PHOENIX REGIONAL STANDARD OPERATING PROCEDURES	
Policy Name: **FIRE CONTROL**	Policy Number: **M.P. 202.04**
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Related Policies: 202.02C, 202.12E, 202.11, 202.20	
Other Reference: NFPA 1710, UL FSRI	
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PROCEDURE

It is the standard operating procedure to stabilize fire conditions by an aggressive, well-placed fire attack. Any initial attack must attempt to overwhelm fire conditions with well-placed water application and suppression efforts from the most advantageous position(s) to include interior, exterior, or a transitional attack. A transitional attack should be considered when you are passing fire to fight fire and/or conditions need to be changed from the exterior prior to making entry. The fire attack must utilize adequate water volume (gpm) for the fire conditions, heat release rate, and structure/compartment size to control the fire, protect victims and/or property, as well as prevent extension into exposed structures.

PRINCIPALS OF FIRE ATTACK

The most fundamental job of the Phoenix Regional Fire Departments is implementing an effective fire attack. Size up, risk management, and rescue profile drive the strategy, ultimately deciding the best tactics for fire attack. It is necessary to determine the complexity of the compartments, flow path, and exposures when gauging possible fire attacks. Knowledge and understanding of fire behavior and water application are necessary to mitigate the hazard, impact savable lives/property, and remain as safe as possible.

RESIDENTIAL FIRES

By definition, this procedure considers residential fires to be any structures that our community typically resides. This includes mobile homes, houses, multi-family residences, apartments (low-, mid-, or high-rise occupancies), and any buildings that are lived in. These can range from small structures to large multi-story buildings. Firefighting in these structures should be done with a thorough size-up of life safety potential.

Fire control is a crucial component of improving the possibility of savable lives on the fireground. When possible, search and rescue efforts should be performed simultaneously with fire attack to allow for the best outcomes. Effective fire control also directly impacts the possibility of savable property. Simply put, extinguishing the fire makes everything better on the fireground.

Effective fire suppression techniques include understanding the principles of fire behavior. In order to execute fire control, it must be understood what actions best extinguish interior fires. Interior surface cooling with water, then followed by water application to the burning fuels/contents is the most effective extinguishing tactic. This directly impacts interior spaces and tenability for victims and firefighters. An effective fire attack requires appropriate water volume to overwhelm and control the fire. The fire area's size and/or volume must be part of a thorough size up in determining appropriate water volumes as a part of a well-supported fire attack. The ability to get water flow to the best possible locations, from either the interior or the exterior, requires effective hose line deployment with hose lines of adequate length and size for the desired water flow. Utilizing the transitional attack involves water application from the exterior to change conditions prior to making an interior attack. Size up of the fire structure and the distances and items that are challenging the ease and direction of attack lines is a critical function of Company Officers directing the fire attack.

When ventilation limited conditions are discovered during size up, an interior fire attack is typically the best option. When interior fire attack is the best option, suppression efforts directed through the inlet of interior flow paths are the most advantageous. The use of water volume, effective hose stream patterns, and nozzle manipulation are critical to cooling the immediate environment for firefighters advancing on the fire and increasing the pressures to change the flow path direction away from firefighters. Fire attack and coordinated ventilation provide greater survivability, firefighter safety, and property conservation. Intelligent fire attack techniques and coordinated ventilation are essential to effective operations.

When there is a fire in an unventilated compartment, coordinated ventilation in the fire compartment simultaneous to the fire attack will exhaust the super-heated fire gasses and smoke ahead of the advancing attack crew. Ultimately, this tactic changes the flow path direction by over-pressurizing the pathway firefighters are using to make their attack and pushing it back to the fire compartment and out of the exhaust point. A fire attack against the flow path, without the ability to manage the ventilation, is a tactic and should only occur out of necessity.

Understanding air movement and interior pressures should be evaluated and identified as a part of a size up prior to effective fire attack tactics. This recognition and understanding allows for more efficient fire suppression as well as improving interior survivability. Fire suppression from the most advantageous position (interior or exterior) can significantly impact the thermal insult, pressures, and flow path inside a fire building. Cooling the interior conditions reduces pressures and may create favorable conditions for supplemental fire attack and interior search efforts.

Fire control is best supported with coordinated ventilation that is well planned and communicated utilizing fire behavior principles. This can be accomplished in multiple ways, including vertical and horizontal methods. Uncoordinated ventilation will make fire control more difficult, increasing both toxic gasses and thermal insult; this is dangerous and decreases tenability for potential

victims. Access and egress openings must be considered as ventilation and effectively managed during fire attack operations.

