

	<b>Terryville Fire Department Best Practices</b>	
	<u>Subject</u> <b>Commercial Structure Fires</b>	<b>BP# 3-04</b>
	<u>Authority</u> <b>Chief of Department</b>	Initiated 5/1/16  Revised

**A. PURPOSE**

1. Commercial Structure Fires challenge the expertise of firefighting forces and require a coordinated team operation. The following best practices are for commercial structure fires and to establish methods of operating at such fires.

**B. GENERAL GUIDELINES / CONSIDERATIONS**

1. All members shall comply with the Respiratory Standards (BP# 1-06) along with all other safety related best practices.
2. If a known life hazard is found and immediate action could prevent the loss of life, appropriate action (rescue activity) may be taken by the individual member. This applies only for a known life hazard, not for standard search and rescue activity. If such action is taken, the Incident Commander (IC) must be notified immediately and appropriate adjustments made.
3. Commercial structures present a wide range of uses, occupancies, and construction types. They can include anything from a school, church, strip mall, or large open warehouse. Construction features will often dictate tactical approaches, such as buildings with a common cockloft, basement or roof features.
4. Commercial structures will often pose obstacles that can hinder forcible entry, limit access, and can easily overtax initial arriving units.

**C. SPECIAL CONSIDERATIONS**

1. While not recognized or defined as a specific type of construction, a taxpayer building is a term used by the fire service to describe a row of multiple commercial occupancies housed within a single structure.
2. A taxpayer may contain a single business that occupies one large structure or consist of multiple attached smaller structures.
3. Although classified as a commercial structure, responding members can not rule out the possibility of owners/workers using the structure as a residence.

## D. SIZE-UP

1. Size-up begins when the alarm is received and continues until the fire is under control. It is an ongoing process that may require modification as operations progress.
2. Alarm Source
  - a. How was the alarm reported?
  - b. Direct calls may be more accurate than alarm company information
  - c. Attempt to locate occupant(s) upon arrival to aid in additional information such as the fire location, how long it's been burning, best access points, safety hazards, etc.
3. Time of Day
  - a. Expect a greater number of occupants during normal business hours.
  - b. Expect reduced manpower during weekday / daytime calls.
  - c. The use of security features after normal business hours may result in delayed access to the building. This factor and the effects it will have on fire growth and structural integrity must be evaluated during size-up.
4. Type of Occupancy
  - a. Wide ranging depending upon the type of business and time of day.
5. Life Hazard
  - a. During normal business hours, the potential life hazard may be severe in some commercial occupancies. If the building contains a second floor, it may include storage space, offices, or residential units.
  - b. Most occupants of commercial occupancies should be able to self evacuate. The IC should check with the proprietor/tenant and obtain information on the status of occupants and employees.
  - c. In rare instances, occupants have been found to live in the commercial portion of a building. The IC must determine the credible presence of occupants through the structure and ensure that the necessary resources for a thorough search and rescue are available.
  - d. During non-business hours, the likelihood of finding occupants in the mercantile portion of a building is very low. In these situations, the primary life hazard is of that of the firefighters. The IC should not place firefighters at great risk only to protect property.
6. Construction

- a. Many of the commercial buildings within the Terryville Fire District are one story Type II (non-combustible), Type III (ordinary), or Type VI (wood frame) construction.
- b. Taxpayers constructed with wood bearing walls are classified as Type V construction, while taxpayers with masonry bearing walls are classified as Type II or Type III construction.
- c. Older style buildings can be assumed to include a tremendous amount of combustible material as part of its construction. The majority of this combustible material is found in concealed spaces.
- d. Some buildings, classified as Type II, utilize light weight steel bar joists with a metal roof deck (strip malls). While these structural members will not add to the fire load, the features of construction may contribute to fire spread and early failure of the building.
- e. Some newer constructed buildings may be of Type III construction. These buildings will often utilize lightweight structural members such as trusses or wooden "I" beams.

