if it can be accomplished safely.

3.8.7 REMEMBER, IF THE SECURITY DOORS ARE CLOSED, THERE IS AN EXTREMELY LOW LIKELIHOOD OF CIVILIANS BEING INSIDE THE BUILDING. A RISK BENEFIT ASSESSMENT WILL SHOW THAT ADVANCED FIRES IN THESE CIRCUMSTANCES SHOULD BE FOUGHT FROM EXTERIOR POSITIONS ONLY. FIREFIGHTER SAFETY SHALL NOT BE COMPROMISED AND RESCUE ATTEMPTS ONLY BE INITIATED FOR THE REMOVAL OF VIABLE VICTIMS!

### 3.9 EXIT FACILITIES

3.9.1 Access and egress at the front of the smaller stores is normally through one main door. Larger stores, such as supermarkets, may have more than one designated entrance, and have additional emergency exits to increase the means of egress during an emergency.

3.9.2 Emergency exit facilities are often present to the rear of the occupancy, but customers are rarely aware of the availability of these exits, or their location.

3.9.3 In some large occupancies, such as supermarkets, exits to the front of the store may be complicated by the rows of checkout facilities. Shopping carts may be in the route of travel for occupants trying to escape.

3.9.4 Some strip shopping centers have a second story. Access to this second level will vary greatly. In some cases, a separate stairway will be present for each of the occupancies on the upper level. In other cases, one stairway will serve the entire upper level. It is important to note that these stairways may be located on the interior of the structure in a common public area or within a particular occupancy (which may occupy both levels). In other cases, the stairs may be on the exterior of the building.

3.9.5 Exit facilities are frequently found in the rear of individual stores. These doorways are not intended for public use and present a security problem for the owners. A common security device found at rear doors of strip shopping centers is the drop-in static bar. These are identified from the exterior by the presence of at least four bolt heads on the exterior of the metal door indicating the presence of brackets for a static bar.

## 4 HAZARDS

### 4.1 LIFE HAZARD TO OCCUPANTS

4.1.1 Life hazard in strip shopping centers will vary greatly depending upon the occupancy and whether it is one or two stories in height.

4.1.2 The life hazard in a one-story center may pose a more severe life hazard during normal business hours. The potential is for employees to be trapped in rear areas or basements should a fire occur during this time period. During the night hours, these premises are normally not occupied. However, the possibility of some workers being on the premises must not be overlooked. It is common for cleaning crews to have locked themselves in the store or offices while working.

4.1.3 Department members must be aware of the potential for life hazard after hours, particularly in those businesses that are family-run. Owners and their family members may be sleeping in the rear of their respective shops after hours. There have been many observed instances of this situation in the Northern Virginia area.

4.1.4 Life hazard in two-story strip shopping centers can be more significant. Occupancies such as apartments, offices, and social halls may be found in the area above the businesses at street level. Due to this feature, the life hazard is potentially high at all times of the day and night.

### 4.2 COLLAPSE

4.2.1 The potential for structural collapse at a strip shopping center is dependent upon several variables. First, the type of construction; second, the intensity and volume of fire; third, the amount of time the structure has been burning. All members must be observant in watching for and identifying signs of collapse.

4.2.2 Causes for collapse that officers and firefighters should consider include the following:

- Type of construction. Exposure of unprotected steel structural components to flame and high heat conditions. This can result in expansion and twisting, which may cause the collapse of walls and/or parapets and facades onto the roof or dump the load outward toward the street where members and apparatus are operating.
- Backdrafts. In a store where fire has been burning for some time after normal business hours a backdraft may cause a localized collapse.
- Unexpected loads. Occasionally, remodeling projects necessitate the addition of air handling units. These units are not always mounted on the roof, but may be suspended under the roof in the truss space. This is a significant added dead load on the roof assembly and can contribute to early collapse of that section of the roof. Additionally, these units may not be able to be seen as they are often located above a suspended ceiling.
- Suspended ceilings. Fires that have extended to the space above suspended ceilings should cause officers great concern. Collapse of this type of ceiling assembly will most certainly result in the entrapment of firefighters operating underneath it. This is mainly the case in large open areas where large portions of the cross tees can come down over a crew, essentially acting like a spider web. This mass of grid members is practically impossible to escape once it falls over top of a person.

4.2.3 Warning signs that signal imminent collapse:

- Heavy fire burning 20 minutes or more, especially in large open areas. This should be reduced to **10 minutes or even less in trussed roof construction.**
- Smoke or water coming through mortar joints in walls.
- Walls that are sagging or bulging.
- Cracks showing in exterior walls.
- Heavy floor or roof loads.
- Spongy roof surface.

4.3 HAZARDOUS MATERIALS

4.3.1 Due to the nature of strip shopping centers and the diverse tenants that occupy them, companies must remain cognizant of the multitude of hazardous materials that may be present.

- 4.3.2 The single best method to be prepared for what may be encountered is a thorough preplan building inspection of the occupancy.
- 4.3.3 Knowing what type of tenant is operating in a given occupancy enables firefighters to be better able to anticipate what hazards are possible. Look for occupancy signs, know what you are going into.

