

**PHOENIX REGIONAL
STANDARD OPERATING PROCEDURES**

BASEMENT AND BELOW GRADE FIRES

M.P. 202.04B 01/25-N Page 1 of 5

PURPOSE

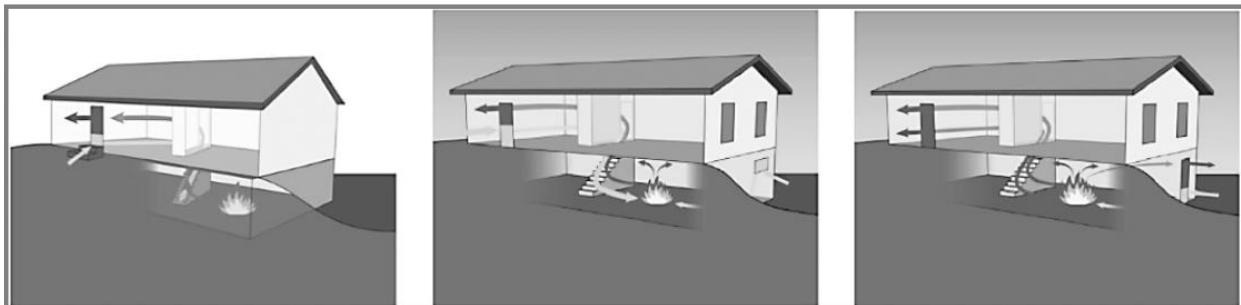
The purpose of this procedure is to establish safe and effective expectations for fire operations (extinguishment, search, and loss control) in occupancies with basements and/or below grade spaces. Basements and below grade compartments pose significant threats to firefighters and can have challenging circumstances that severely limit the ability to extinguish and search those spaces when experiencing high heat and convective currents. Working on the floor above a basement fire poses significant threats due to the potential for lightweight construction and for working in the exhaust portion of the flowpath.

Basement Types

Basement design, location, and access are not standard. Access and ventilation opportunities are limited, and fuel loads can be extraordinary and unpredictable. Multiple types of basements exist in the Phoenix region. The 3 standard types include:

- **No-access basement**
 - No external basement access with internal access only
 - Root cellars are most common type of no-access basements in older Phoenix regional occupancies
- **Limited-access basement**
 - External window access only, including walk up or lookout basements
- **Full-access basement**
 - External door or large escape window access, walkout or daylight basement

Diagrams representing exterior No-access Basement (left), Limited-access Basement (middle), and Full-access basement (right). (Courtesy of UL Fire Safety Research Institute)



**PHOENIX REGIONAL
STANDARD OPERATING PROCEDURES**

BASEMENT AND BELOW GRADE FIRES

M.P. 202.04B 01/25-N Page 2 of 5

Basements also are found in 2 distinct construction states. They include:

- **Finished**
 - Provides structural protection to structural floor components with a potential for livable space (drywall, and interior compartment build out)
- **Unfinished**
 - Provides *no* protection to structural floor components or livable spaces

Size up

Early identification of basements and their access opportunities is critical. This must be considered in the initial onscene size up and a component of the 360° size up. The presence or lack of a basement must be communicated in the follow up report. The early communication is necessary to minimize/eliminate the opportunity for fire crews to end up working above a basement without their knowledge. The immediate dangers include falling through the floor and working in the exhaust portion of a flowpath.

The location of the fire in buildings/occupancies with basements is a critical component of size up. The location and level of the fire in the building must be recognized and communicated in the follow up, if known. There are multiple examples of smoke or fire conditions from the exterior that are indicative of a basement fire. They include:

- Full exhaust ventilation at the first-floor entryway (smoking filling the entire door) without the presence of a neutral plane
- Smoke showing from roof vent pipes or a chimney
- Below grade window or door opening that is a ventilation intake without the presence of a neutral plane

Initial and ongoing size up from the most advantageous position(s) should utilize a thermal imaging camera (TIC). Specific, on-going size up from interior positions can be critical in locating the fire however is a poor assessment tool in assessing structural integrity.

When a fire is located at the basement level, fire attack must begin on that level. That includes basement windows, doors, or stairwells.

**PHOENIX REGIONAL
STANDARD OPERATING PROCEDURES**

**BASEMENT AND BELOW GRADE FIRES
M.P. 202.04B 01/25-N Page 3 of 5**

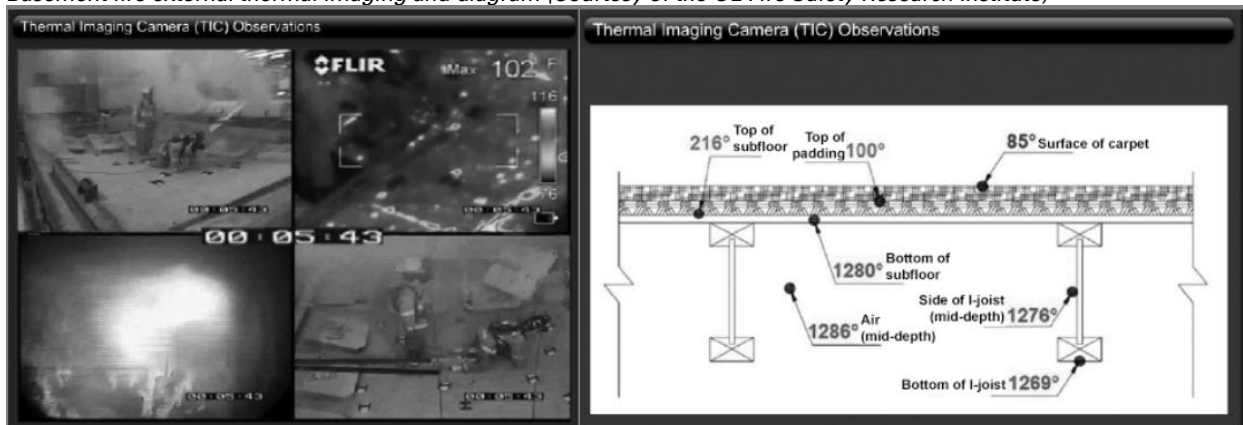
Determining the ventilation profile is an important part of the initial and ongoing size up. Determining the air inlets and the smoke/fire exhaust points for the entire structure improves the effectiveness of the fire attack and minimizes the safety concerns of firefighters knowingly or unknowingly working within the exhaust side of a flow path. Multiple serious injuries and deaths to Firefighters have been experienced when Firefighters have entered the first/ground floor entrances with a fire in the basement. Changes in the air inlets (ventilation) on the basement level have created unsurvivable conditions for Firefighters on the first floor with the exhaust point behind them.