## 7. Roof Design

- a. There are many types of roof construction found on commercial buildings. The varied types of roof construction present different challenges and hazards.
- b. The type of roof most commonly found on a taxpayer is the standard wood frame with a built up tar and gravel covering. Modern construction techniques utilize lightweight building materials such as trusses and wood "I" beams and are finished with a rubber roof covering.
- c. Truss supported roofs are very common in new construction. Bow string truss roofs are usually found on older single tenant buildings with large open floor plans such as storage buildings, supermarkets, bowling alleys, etc.
- d. Type II construction contains metal deck roof supported on bar joists. These roofs have a history of collapsing without warning, often in as little as ten minutes, resulting in firefighter fatalities. This size-up factor needs extra consideration when dealing with delayed discovery or delayed access.

## 8. Cocklofts

- a. A common construction feature in commercial buildings, specifically taxpayers, is a single non fire-stopped cockloft that extends over all occupancies within the building. Fires that originate in, or extend into the cockloft are a major cause of total loss at commercial buildings.
- b. Fires in cocklofts have been a major factor in the occurrence of backdrafts.

## 9. Ceilings

- a. The presence of multiple ceilings, especially in older buildings, should be expected. These multiple ceilings may hide the true volume of fire and extent of structural involvement. All ceilings must be opened. This task requires the proper use of thermal imaging cameras and adequate resources.

## 10. Floors

- a. A common type of floor construction in older buildings is wood planks supported by wood joists. Masonry floor construction using concrete or tile, supported by wood can also be found. These floors make it difficult to confirm that a fire is raging in the basement beneath. Sudden collapse of this type of floor is common and may be expected after prolonged exposure to fire.

## 11. Basement areas

- a. Fires that originate in the basement are often difficult to locate and access. In some cases, access to the basement may be through a trap door in the rear of the building. The access to the basement of a taxpayer may be found in an adjacent business.
- b. Basement hazards may consist of a large amount of combustibles, utility connections, or fuel storage. Large quantities of stock can disorient members or block an exit if toppled over. The basement floor plan may be completely different than the street level floor plan.

## 12. Fire Load and Contents

- a. The services provided, contents, or products found in a particular building can add considerably to fireground hazards. Fire loads can be especially high in taxpayers. A store may contain large quantity of combustible, plastics, flammable liquids, or chemicals that will add substantially to heat release and fire spread.
- b. Extremely heavy items that will be found in an appliance, auto parts, or plumbing store, may not add considerable fuel to the fire, but will increase the potential for early failure of structural members.
- c. The IC should identify the contents of the taxpayer and determine how they affect the overall operation, structural stability, and firefighter safety.

## 13. Sufficient Resources

- a. Fires involving a large commercial building will require a large commitment of personnel and apparatus. The needs for additional ladder companies due to extensive forcible entry, search, and overhaul at the types of fires if great.

## **D. EXPOSURE PROTECTION**

1. Fire “lapping” out of a window, or burning on the exterior of a building, presents a serious exposure problem.

2. Common cocklofts will allow for rapid fire spread.
3. Units operating a hoseline to extinguish a fire on the exterior of a building should sweep the stream across the face of the building, starting at the top, so the water cascades down the exterior. Do not operate the stream directly into the windows when crews are operating within the building.
  - a. Consider stretching a 2 ½” hoseline for exposure protection if increased volume or reach of the stream is necessary.

## **E. FULLY INVOLVED BUILDINGS**

1. A 2 ½” hoseline should be utilized for commercial structure fires to allow for faster knock down, greater reach of stream, increased volume of water and increased exposure protection.
2. Operate the hoseline on the exterior to protect exposures before entering building.
  - a. Buildings fully involved have an increased collapse potential and require a complete evaluation by the IC before entering
3. Wood frame buildings that initially appear fully involved may only have their exterior siding burning.
4. Consider utilizing master streams from either the engine or tower ladder.
5. Room should be left at the front or sides of the building to allow the tower ladder to position itself appropriately.