4.3.4 Some examples of what may be present include:

- Paint stores: lacquers, stains, paint thinners, pressurized vessels of various sizes, not to mention oil-based paints.
- Drug stores: alcohol, various aerosols, household cleaning supplies.

#### 4.4 BACKDRAFTS AND FLASHOVER

4.4.1 Backdrafts and flashover may occur in any structure. However, fires in strip shopping centers, in particular, can set up the circumstances leading to backdraft or flashover.

4.4.2 For security reasons, mercantile occupancies are typically closed up tightly after business hours. Additionally, some businesses located in high crime areas may elect to use steel roll-down security doors over their front windows and doors. This results in a further delay in discovery of the fire and contains the heat and gases inside for a longer period of time prior to our arrival. Members must recognize the signs of backdraft and remember that ventilation must occur at the highest point possible prior to hose crews introducing oxygen at their point of attack.

4.4.3 Members must be cautious of the fact that backdrafts can occur within void spaces within the structure. This is particularly associated with multiple ceiling spaces created as a result of remodeling/renovations.

4.4.4 Flashover is a much more common occurrence. The contents burning in a strip shopping center produce great quantities of combustible fire gases that build rapidly, mushrooming down from the ceiling. The introduction of oxygen can lead to the ignition of these gases. Members must be aware of the build-up of these gases.

4.4.5 Members must be cognizant of differences in ceiling height. The overall height of the occupancy must be considered in the size-up as the smoke layer may be the same distance above the floor in adjoining occupancies, but the ceiling in one may be considerably higher than the other. The depth of the smoke layer would then be significantly greater in the occupancy with the higher ceiling and present a higher hazard of flashover.

4.4.6 While ventilation is critical to removing products of combustion from any occupancy, **cooling the overhead with hose streams is the most effective method for controlling or preventing flashover in a closed or confined space.**

#### 4.5 FIRE EXTENSION

4.5.1 Horizontal fire spread or extension is the most significant concern in strip shopping centers. Fire separations are not required between each occupancy. Therefore, exposures to each side of the involved store must be examined early to check extension resulting from rapid mushrooming of heat and combustible gases under the roof.

4.5.2 Fire can spread or extend horizontally by various means that include the cockloft, suspended ceilings, air handling ductwork, and utility poke-throughs, among others.

4.5.3 Fire can extend via the facade that may have been added to the front wall of the shopping center. Fire rolling out the front show windows can extend up into the facade and then move across the front. Fire can also originate in these spaces, such as a light fixture that malfunctions or a bird's nest being ignited and then spreading horizontally in the concealed space. Crews should be wary of the possibility of the facade becoming weakened and collapsing off the front of the structure.

4.5.4 Vertical spread is of lesser concern, but still must be considered, particularly in multi-story strip shopping centers. Vertical spread can occur via ductwork, pipe chases, stairways, stud and column spaces behind walls, elevator shafts, stock conveyer openings, and any other vertical artery.

## 4.6 HAZARDS ASSOCIATED WITH HOSE LINE ADVANCEMENT

- 4.6.1 Advancing hose lines into these occupancies can present some significant hazards. Rollover across the ceiling may be a result of a well-advanced fire a long distance from the point of entry. The advancing hose crew must cool the ceiling as they move in to control the rapidly building fire along the ceiling. Additionally, a back-up line must be assigned to another crew to protect the rear of the advancing crew.
- 4.6.2 It is typical of the occupancies in strip shopping centers to contain aisles of shelving filled with stock. This situation sets up many obstacles to be negotiated, often in low or zero visibility. Members must be cognizant of the fire load and intensity and recognize that while the mobility of 1 ¾-inch hose is superior to 2 ½-inch hose, the gpm requirement may rule out the use of the smaller hose.
- 4.6.3 Operations in the basements of these occupancies are especially hazardous due to the stock arrangement. The potential for falling stock to block hoseline advancement, or impede firefighters' means of egress must be considered
- 4.6.4 Units advancing into the structure must be cognizant of the stability of the floor as well as the roof or ceiling assembly above. A constant evaluation of these structural members, sometimes by another crew, is necessary to ensure a safe operation. This is of particular importance as crews advance deeper into the structure.

## 4.7 HAZARDS ASSOCIATED WITH BASEMENTS

- 4.7.1 The storage in strip shopping center basements can take on a variety of configurations with no standard layout. Members preparing to operate in basement fire situations must be on guard for stored materials becoming unstable and falling. In addition to the obvious possibility of injury this presents, stock falling onto hose lines can make advancement extremely difficult, if not impossible. Displaced materials can also block firefighter escape routes.
- 4.7.2 Other basement hazards include walk-in freezers, hazardous materials, and pressurized containers. Machinery as well as heating and air-conditioning equipment might also be located in the basement. Gas and electrical service will most likely be brought into the basement if the building has one.