Life safety should be a serious consideration in assessing the fire location, interior access, and searchable space. An effective fire attack on the basement level is about extinguishment as well as creating and maintaining searchable space. Consideration must be given to the structural integrity of the floor joists system while searching and working on fire control below them.

Risk Management

When a basement is present and conditions are such that there is a likely basement fire, our actions must reflect good risk management decisions. Assigning crews to the first floor, above the fire, has significant safety concerns and should not be done until fire control has been achieved and the smoke has been ventilated to determine the integrity of the floor sheeting and joists. Thermal imagers and sounding the floor are not reliable means of determining the structural integrity of the floor system, especially in buildings using lightweight construction materials. Rugs and furniture can hide the areas of floor collapse or areas burned away with no structural supports beneath.

Basement fire external thermal imaging and diagram (Courtesy of the UL Fire Safety Research Institute)



**PHOENIX REGIONAL
STANDARD OPERATING PROCEDURES**

BASEMENT AND BELOW GRADE FIRES

M.P. 202.04B 01/25-N Page 4 of 5

Strategy

The incident strategy, when a basement is present, is dependent on the conditions and resource capability to extinguish the fire prior to structural failure. An offensive strategy is appropriate when the fire conditions will allow for fire attack crews to extinguish the fire in the basement from the most advantageous position(s) (interior and/or exterior). This extinguishment should be on the same level as the basement and crews should determine the integrity of the floor joists separating the basement and the upper floor(s).

A defensive strategy should be considered when crews cannot effectively apply water into the basement from the most advantageous positions on the same level of the basement. A defensive strategy should also be considered when there is limited or zero capability to assess the floor joist integrity separating the basement and the upper floor(s) or it is known that they are compromised.

It could be considered to change from a defensive strategy to an offensive strategy once fire control has been achieved and the floor joists are examined, post ventilation of the basement, to determine the ability to operate on top of the floor joists.

Action

The most effective incident actions for fires in structures with a basement is to extinguish the fire from the most advantageous position on the same level as the fire and to minimize any ventilation prior to extinguishment. If the fire is found to be in the basement, extinguishment from the most advantageous position(s) (interior and/or exterior) should be executed prior to Firefighters making entry into the level above the fire (first or ground floor). The fire attack must be with a minimum of 150 gpm.

Search operations should be consistent with standard operations based on the conditions and available resources to extinguish the fire. Search operations above the fire require the extinguishment of the fire in the basement and the evaluation of the integrity of the floor joists.

Ventilation should be coordinated prior to and during the fire attack. The creation or enlarging of a ventilation opening on the basement level can increase the velocity and pressure of air moving to the floor above, when an exhaust point is open on the first/ground floor. Any Firefighter working in the exhaust portion of that flowpath may experience unsurvivable heat conditions when the ventilation

**PHOENIX REGIONAL
STANDARD OPERATING PROCEDURES**

BASEMENT AND BELOW GRADE FIRES

M.P. 202.04B 01/25-N Page 5 of 5

exhaust is not controlled and there is no water on the fire. Ventilation after fire extinguishment should be in the most effective method for the structure and the openings. Increasing the number of air exhaust points and/or their size will increase the velocity and pressure of the ventilation through the structure.

For fires in full-access and limited-access basements, the fire attack position should be consistent with standard interior or exterior fire control as necessary. The better the ability to apply water to the interior structural surfaces (walls, ceiling, floor joist members) the more effective the cooling and extinguishment will be. Attempting to extinguish the fire by cooling the air and not the surfaces will be counterproductive and will not be effective.

For fires in no-access Basements, the ability to control the fire from exterior positions in the most effective manners is minimal or nonexistent. The only access point to the basement is typically from interior stairs. These interior stairs will likely become the chimney for exhausting, superheated air/smoke traveling from the basement to any ventilation openings/exhaust point on the first/ground floor. The ability to flow water into the basement, onto the interior structural surfaces from above or from the stairwell is extremely limited. Often water from above ends up on the floor of the basement and not on the surfaces or materials that are burning, and the extinguishment is very slow or limited. Using fog streams or other appliances (Bresnan Distributor, penetrating nozzles, etc.) can be considered but should not require firefighters to work from above the fire (dangerous position) and may have minimal or limited success.

Overhaul and Loss control will be dependent on the structural conditions of the floor joists and the ability operate inside or above the fire compartment.