## **F. ENGINE COMPANY OPERATIONS**

1. If an offensive attack is initiated, correct handline selection is critical. Contents, fire load and other size-up factors must be considered for adequate hose selection. As a general rule, a 2 ½” line should be stretched for fire attack. This may be adjusted based upon size-up indicators such as fire load and available manpower.
2. Based on size-up and fire load, the first arriving engine may be instructed to bypass the hydrant and begin their fire attack using tank water. In these instances, additional arriving engines shall take a position at the closest hydrant and be prepared to lay in a supply line to the working engine.
3. Sufficient hoseline must be stretched to cover the anticipated fire area. Members shall spread out on the hoseline at the building entrance to provide for efficient advancement. Stretching a 2 ½” line will require sufficient manpower.
4. The primary consideration for the placement of the first hoseline is to the exterior area of the building by the fire area for a fast water attack. This will enable a quick knockdown of the fire while at the same time, drastically improving conditions within the building. After a quick knock down, the hoseline should then be relocated inside to extinguish the fire. If a second hoseline has already been pulled, the first hoseline may be used as a backup line.

5. If, upon arrival, the volume of fire, signs of a potential backdraft, or other size-up factors require a defensive strategy, then 2 ½" handlines and/or master streams will be utilized.
6. The engine officer shall advise via portable radio when the hoseline attack is to commence in addition to updates such as water on the fire, fire knocked down, etc. Conditions in areas behind, adjoining or above the operating hoseline must be monitored. All members must be alert to fireground communications concerning hoseline placement and the commencement of hoseline operations so they may adjust accordingly.

## **7. General Assignments (Basement Fires)**

- a. First hoseline stretched through main entrance or entrance closest to the interior stairs. Again, the IC should consider a fast water attack from the exterior if possible before moving in.
  - i. Access to the basement in a commercial building may be limited. Many basement entrances are located in the rear of the building. If a fire in the basement is suspected, the length of hose stretched should be at least twice the depth of the building when entering from the front.
  - ii. Engine companies shall not enter the basement without a charged handline and must position a member at the top of the stairs to warn crews below, if conditions beyond them deteriorate. Whenever a crew descend into the basement, the IC shall be notified.
  - iii. Control of the interior door is critical! The door should be maintained closed when an exterior entrance is used for attack. The first hoseline will remain on the first floor until the basement fire is controlled.
  - iv. Ventilation of the basement is necessary for the safety of the advancing line. A truck company must be assigned to this task.
  - v. The basement is typically used for storage and contains a high fire load. If crews are unable to control or extinguish a basement fire within 10 minutes, the IC should consider switching to a defensive mode.
- b. Second hoseline will initially position outside the fire building as a back-up for the first hoseline. When not needed to back-up the first hoseline, it can be used to extinguish any fire that may extend to the floors above or positioned as per the IC.
  - i. When the first hoseline does not advance down the interior stairs, or no interior access to basement exists, then the second hoseline can be directed by the IC to enter the basement via an exterior entrance if present.
- c. Third hoseline may be stretched, charged and positioned as ordered by the IC.

## **8. General Assignments (1<sup>st</sup> Floor Fires)**

- a. First hoseline to apply fast water via exterior if possible and then relocate through main entrance to extinguish fire.
- b. Second hoseline initially positioned and charged outside the fire building as a back-up for the first hoseline. If not needed as a back-up, it can be used to extinguish any fire extending to other floors or exposures.
- c. Third hoseline may be stretched, charged and positioned as ordered by the IC.

## 9. General Assignments (Upper Floor Fires)

- a. First hoseline to apply fast water via exterior if possible and then stretch through main entrance and up the interior stairs to the fire floor to extinguish the fire.
    - i. When there is no access to the upper floors by way of the main entrance, locate and stretch via the stairway that provides access to the fire area.
  - b. Second hoseline initially positioned and charged outside the fire building as a back-up for the first hoseline. If not needed as a back-up, it can be used to extinguish any fire discovered in the basement or extending to other floors or exposures.
  - c. Third hoseline may be stretched, charged and positioned as ordered by the IC.
10. The second arriving engine at a commercial fire may be directed to connect into the Siamese connection and await orders from the IC to supply water into the system. This should be at 100 psi initially. For larger fires, additional lines and increased pressure into the system may be required.