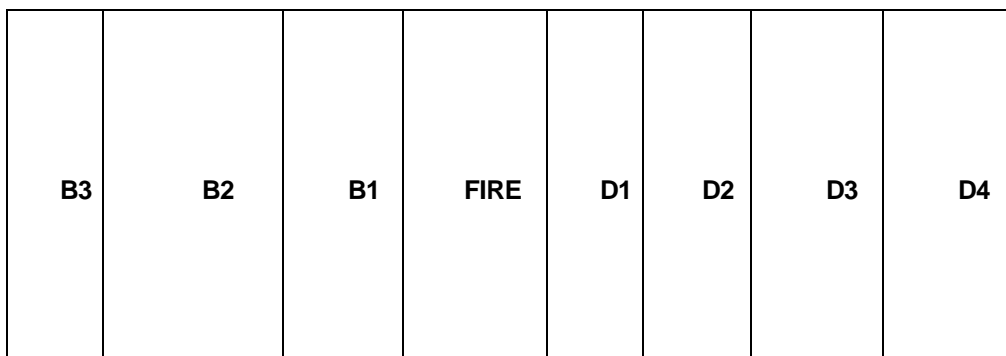
## 5 FIRE OPERATIONS

### 5.1 STRATEGIC FACTORS

- 5.1.1 Officers must constantly perform a risk/benefit assessment. Strip shopping centers present many hazards to operating forces. If the building is determined to be unoccupied, the degree to which our members are exposed to hazards inside the building must be minimized. Structural integrity can deteriorate rapidly and fire spread can be swift, given the nature of the contents and the ability of fire to move through the structure. If a search is to be made, strong consideration should be given to the use of tag lines during the search, due to the configuration of stock and shelving, as well as large open areas.
- 5.1.2 Exposure protection must be ordered and carried out early. Fire spread from store-to-store, once a serious fire has gained control of the store of origin, can be difficult to stop if not flanked early.
- 5.1.3 Given the use of trusses in strip shopping center construction, partial collapse of the roof should be anticipated.
- 5.1.4 Ventilation, forcible entry, and fire attack must be coordinated. If the building is tightly closed and a significant amount of smoke is pushing, the top must be opened first to control possible backdraft and flashover situations. If heavy smoke is showing, but backdraft or flashover conditions are not indicated, venting of the large storefront windows will greatly improve conditions for units entering to locate and attack the fire. Venting as well as forcing entry into the occupancy should not occur until water is ready at the nozzle or appliance.
- 5.1.5 Aggressive ventilation is crucial. If venting is needed, it must be done early. Integrity of the roof may be lost preventing topside venting if it is delayed. Ventilation can assist members operating inside and can help slow down the lateral spread of fire through the cockloft area.
- 5.1.6 Heavy caliber streams should be given consideration for attacking fires under roofs of truss construction. This is particularly true for metal deck roof fires. Directing water upward not only extinguishes the running fire, but cools the steel and significantly reduces the chance of collapse.



- 5.1.7 The tactical consideration for stopping a fire from spreading through the cockloft is to get ahead of it. Ceilings must be pulled and heavy caliber streams applied from below. If the fire is well advanced and the structure has an open cockloft from end to end, consideration may be given to the use of a trench cut. The primary consideration here is how long it will take to complete the trench cut. One truck company is NOT sufficient to accomplish the task!
- 5.1.8 Crews entering occupancies must check the ceiling above the door **BEFORE** moving in. In many cases, renovations will result in the need to open two or more ceilings to check the actual cockloft. Fire in the cockloft that is undetected can bring the ceiling assembly down after crews are inside and trap them. As was stated earlier, this is of particular concern with suspended ceiling assemblies. The ceiling tile, cross "T's", and hanging wire come down in a web. Firefighters caught in this web are in grave danger of not being able to escape. Thermal Imaging Cameras (TIC) are an excellent means to quickly check for fire conditions in the ceiling and the basement before moving in, and as units progress.
- 5.1.9 Consider the time needed to gain access to the occupancies adjacent to the involved unit. Anticipate where the fire has traveled in the time since gaining access. Assurance must be made that the fire will be flanked or units will find themselves in a situation of trying to catch up to a rapidly extending fire.
- 5.1.10 Everything to the left of the involved store is the "B-Baker" exposure and to the right is the "D-David" exposure. Begin checking for extension in the cockloft in exposure B2 or D2 to avoid having the fire extend past your positions. (An example of the verbal designation of the exposure is "exposure Baker 2" or "the David 2 exposure").



????????????

Exposure Baker

????????????

Exposure David

5.1.11 Operations on the roof must be limited to areas where fire has not entered the cockloft space or crews must operate by supporting themselves independent of the roof. Use of tower ladders is prudent for these situations.

5.1.12 Fire entering the cockloft of a truss-constructed roof assembly calls for the immediate evacuation of the roof and directly underneath the area of fire involvement. Due to the possibility of heavy involvement occurring rapidly, preparation for the use of heavy caliber streams must be made in advance.

## 5.2 RESOURCES FOR FIRES IN STRIP SHOPPING CENTERS

5.2.1 The minimum resources assigned to fires in strip shopping centers are:

- 4 engine companies
- 2 truck companies
- 1 rescue company
- 1 EMS unit
- 1 battalion chief

5.2.2 The 4<sup>th</sup> due engine shall assume the role of the Rapid Intervention Team (R.I.T.), unless otherwise assigned by the Incident Commander.