UL-FSRI: FIRE SUPPRESSION VIDEOS

Tactical Consideration: There Can Be Survivable Spaces on Arrival

Tactical Consideration: Nothing Showing Means Nothing

Tactical Consideration: Flow Path and Suppression must be Considered Together

Tactical Consideration: Interior Suppression with only Smoke Showing

Tactical Consideration: The Closest Door to the Apparatus Should Not Dictate Line Placement

Tactical Consideration: Exterior Attack with Fire Showing from the Entry Point

Tactical Consideration: Initiate Your Fire Attack on the Same Level as the Fire

COMMERCIAL FIRES

By definition, this procedure considers commercial buildings to be any structures that our community typically conducts business, manufacturing, storage, or typically non-residential in nature. These can be varying in size and complexity. Commercial buildings can be free-standing, part of or connected to other occupancies, and can be multi-story above and/or below grade. They can contain large volumes of contents and include hazardous materials or processes. They can be less compartmentalized than residential structures and have larger overall spaces. Commercial occupancies in the Phoenix regional area can exceed 1 million square feet in space. Residential fire tactics and flow rates should ***not*** be used in commercial fires, and NFPA 1710 target flows should be the minimum.

Commercial building fires can have a life safety potential when experiencing fire conditions. The greatest difference between commercial and residential life safety is firefighters' ability to impact that life safety problem. Residential occupancies can allow for more effective search operations due to the confined nature and fire area volumes. Search operations in large open areas, large complex interior arrangements, or industrial settings with severe or worsening fire and smoke conditions are ineffective and dangerous. As in any structure, the best thing we can do for any potential victims is to extinguish the fire when possible. In cases of a known rescue, a targeted search is possible with a thorough understanding of the fire and smoke conditions and a legitimate assessment of the position in the risk management plan.

Commercial fires require an understanding of fire behavior as well. Commercial fires are more complex, involve large areas and large content loads that can produce intense, severe fire conditions. The best opportunity to extinguish commercial fires is to catch them at their smallest

state after arrival with a well-executed fire attack that overwhelms the fire conditions. When present, building fire suppression systems should be supported as early as possible as well. Water volume and aggressive exposure protection are critical. Exposure protection may require interior and roof positions or exterior operations depending on the building's conditions and structural integrity.

All resources should be directed to fire attack operations from the onset unless a known rescue is present. In this case, crews assigned to rescue must reassess the fire conditions, structural stability, re-evaluate their risk management plan and communicate the necessary support actions. Sector Officers and/or the IC must be able to support the fire attack operations and manage the strategic level risk management plan to determine the duration of time it is possible for this rescue to occur.

When working in the offensive strategy, the Company Officer should consider the need to attack the fire with large volume handlines capable of flowing a minimum of 250 GPM from the most advantageous positions. NFPA 1710 standard is a minimum of three hand lines with an overall volume of 500 GPM or greater. **Water application may be done from an exterior position utilizing a transitional attack to improve conditions prior to entry.** When conditions, or forecasted conditions, prohibit **safe and effective** interior fire suppression the strategy should be changed to defensive.

Water application may be done from interior positions as conditions and risk management allow an offensive strategy or may be conducted from the exterior in an attempt to gain control of the conditions or change to a defensive strategy. The fire attack's position and effort will determine the most appropriate method to deploy 250+ GPM from the necessary tactical positions. Company Officers and/or Sector Officers' responsibility is to direct the attack to determine the most appropriate methods to engage a commercial fire.

Regardless of the strategy, a deliberate volume of water must be used to attempt to overwhelm the fire and heat conditions.

Fire control in commercial fires is best supported with coordinated ventilation that is well planned and communicated utilizing fire behavior principles. The greatest challenges for ventilation in commercial fires are the buildings' size, the ability to create ventilation that is effective in supporting the fire attack, and interior conditions. It is necessary to consider the size of ventilation exhaust points to effectively improve interior conditions. This requires a size up of natural openings and the opportunity to create openings for horizontal or vertical ventilation. The use of windows and doors may provide better ventilation **in coordination with fire attack** than vertical ventilation. The greatest challenge with vertical ventilation is the ability to create a large enough opening in comparison to the building volume to provide adequate ventilation. It may be impossible to cut a ventilation hole large enough to adequately exhaust interior heat and smoke. The IC must work with Sector Officers to determine the potential and available options to ventilate

fires in commercial buildings. **The intent of this coordination is to prevent rapid fire growth with fire companies inside the building.**

150 FOOT RULE

The simple expectation is that no fire companies should operate on the interior of any structure, during firefighting operations, beyond their ability to retreat to an area of safe refuge prior to their low air alarm going off.

During the recovery after the LODD of Firefighter Brett Tarver, the Phoenix Fire Department established that the *maximum* distance any company should advance and operate inside of a structure with smoke and fire conditions is 150 feet. This was determined by the standard lengths of our attack lines and the capacity of SCBA air to allow ingress, working time, and egress without the low air alarm sounding/vibrating.