## H. TRUCK COMPANY OPERATIONS

### 1. Ventilation

- a. Today's fires are becoming ventilation limited, which at times occurs before the first companies arrive. Therefore, when we force entry, a window fails, or air is introduced into the structure, we see a rapid acceleration of energy and heat. Remember, *ventilation* is any action that allows smoke out and air into the structure. When air is allowed in or out of a structure, we are feeding the flow path and increasing the energy to the fire. Under all circumstances, it is important that members "control the door" and limit unnecessary ventilation.
- b. There shall be no venting indiscriminately before the fire is being controlled as this could create untenable conditions, forcing the attack crew out of the building. This is especially dangerous if you vent behind the line lighting up the entire hallway. Smoke is fuel.
- c. VENTING FOR LIFE – Accomplished to facilitate movement of members into an area where there is a known or suspected life hazard. With an inherent calculated risk of eventually "pulling fire" toward the ventilation area, it is performed only as part of an attempt to reach possible survivors. Consider closing hallway and office doors to limit and/or compartmentalize fire spread.

- d. VENTING FOR FIRE – Accomplished to facilitate the engine company advance to and extinguishment of the fire. This venting should be delayed until the engine company has water and is moving in on the fire.
- e. The safest and most effective method of preventing or controlling a backdraft is through vertical ventilation. It is important that any roof ventilation is properly positioned above the fire. A charged hoseline must be in place at the front of structure.
- f. Outside Vent (OV) personnel should be in position to vent when instructed to do so. OV personnel must inform the IC of any possible delay due to building construction or the need for additional tools.

## 2. Search & Rescue

- a. Immediately upon entering the room from a window, if smoke is pushing in from the interior hall, members should make a quick check/sweep of the floor in the hall outside the door for potential victims before closing the door. Once this door has been closed, a more detailed search may be permitted. The completely removed window will adequately vent the room and the potential of pulling fire toward the vented room will be minimized by the closed door.
- b. When the search of the room has been completed, the door can be opened carefully. This may assist in overall interior ventilation. In the event that fire may be pulled to towards room, the door shall be left closed.
- c. If more than one occupant is found, the IC shall ensure that adequate staffing is assigned to effect their removal. The primary function of the engine crew during this critical period should be to protect the interior stairs.

## 3. Fire Extension

- a. High heat accompanied by heavy smoke with no visible fire is a sign of fire burning in these hidden spaces. Advanced fire in these voids may cause the ceiling to be blown down on members pulling ceilings on the top floor.
- b. If a fire is suspected in the ceiling/cockloft area upon arrival, then an inspection hole shall be made in the ceiling. This hole shall be made just inside the occupancy adjacent to the entrance. The inspection hole shall be as small as possible to limit the amount of air entering the potentially explosive void. A charged line should be nearby before making the inspection hole or opening up any concealed area.
- c. A thermal imaging camera should be used when opening up or checking for fire in walls or ceilings.
- d. A major concern in all fires is knowing where the fire originated. Fire may extend to lower floors via drop downs such as HVAC vents.
- e. Rapid fire spread via an open stairway should be a concern for firefighters operating on upper floors.



4. General Assignments (First Truck Company)

- a. Force entry through main entrance on the first floor
- b. Primary search of first floor (Use T.I.C. as appropriate)
- c. Check near and behind doors that lead to exterior for any occupants that may have been overcome while trying to escape
- d. Determine the life hazard and rescue method as required
- e. Locate and confine the fire (Communicate fire location to I.C. and extinguish if possible)
- f. Ladder building as needed
- g. Control ventilation of the fire area
- h. Attempt an examination of the basement and roof near fire area
- i. Primary search of the perimeter
- j. Roof ventilation, if needed

5. General Assignments (Second Truck Company)

- a. Forcible entry to adjacent occupancies or businesses, making a quick inspection within.
- b. Primary search of all floors above the fire floor
- c. Check near and behind doors that lead to the exterior for any occupants that may have been overcome while trying to escape
- d. Reinforce laddering
- e. Roof ventilation, if needed
- f. Ensure the basement is examined for fire
- g. Secure utilities. Exercise caution when searching for the electric panel. Do not pull meter pan unless authorized by the IC. (If no second truck company arrives, this is performed by first truck company.)
- h. Secondary search of perimeter. (If no second truck company arrives, this is performed by first truck company.)
- i. At basement fires, if the second hoseline has been stretched via an exterior basement entrance, perform coordinated search and examination of basement.