5.2.3 When reports of trapped occupants are received, the assigned resources should be modified to include ALS units, if not already dispatched.

5.2.4 Utility-fueled fires will require the assistance of the appropriate utility company.

5.2.5 The rehabilitation of companies that have been operating may require additional resources for relief as well as to staff "rehab".

5.2.6 Units encountering delays in responding should communicate this immediately, along with changes in arrival order that will affect assignments. The dispatcher should notify the responding chief officer of these changes.

5.2.7 Reserve resources should be available in staging to meet contingencies as they occur until the fire is declared under control.

### 5.3 APPARATUS POSITIONING FOR FIRES IN STRIP SHOPPING CENTERS

5.3.1 Companies will position as follows unless otherwise directed:

- First-due engine to the front.
- Second-due engine take water supply for the first engine.
- Third-due engine to the rear.
- Fourth-due engine will assume RIT duties. This engine can still supply water to the third engine while the officer and crew report to the IC for RIT.
- First-due truck to the front.
- Second-due truck to the rear.
- Rescue company to the rear.

5.3.2 If heavy fire conditions are encountered requiring either an offensive exterior attack or defensive operations, the incident commander should utilize a tower ladder(s) on side A for mobile ground-level heavy caliber streams. Priority position in the front must be given to a tower ladder if one was on the original assignment or if one was ordered on a special call or greater alarm. The tower ladder is the most effective master stream for this type of low-level operation. Under this circumstance, if the second-due truck is a tower ladder, the incident commander should switch the assignments of the two trucks.

5.3.3 The first-due engine should try to see as much of the structure as possible when approaching the building. It is understood that shopping centers are not likely to be viewed on all sides by one particular company. The first engine should take a position on the front of the building. Park the rig past the involved store or stop short as needed in order to leave the front position for the truck. Give an on-scene report, supply line and hydrant information, perform an initial size-up followed by a situation report, and advance the initial attack line.

5.3.4 The first-due truck should take a position in front of the involved store(s). The objective of the position of the truck is to facilitate use of the aerial for roof access, ground ladder deployment that may be needed, use of the master stream (particularly if the unit is a tower ladder), and auxiliary equipment on the unit.

5.3.5 The second-due engine shall ensure that a water supply is established to the first engine and advise the incident commander if a sprinkler siamese is present on the front of the building.

NOTE: The incident commander must ensure an engine is assigned to supply the sprinkler system in those cases where a system is present in the involved section of the building.

5.3.6 The third-due engine shall position in the rear. This might be difficult in some cases as rear access for vehicles is not always available. The third-due engine is responsible for hose line operation in the rear and support of the rescue and truck companies operating in this area. Hose lines advanced through rear entrances to the involved store or into exposures must be coordinated with engines operating through the front to avoid opposing hose lines. The driver of this engine shall advise the incident commander if a sprinkler siamese is located on the rear of the building.

5.3.7 The fourth-due engine shall assume the duties of the R.I.T. The driver can be assigned to supply water to the third engine.

5.3.8 The second-due truck shall take a position in the rear with a primary assignment of gaining access to the roof. Use of the aerial is preferred but care must be given to overhead hazards. Lighting of the roof and the rear area should be addressed early. A report of the conditions in the rear and particularly on the roof to the incident commander should occur as soon as access to the roof is achieved.

5.3.9 The rescue company should position in the rear unless otherwise directed by the incident commander. The rescue is primarily responsible for gaining access to the rear of the involved occupancy and the immediate exposures on both sides.

5.3.10 The EMS unit should position in an area that will not block fire apparatus and allow for unimpeded egress from the scene in the event patient transport is necessary.

5.3.11 The chief officer shall position the command vehicle without blocking firefighting units, but in a position which allows for effective command of the incident. This position must allow the chief a clear line of sight of the involved area.

## 6 ENGINE COMPANY TACTICS

### 6.1 WATER SUPPLY

6.1.1 When dispatched for a fire in a strip shopping center, the first arriving engine will lay supply line(s) to establish the water supply for an offensive interior attack. The location and method of the hose lay should be communicated to the second-due engine company.

6.1.2 A forward (or straight) hose lay of a supply line(s) shall be used when possible. Modifications to this procedure may be made to ensure sufficient fire flow to extinguish the fire.

6.1.3 In areas where hydrants are not readily available, the procedure for relay or shuttle operations will be followed.

### 6.2 ON-SCENE REPORT

6.2.1 The first due unit officer shall include the following information in the on-scene report:

- Water supply/layout location (if not previously reported)
- Type of structure
- What is evident

### 6.3 SIZE-UP AND SITUATION REPORT

6.3.1 It is not practical for the first due engine officer to view all sides of the structure at strip shopping centers. However, the officer must note the location and extent of smoke and fire, obvious rescues, access points, utilities, and exposures that are affected. In shopping center situations, the first-in engine should position in the closest parking aisle near the front of the involved store. The main thoroughfare in front of the row of stores should be left open for movement of other apparatus and positioning of truck companies. In street front situations, the first engine should not park directly in front of the involved store and be sure to leave room for positioning of incoming trucks while maintaining a lane for other apparatus movement on the street. Units should avoid parking directly in front of the involved store to reduce exposure of personnel and apparatus in the event fire vents out the front show windows.