There are variables that can limit the reasonable maximum distance fire companies should operate inside a structure. These include smoke and fire conditions, building construction or layout, occupancy type, interior obstacles, and the overall physical effort required to advance into a building that increases the air consumption rate.

For the purposes of mid-rise and high-rise buildings, the 150-foot rule is defined as the maximum distance any company should operate on the interior of any structure from the exterior entrance or other protected interior access points. This is measured from any area of safe refuge to the end of the hoseline length stretched into the building. In instances where fire crews are entering a structure from the exterior doors without protect areas of refuge, the 150' is measured from that door. Areas of safe refuge are considered stair wells, stair landings, or any area that can be protected by doors and potentially pressurized to keep smoke and fire out. These include structures that have standpipes in the stairwells that are designed for the connection of fire hoses that can be protected with doors and means of managing the interior environment.

FIRE ATTACK FROM STANDPIPES

As the City of Phoenix grows, there has been and will continue to be an increase in buildings with large square footages and multi-story construction requiring an understanding of building suppression systems. In addition, firefighting personnel must have an understanding of the types of firefighting equipment necessary to ensure an effective fire attack from standpipes. These include commercial and residential occupancies, from 1 story to 40+ stories. Standpipe firefighting has multifaceted considerations based on the presence of building systems as well as the size, layout, and complexity of the structures. Critical keys to consider when initiating a fire attack from a standpipe include:

- Ability to provide adequate water supply either utilizing building systems or engine company pumps

- Ability to provide high pump discharge pressures to adequately take over for malfunctioning or inadequate building fire pumps (Tandem pumping and high-pressure supply hose should be considered).
- Ability to provide adequate water pressure, depending on the hose and nozzle used, to the highest/farthest standpipe outlet.
- Ability to provide fire department external shut off at standpipe connections.
- Ability to determine adequate flow at the nozzle.
- Ability to flow NFPA 13E and 1710 recommended GPM for initial and subsequent fire attack from standpipe connections.
- Ability to flow NFPA 1710 recommended GPM from standpipes on multiple floors simultaneously.
- Knowledge and understanding of pressure reducing and pressure restricting appliances as a part of standpipe systems and their limiting factors for firefighting.
- Ability to stretch hose lines from standpipe connections to the fire location that can be limited by smoke and heat conditions in stairwells and common hallways.

FIRE ATTACK EQUIPMENT AND STANDARDS

The Phoenix Fire Department has a flexible set of hose and nozzle packages to execute an effective fire attack. Each has a specific range of effectiveness to cover the broad potential of residential and commercial fires. It is the expected standard that Firefighters are proficient with these tools and in understanding their capabilities. It is expected that Company Officers and Sector Officers can determine the most effective fire attack operations and supervise their deployment and operations. It is expected that Incident Commanders can determine the overall fire attack requirements for the incident in its entirety and provide direction and leadership to tactical positions as to the overall incident action plan and specifically fire attack for the given incident.

The current standards for water volume for fire attack and the specific hose and nozzle combinations currently carried by Phoenix Fire Engine Companies are:

- *Standard water flows from hose lines and appliances*
    - Residential
        - 150 GPM – (2.5 gallons per second) (1.75" hose lines with automatic nozzles)
    - Commercial
        - 250 GPM - (5 gallons per second) (2" and 2.5" hose lines with fixed gallonage or smooth bore nozzles)
        - 500 GPM - (8 gallons per second) (portable appliances)
        - 600+ GPM – (10+ gallons per second) (deck gun or ladder pipe)

These expectations meet or exceed national best practices and NFPA 1700 and 1710 guidance.

The current hose and nozzle packages that are carried on Phoenix Fire Engine Companies include:

- 1 ¾" hose line with automatic nozzles (x2 minimum)
    - Hose lengths include:

        - 150′ crosslay
        - 200′ crosslay
        - 100′ to 150′ front bumper line
      - Automatic nozzle (75/45 psi nozzle pressure for 70 to 200 GPM)
  - 2″ hoseline with smooth bore nozzles (x1)
    - Hose length:
      - 200′ crosslay or rear mount depending on apparatus manufacturer
    - Smooth bore nozzles with 1 1/16″ tip (240 GPM at 50 psi nozzle pressure)
  - 2 ½″ hose line with smooth bore nozzles (1 or 2 depending on apparatus manufacturer)
    - Hose length:
      - 200′ rear mount (1 or 2 depending on apparatus manufacturer)
    - Smooth bore nozzle with 1 3/16″ tip (300 GPM at 50 psi nozzle pressure)
    - Blitz Monitor with solid bore or peripheral tips (up to 500 GPM)

A necessary component of an effective fire attack is the firefighter's ability to operate specific hose and nozzle packages at the required water flows. A component of effective and safe hose line operation in a fire attack is nozzle reaction. Nozzle reaction is defined as the force exerted by the fire nozzle on the Firefighter. The Phoenix Fire Department standard for nozzle reaction is ***70 lbs.*** for single Firefighter operations. Anything above <u>should</u> require additional Firefighters (s) or operations from the fixed positions on the ground to operate effectively and safely. Any fire attack operations should utilize as many Firefighters as required to deploy, flow, move, and ensure operational safety depending on the line length, diameter, flow, and nozzle reaction.