## 6. Roof Operations

- a. A minimum of two members must be assigned to roof operations. Multiple roofs on older buildings may require additional manpower. An officer should be assigned to the roof when possible to supervise operations.
- b. On buildings involving two or more separate occupancies, the IC should consider assigning an entire crew to the roof. On very large roofs, the IC should consider multiple crews under the direction of a chief officer.
- c. The roof team shall notify the IC of any conditions that would delay roof ventilation if needed. Information concerning fire conditions, roof construction, roof covering, hazards, or excessive loads such as HVAC units, etc., must be communicated to the IC.
- d. The roof team must make the presence of lightweight or truss roof known to the IC immediately. The presence of a curved roof, which is an indicator of bow string truss, must be reported to the IC. If heavy fire is suspected in a truss roof assembly, the IC remove all members from the roof, evacuate the building, and set up a collapse zone.
- e. When venting a roof, the team should vent above fire and attempt to use natural openings such as sky lights, scuttles, etc. before cutting roof.
- f. When roof operations are complete, members are to get off the roof.

## I. HAZARDS

### 1. Collapse

- a. When assessing the possibility of collapse, the IC must consider the type of construction involved, the volume of fire, and the amount of time that structural members have been burning or exposed to direct flame contact.
- b. A large volume of fire burning out of control for greater than 10 minutes of excessive loads from items like the building contents, water, ice, or snow shall be evaluated as to the effect it will have on the structural integrity of the building.
- c. Expect floor collapse if you suspect that a fire in the basement has gone undetected for an extended period of time, or when entry has been delayed.
- d. If progress on a fire has not been made within 15 minutes, the IC should consider pulling all interior crews out of the building and reassess conditions.

### 2. Parapet Walls

- a. The least stable of all building walls is the parapet wall. The failure of parapet walls has taken a heavy toll on the fire service. Awnings, canopies, and overhanging signs are usually attached to the front wall or parapet. These present a collapse danger if the supports are weakened during the fire.

- b. Well involved cockloft fires pose the danger of complete parapet wall collapse. Parapet walls often sit on a steel beam for their entire length. Large openings on the front of the building may also indicate the presence of a concealed steel beam. During a fire, these beams have elongated, causing collapse.
3. Backdraft
- a. The feature of construction, specifically large hidden voids, which are commonly found in taxpayers, are a major factor in the occurrence of backdrafts. The majority of the voids are found in the ceiling area.
  - b. First arriving crews must ensure that these voids are identified and examined for backdraft conditions very early in the incident. If heat or fire is suspected in a void, the void must be opened from a safe location. Thermal imaging cameras shall be used to assist in determining if there is a high heat condition above the ceiling.
  - c. If a backdraft condition exists, that information must be communicated to the IC and vertical ventilation must be completed before interior operations are initiated.
  - d. A coordinated attack between engine and truck companies is critical. A charged handline must be in place before vertical ventilation is performed.

## **J. ADDITIONAL POINTS TO CONSIDER**

- 1. Truck Chauffer
  - a. Should remain at truck for turntable operations when tower is in use
  - b. If tower will not / cannot be used, chauffer should assist roof team.
- 2. Tool Assignments
  - a. Considering the construction of the building, the following tools should be considered by the respective team/assignments:
    - i. Can – hook, P/W can
    - ii. Irons – Axe & Halligan, Rabbit Tool, Partner Saw (w/ metal blade)
    - iii. OVM – Axe & Halligan, Maul, ladder, saw
    - iv. Roof – Ground Ladders, saws, hook, halligan