- 6.3.2 The officer must attempt to determine the location of the fire within the store and its extent. When the location is not immediately apparent, consideration should be given to using the truck or rescue company equipped with a tag line to locate the fire. The engine can then stretch the appropriate size and length of hose line based upon information from that company.
- 6.3.3 The information gathered from the size-up will dictate the mode of operation, action plan, and tactics employed. The size-up results are reported through the situation report, which shall include command statement, initial assignments, and requests for greater alarms. Progress reports will follow.
- 6.3.4 Should interior operations be initiated, the first engine company will begin operations following departmental two-in/two-out guidelines.
- 6.4 INITIAL LINE
- 6.4.1 The initial attack line for most fires within this type of structure will be based upon the location and extent of fire. Engines should expect to utilize 2 1/2" hand lines if a large portion of the occupancy is involved. Strip shopping centers contain a medium fire load that requires a fire flow of 20 gpm per 100 square feet of involved area. A medium fire load in an area of only 1250 square feet calls for 250 gpm fire flow. If heavy fire conditions are met with 50% or more of a given occupancy involved, use of deluge sets or supply to a tower ladder should be considered. Engine companies must consider the increased reach and heat penetration that larger caliber streams provide. Officers must also consider the need for additional members when deploying large hand lines. Engine companies should be paired up to handle and advance these lines.
- 6.4.2 Reach of the stream is also a critical consideration. A larger size hoseline with throw a stream of water a greater distance. For these reasons, the engine officers should at least consider the use of 2 1/2-inch hoselines. The first due engine crew will usually be responsible for deploying the first line but may need to use the crew of the second-due engine to assist. If the fire is obviously small with limited extension, the officer may choose to use 1 3/4-inch hose.
- 6.4.3 The first engine should advance the initial line on the fire. The advancement of the initial attack line will generally be through the front door of the occupancy. In most cases, the hose line will be charged prior to entering. At times, the front of the occupancy may be heavily secured and forcible entry operations will be required before the attack can commence. This job remains the responsibility of the first due truck.

- 6.4.4 The officer will have to determine what size and length hand line is appropriate or if the initial attack will be made with master streams.
- 6.4.5 The purpose of the initial attack line is to protect occupants, confine the fire, and if possible, advance to the seat of the fire for extinguishment.
- 6.4.6 The conditions found upon arrival and the information gained during the size-up, may dictate changes in these tactics. The initial stream can be from a master stream device in the cases where a large amount of fire is encountered. Officers also have the option of using heavy caliber streams for initial attack to knock down a heavily involved area before reverting to a hand line operation.

## 6.5 BACK-UP LINE

- 6.5.1 The back-up line for most fires within these types of structures will need to be capable of delivering the same amount of water as the attack line or more. The line should be of sufficient length to reach the location of the initial attack line or to be advanced to the area beyond the initial line, if required.
- 6.5.2 The second line will generally be stretched from the first-arriving engine company apparatus. The second-due engine company will accomplish this task unless the crew was used to assist the first-due engine with the initial line.

## 6.6 LINES INTO EXPOSURES

- 6.6.1 Preparation shall be made to position a line in the exposures. The first line will most likely go to the most severe exposure as ordered by the incident commander.
- 6.6.2 Fire can rapidly spread horizontally, particularly in those buildings with little or no separations in the cockloft. When conditions indicate this is the case, it is advisable to consider skipping a store or two down the row from the involved store. This tactic is more likely to ensure that crews get in front of the fire that is spreading under the roof, and enable them to stop that lateral extension. Later arriving units can then enter stores that were skipped.
- 6.6.3 Crews that are moving into the individual stores must check into the ceiling just inside the entrance **prior** to moving in. Fire that has taken possession of the ceiling area can drop the ceiling, and trap crews inside. This is a particular concern if suspended ceiling assembly has been used. The grid drops and acts like a spider web over members caught below and escape is next to impossible.