The Phoenix Fire Department standard is as follows:

- 1 ¾″ hoseline with 75 psi automatic nozzle (in high pressure/blue setting) @ *150 gpm*
  - ***1 firefighter*** operation (average 65 lbs. nozzle reaction during testing)
- 1 ¾″ hoseline with 45 psi automatic nozzle (in low pressure/red setting) @ *150 gpm*
  - ***1 Firefighter*** operation (average 60 lbs. nozzle reaction during testing)
- 2″ hoseline with 1 1/16″ solid bore nozzle @ *240 gpm*
  - ***2 Firefighter*** minimum operation (average 85 lbs. nozzle reaction during testing)
- 2 ½″ hoseline with 1 3/16″ solid bore nozzle @ *300 gpm*
  - ***3 Firefighter*** minimum operation (average 110 lbs. nozzle reaction during testing)

A water supply is a critical component to an effective fire attack. Standard Phoenix Engine Company apparatus typically carry 500 gallons of water (+ or – 50 gallons, depending on the apparatus generation). There are a very small amount of exceptions to this in the Phoenix Fire Department, and an intimate knowledge of each independent apparatus is always required. The establishment of an uninterrupted water supply for declared working fires can be a critical component to appropriately support an effective and safe fire attack.

Specific circumstances exist that it is reasonable for a first due Engine Company (with at least 450 gallons of onboard water) to ***not establish*** a hydrant supply line. These include fires with an unknown location or route to the location in a neighborhood or apartment/business complex, fire in a high-rise building, fires with a known rescue situation requiring immediate action, and/or anytime an Incident Commander has calculated the need for a rapid-fire attack before an initial supply line can be established. It is always the Incident Commander's and/or Sector Officer's responsibility (depending on incident complexity) to ensure adequate, uninterrupted water supplies are in place in all critical tactical positions to support effective fire attack operations.

Strategic Level Considerations

It is the incident commander's responsibility to ensure that an effective fire attack from the most appropriate positions is part of the incident action plan. The positions and volume will be dependent on the incident size, complexity, incident strategy, and available resources.

Command must define Offensive/Defensive Strategy based upon the position in the risk management plan. In addition, Command will consider the following when addressing fire control:

1. Rescue profile of occupants
2. Fire/smoke volume
3. Fire extent
4. Structural conditions
5. Structural ingress and egress
6. Smoke conditions and ventilation profile
7. Available resources

A critical Command decision (both initial and ongoing) relates to the Offensive/Defensive Strategy of the incident:

- Offensive Strategy—an exterior and/or interior fire attack, from inside the hazard zone, with appropriate support work to best support creating and maintaining tenable spaces in conjunction with search operations depending on the rescue profile and occupancy type.
- Defensive Strategy—A fire attack on the fire structure/occupancy from the most advantageous positions and outside of the hazard zone. This fire attack should also work to reduce fire extension into exposures, when possible, from the most advantageous positions (interior or exterior), depending on structure, conditions, and position in the risk management plan.

The Incident Commander will support any fire attack with whatever resources and action is required to reduce fire extension and to bring the fire under control. Command must initially declare the incident strategy and continue to confirm the strategy and the appropriate benchmarks and elapsed time notifications.

OPERATIONAL INFORMATION

BASIC OFFENSIVE PLAN:

- Assume command
- Incident size up and determination of critical factors
- Initial fire attack from the most advantageous position with most appropriate water volume
- Conduct a primary search in coordination with fire attack when possible
- Provide coordinated support activities (e.g., ventilation, forcible entry)
- Support fire attack from the next most advantageous position with appropriate water volume
- Address loss control and property conservation
- Evaluate actions and revise strategy and tactics as necessary

BASIC DEFENSIVE PLAN:

- Assume command
- Incident size up and determination of critical factors
- Write off what is lost, identify, and protect savable exposures
- Attack the fire from the most advantageous positions with most appropriate water volume (large volume devices, well-placed positions)
- Work to support the needs of a high-volume fire attack (necessary water supply, pumped water, etc.)
- Ensure adequate resources to support the operation fully
- Address fire extension, life safety, and loss control and property conservation in exposures if risk management and strategy will allow
- Evaluate actions and revise strategy and tactics as necessary