## 6.7 BASEMENT FIRES

- 6.7.1 Fires in basements expose the entire structure. Basement fires create added problems to successfully applying water to the seat of the fire. It is recognized that most modern shopping centers are built on slabs and have no basement level. However, crews must be familiar with their response districts as basements will be found in some cases.
- 6.7.2 Entrances to the basement must be identified prior to stretching any lines. Preference should be given to the use of exterior entrances. However, often the only access to basements in strip shopping centers is via an interior stairway, which is usually located at the rear of the occupancies.
- 6.7.3 It is important to advance sufficient hose to the entrance to the basement. Consideration should be given to bringing this line in through a rear entrance near the basement stairs to avoid long and difficult hose stretches directly over the fire area. The line should be stretched dry if possible and enough hose to reach the basement flaked out near the entrance to provide mobility as the line advances. This can be estimated by using the length plus the width of the occupancy. This total approximates the length of hose that should be brought to the entrance.
- 6.7.4 Basement fires in strip shopping centers are either extremely difficult or impossible to vent. With that in mind, crews **MUST** utilize either a straight or solid stream application. The use of fog in a confined area with little or no ventilation will most certainly result in the crew being driven back out, and probably lead to burn injuries as well.
- 6.7.5 If the fire is well advanced and crews have the ability to apply water from protected positions before moving in, they should do so. Options, such as the use of a small window, although rare, may allow streams to be operated into the confined area to achieve some knockdown prior to entry. Older centers may have windows located in wells situated in the sidewalk and covered with metal doors or grates. These can be used for operating a stream into the basement but should not be used for access.
- 6.7.6 Use of distributor nozzles from above, where a hole can be made to facilitate such, is a viable and safe option if structural integrity has not yet been compromised.
- 6.7.7 Crews operating on floors above the basement must be cognizant of vertical fire spread via pipe chases, duct work, stairways, and any other void that might be present.



- 6.7.8 Fire on the first floor may very well be a result of extension upward from a fire in the basement. Always check the basement and remember that fires can, at times, extend downward by various means from a first floor fire as well.
- 6.7.9 Adjoining basements must be checked for horizontal extension through common beam pockets or other poke-throughs and voids.
- 6.8 FIRES IN STRIP SHOPPING CENTERS WITH A SECOND FLOOR
- 6.8.1 Unit assignments for fires in strip shopping centers with a second floor will typically remain the same as for single-story structures. However, several additional tactical factors need to be considered. Officers should consider an additional hose line for operations above the fire in those cases where a second story is present. There are two purposes of the line above the fire. The first is to protect the company doing the primary search of the floor above and the second is to extinguish vertical extension.
- 6.8.2 It may take longer to get a hose line into place if the fire is located on the second floor. These lines should be stretched into an uninvolved portion of the second floor to position properly for attack and protection of any uninvolved areas.
- 6.8.3 Stairwells to the second floor are not always obvious. Typically, the entrance to this second level has the same appearance as the storefronts along the strip. Members must have preplanned knowledge of stairwell locations.
- 6.8.4 If engine crews cannot readily locate the stairway, the use of ground ladders for advancement of hose lines through windows should be considered.
- 6.8.5 A fire located on the first floor adds an additional exposure problem. Not only must horizontal exposures be covered, but areas above the fire must also be addressed in terms of fire extension as well as life hazard.
- 6.8.6 No more than two hose lines should be stretched through any one entrance into a building. The advancement of additional lines should incorporate alternate means of entry.
- 6.8.7 The line assigned to the floor above the fire will typically be the 1¾-inch pre-connect, allowing for the needed speed, mobility, and fire flow.
- 6.8.8 This line should be of sufficient length to reach the area above the fire and into the cockloft, if required. The unit this line is deployed from will be determined by the incident commander, or assigned unit officer.

## 6.9 OPERATIONS IN THE REAR

6.9.1 Consideration should be given to 2 ½ inch hose if heavy fire conditions are encountered.

6.9.2 The third-due engine should take a rear position, laying out its own supply line. Preparation shall be made to position a line at the rear. This line will most likely go to the most severe exposure as ordered by the incident commander. However, depending on fire conditions, this line could be ordered to the roof to cover truck crews working there. The line might also be ordered into the involved store if crews were withdrawn from an attack from side A.

6.9.3 The fourth-due engine will supply the third engine and the crew shall assume the role as R.I.T unless otherwise assigned by the incident commander.

6.9.4 If fire is determined to be in the front of the store only, a tactical decision might be made to attack from the rear. In this case, the incident commander will need to deploy resources in such a way as to facilitate the change in direction of attack. The Incident Commander should announce the change, request the attack from the rear, and begin exposure coverage. **The Incident Commander must constantly evaluate the situation and make adjustments to meet the needs of the incident. This is reiterated here as it is recognized that making the attack from the rear may be too time consuming if entry is difficult.**

## 6.10 ADDITIONAL FIRE ATTACK CONSIDERATIONS

6.10.1 Officers must also consider fire extent and volume when assessing attack options. Heavy caliber streams from deluge sets, squirts, and tower ladders are extremely effective in knocking down large volumes of fire. This can be done while still in an exterior offensive mode of attack with the intent of stopping rapid fire spread and knocking the fire down to a size that can then be extinguished with hand lines.

**NOTE:** The rescue and truck company's functional duties on fire calls closely parallel one another. Tasks assigned, such as a search for victims and location of the fire, forcible entry, ventilation, control of utilities, may be carried out by either of these units.

Assignments specific to the truck would involve laddering, whereas the rescue might be called to advance additional attack lines, utilize extrication and cutting tools or specialized equipment carried on the apparatus. The truck and rescue company perform vital functions on the fire ground. Success in preserving life and property hinges on the proficiency of the members performing these duties.

## 7.1 POSITIONING

7.1.1 In most instances, the first truck shall position at the front of the involved occupancy.

7.1.2 The second truck to arrive will take the rear. If the rear is inaccessible, the truck should position at the closest side to allow both roof access and deployment of ground ladders at the needed location on side C.

7.1.3 The primary responsibilities for the truck on side A are entry to the involved and adjoining stores, as well as horizontal ventilation. Additionally, master stream operation to the interior, if needed, will be most effective from side A. The primary responsibility for the truck on side C is access to the roof and vertical ventilation.

7.1.4 Tower ladders are preferred for side A positioning over conventional aerials. The highly mobile master stream available with this apparatus will be in place as needed for fire attack or exposure protection.

## 7.2 INITIAL ACTIONS

7.2.1 Locating the fire is the responsibility of the truck whenever the truck is on scene with, or very close, to the arrival of the first engine and the location of the fire is not readily apparent. If the fire location is not known, the engine crews cannot properly position, stretch, and operate hose lines. A tag line and long hook should be added to the tools the truck or rescue crews take with them on a fire in this type occupancy. Once the fire is located, this is then communicated to command who can then properly select the apparatus that will allow a hose stretch via the most expedient entrance.

- 7.2.2 The importance of communications between the truck and rescue companies and command cannot be over emphasized. Information about conditions found, the company's location and progress made, must be continually conveyed to command.
- 7.2.3 The plenum or cockloft area must be checked early and often throughout the incident. Thermal imaging cameras are an excellent means to quickly check for fire conditions in the ceiling and the basement before moving in, and as units progress.
- 7.2.4 Access to the rear of the strip shopping center is critical. At least one truck company and one rescue company should be assigned to the rear on all working fires. Laddering the roof is most often easier at the rear since there is typically not a parapet as there is on the front. Additionally, the rescue company should be operating at the rear for forcible entry reasons. Normally entry at the front is easy, break the glass and you are in. However, it must be noted that some occupancies may have steel security gates and roll-down doors covering the front windows and doors requiring a significant forcible entry operation. At the rear, security measures offer complicated forcible entry challenges that rescue companies are equipped and trained to handle.
- 7.2.5 Early identification of a basement fire in a closed business will be difficult. Crews may have to force entry into more than one occupancy before the correct one is identified. Even then, identifying the fire as being below grade in a smoke charged store with the only basement access being located inside will be extremely challenging. During these operations, command should order lines advanced to protect members searching for the location of the fire. Units should know which shopping centers have basements. However, when members are confronted with high smoke and heat conditions on the first floor with no visible fire, suspect a basement fire.
- 7.2.5.1 Fire on the first floor may very well be a result of extension upward from a fire in the basement. Always check the basement and remember that fires can, at times, extend downward by various means from a first floor fire as well.
- 7.2.5.2 Adjoining basements must be checked for horizontal extension through common beam pockets or other poke-throughs and voids.

- 7.2.5.3 Heavy fire loading and maze-like storage will dictate the need for rapid ventilation. Accomplishing ventilation in this situation will be difficult at best. Vent holes in the first floor will be required in well-advanced basement fires where windows or alternate stairwells are not present. It is also recognized that in many cases, this tactic will not be possible due to the thickness of concrete floors. However, if possible, large vent holes in the floor should be located adjacent to front showroom windows. Officers must assess integrity of the floor as they consider this tactic. A hose line will be necessary in the area of these large vent holes to prevent further extension. Mechanical ventilation should be considered to supplement the venting process. Positive pressure ventilation in conjunction with fire attack should only be considered in those cases where command is certain that the fire is in a confined location, without the possibility of pressurization causing the fire to extend.
- 7.2.5.4 Crews must be aware of vertical channels (pipe chases, ducts, partitions) leading to the first floor and cockloft. These areas must be checked several times throughout the incident.
- 7.2.5.5 Truck and rescue company members may be called to assist in the advancement of attack lines to the basement by forcing doors, moving stock, conducting search, and controlling utilities.
- 7.2.6 Fires in these stores typically originate on the first floor in the rear stock or utility area. It is very common to have suspended ceilings with missing tiles and utility voids in this area. In both cases, there is direct access to the void space above. With the increased fire load due to stock, and the direct access to the cockloft, members can expect rapid extension into the void space above the occupancy.
- 7.2.7 Storage and utility areas may extend behind the occupancy next door. Keep this in mind when checking exposures on either side of the fire unit. Drywall on metal studs may be all that separates these areas.
- 7.2.8 Ceiling areas must be checked immediately upon entry to determine if fire is in the space above.
- 7.2.9 Preplanning these occupancies is imperative. Identify and anticipate access problems due to dumpsters, delivery trucks, and other parked vehicles. Discuss and develop alternative means of getting personnel, ladders, and tools to the rear. Examples of these include going through an adjoining occupancy or using a tower ladder from side A to carry ladders, personnel, and tools for an over-the-roof means of reaching the rear.

### 7.3 FORCIBLE ENTRY

7.3.1 It is common for the truck or rescue company to be assigned forcible entry into adjoining exposures. It is desirable to have the members continue down the row of occupancies as far as horizontal extension is suspected. Companies should consider beginning in exposures Baker 2 and David 2 when checking for extension as a result of a working fire. A delay in entry delay can be expected if command has to assign a company later in the incident to force entry several stores down due to horizontal extension.

7.3.2 The requirement of checking several or all exposures for horizontal extension due to a common cockloft dictates that members must be proficient in “through-the-lock” forcible entry. Trained firefighters can utilize this method very quickly on the typical commercial front door. Narrow stile aluminum and glass doors, containing a pivoting deadbolt and mortise-type locks are common in strip shopping centers in Northern Virginia. Older stores with tempered- or plate-glass doors will normally have a mortise lock in the bottom that goes into the floor. Using the through-the-lock method saves property without slowing the firefighting effort.

7.3.3 Access and ventilation via the rear can be difficult. Barred and reinforced doors and windows can present significant forcible entry problems for truck and rescue company members. However, the task must be accomplished in order to coordinate with the attack coming from the front of the store.

### 7.4 RESCUE AND PRIMARY SEARCH

7.4.1 The primary concern at strip shopping centers, as in all occupancies, is life safety.

7.4.2 Companies must be aware of the potential life hazard in basements and second stories, where present, in strip shopping centers. Company officers must quickly evaluate the life hazard potential associated with the fire situation. Typically, the life hazard in a strip shopping center is not as high as a residential occupancy. However, the possibility cannot be ignored.

7.4.3 The lack of alternate means of egress from the second level must be considered. Occupants in these areas at the time of the fire may take refuge in restrooms, storerooms, and office spaces. All areas must be searched. Some second stories may contain residential occupancies.

- 7.4.4 Occupants may also be found in rear areas such as offices, stock rooms, restrooms, and basement or cellar areas. Members should be aware that employee lounges are often located in a rear stock room. Windows and doors to these areas may be barred, covered with steel mesh, or bricked over. Companies reporting to the rear of these occupancies must be equipped and trained to handle these challenging forcible entry situations.
- 7.4.5 If an immediate rescue situation is present, obviously that takes priority and the truck or rescue company must take action to effect those rescues. The engine crews should then coordinate their operations to support the rescue effort, most likely by positioning the nozzle between the fire and the location of the victims.
- 7.4.6 The outcome of the primary search must be reported to the incident commander.

## 7.5 LADDER DEPLOYMENT

- 7.5.1 Early laddering of the roof must be accomplished to provide a ready route for crews to assess conditions above the fire and carryout other assigned roof top duties. Once crews are assigned to the roof, at least one additional means of escape must be provided. Interior roof access routes shall NOT be used by crews trying to get to the roof. Use of an interior roof access is dangerous, as firefighters could be trapped by rapidly spreading fire under the roof or smoke and other fire gases suddenly igniting.
- 7.5.2 Crews who get to the roof first should evaluate and communicate conditions to command such as:
- Size and shape of the building
  - Location and volume of smoke and fire
  - Exposure concerns
  - Roof loading (i.e., HVAC)
  - Evidence of a cockloft fire
  - Roof construction hazards, i.e., parapets, changes in roof lines, false fronts, fire walls, etc
- 7.5.3 Egress from the second story is often limited due to fire conditions. These areas must be laddered to provide:
- Roof access and egress
  - Second floor rescue
  - Escape route for crews operating above ground level

## 7.6 VENTILATION

- 7.6.1 Ventilation of the roof must be considered early to relieve conditions for victims and crews operating inside. If backdraft conditions exist, roof top ventilation must precede opening the building at lower levels.
- 7.6.2 Vertical ventilation may be accomplished by the removal of scuttle covers and skylights when present on the roof of the involved structure. The fascia area inside these openings should be opened to check conditions in the cockloft.
- 7.6.3 Venting the front showroom windows provides for significant horizontal ventilation when indicated. However, members must be monitoring conditions for the signs of backdraft and flashover. Minor fires may not necessitate the removal of the front windows.
- 7.6.4 In occupancies with restaurants, fans and ducts will be present. Control of these devices and checking of these areas will need to be accomplished. Shut down the fans and open up framed duct areas. Be aware of hot grease and oil in the restaurant.
- 7.6.5 Fire may originate in the cockloft area due to defective electrical work or grease- laden ducts. Anticipate significant horizontal extension when this occurs.
- 7.6.6 When fire has possession of the cockloft, immediate roof ventilation must occur, if possible. In addition to the ventilation holes, inspection holes must be cut to determine the extent of the horizontal fire spread. Rooftop ventilation will normally require the services of more than one company.
- 7.6.7 Open natural roof openings first, choosing those that are over the main body of fire. If needed, a large hole may need to be cut as close as safely possible to the seat of the fire. It is best to start with a small hole, about 2 x 2 feet, and then expand it. A larger hole is difficult to get opened due to the weight of the roofing materials
- 7.6.8 Truck and rescue companies assigned to the roof should be equipped to perform a trench cut. This tactic may be indicated after factors such as available resources, building configuration and volume of fire have been considered. Companies must be cognizant of the fact that a trench cut will require the services of several companies in order to carry out the operation in a timely and effective manner.



**ATTACHMENT 1**

