OBJECTIVES

- Review provisions of the building code that have tactical implications
- Review building construction pertaining to multifamily dwellings
- Identify common benefits and problems pertaining to multifamily dwellings
- Categorize and review varying types of multifamily dwellings
- Identify common multifamily dwelling tactics and assignments

Multifamily dwellings are residential structures that are sub-divided into smaller units with multiple different families living within the same building. This is where the fire service vernacular of “multiple dwelling” is derived. Obviously, the greater number of people residing within the same building the greater the potential life hazard. Multifamily dwellings have been around for centuries and have been the site of numerous fire disasters. The United States Fire Administration statistics indicate that from 2012 to 2014 multifamily residential building fires accounted for an annual average of 410 deaths and 4,125 injuries. These fires accounted for 29 percent of all residential building fires receiving a response from US fire departments. Cooking was the leading reported cause (73%) of fires in multifamily dwellings (USFA, Topical Fire Report Series Vol. 17 Issue 3).

Building Code

The building code has had a notable influence in how these buildings are designed and configured. The building code is updated every three years and is a product of scientific research and real life experience. Being familiar with this information can assist fire officers with making sound tactical decisions while using their knowledge of the building’s construction to maximize their effectiveness. It is important for firefighters to remember that building codes are not typically enforced retroactively. That is, modern iterations of the building code are not usually applied to older buildings unless the building is significantly altered or an occupancy classification change is requested. This is why we have numerous apartment buildings without fire sprinklers as they were not required by the building code when the building was originally constructed.

Through the years building codes have been modified to regulate construction with an emphasis on occupant egress and limiting fire growth. This training guide will largely focus on the International Building Code (IBC) R-2 occupancy group which includes primarily permanent residents in occupancies with more than 2 units. However, there is applicability to R-1 occupancy groups that include buildings reserved for transient uses such as hotels, motels and boarding houses. Therefore, this guide should be considered when dealing with fires in both R-1 and R-2 occupancies. Additionally, rowhomes are included in this training guide even though they do not fit into the R-1 or R-2 categories.

Building codes have long reflected the need to limit fire areas. That is, in large buildings a need for a fire wall that effectively divides a large contiguous building into a series of smaller sections. NFPA 221 (Fire Wall Standard) defines a fire wall as “A wall separating buildings or subdividing a building to prevent the spread of fire and having a fire resistance rating and structural stability.” Larger multifamily dwellings like The Vista Apartments (1570 S. Lusk Pl.) have fire walls to limit the building’s size from a fire resistance standpoint.
R-1 and R-2 occupancies require 3-hour fire walls to be constructed once fire areas rise to the following limits (see table below). These maximum allowable areas are considered during the building design phase due to the additional costs that are incurred to comply with the building code once a specific square footage threshold is exceeded. The table below illustrates one example of what the building code may require based on a building’s size.

<table>
<thead>
<tr>
<th>ALLOWABLE AREA FACTOR IN SQUARE FEET BEFORE FIRE WALL INSTALLATION</th>
<th>Wood Frame Construction (Type V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Sprinklered (NS)</td>
<td>12,000 SQ FT</td>
</tr>
<tr>
<td>Partially Sprinklered (S13R)</td>
<td>12,000 SQ FT</td>
</tr>
<tr>
<td>Sprinklered – Single Story (S1)</td>
<td>48,000 SQ FT</td>
</tr>
<tr>
<td>Sprinklered – Multi-story (SM)</td>
<td>36,000 SQ FT</td>
</tr>
</tbody>
</table>
Additionally, the code has also recognized the need for isolating one dwelling unit from another. The 2015 IBC requires a minimum of 1-hour fire partitions between neighboring units and for floors separating dwelling units. This requirement is born out of the code’s recognition that awareness of fire conditions is often delayed when the building’s occupants are sleeping. Additionally, current building codes require that R-1 and R-2 occupancies install draft stops in concealed roof spaces (attics, mansards, canopies, etc.) to limit unoccupied spaces to 3000 ft² or above every two dwelling units, whichever area is smaller. This same separation language in the code has been present for over 20 years. Draft stops are typically made of plywood, OSB, or sheetrock and are designed to slow the spread of heat and available oxygen should a fire enter the unoccupied space. The barrier they provide slows the rate in which a fire can overtake the building which is obviously good for both occupants and fire departments. However, in time these barriers are often penetrated by incomplete repairs, cabling or utility runs.

Building construction and protection often comes down to economics. The IBC does not stipulate exactly how a building must be built but instead outlines the minimum safety requirements and allows the building’s designer to decide how to meet the intent of the code. Therefore, the IBC outlines several exceptions or tradeoffs that can be made when achieving compliance. For example, Chapter 7 (Fire and Smoke Protection Features) Section 709 (Fire Partitions) relaxes the 1-hour fire partition requirement to ½ hour for R-1, 2 and 3 occupancies if an NFPA 13 compliant sprinkler system is installed. Therefore, it often becomes an economic equation. Is it less expensive to install an NFPA 13 system that provides full sprinkler protection or is it less expensive to install an NFPA 13R system which omits non-occupied spaces from being protected by sprinklers but then requires that draftstopping be installed? Again, the path that is chosen is not directed by the IBC but instead is a decision that a building’s designer and owner determine. This once again illustrates the value of pre-planning our response areas. If we know beforehand that a building we are responding to is fully protected (NFPA 13) and there is significant fire showing on arrival, firefighters should beware. The structure built with full sprinkler protection is not constructed the same as one that is without sprinklers or is only equipped with a partial system (NFPA 13R). If the sprinkler system is not functioning correctly, expect more rapid fire spread and collapse. This type of tradeoff is not specific to multifamily dwellings but occurs throughout the IBC.

Lastly, it is important to note that with the City’s rapid growth and annexation over the last 50 years there are numerous existing buildings that were built out of compliance of the building code at the time of their construction. This includes some areas of Garden City and both current and former areas of the Whitney and North Ada County Fire Protection districts. It wasn’t that the Uniform Building Code (Prior to 1994) didn’t stipulate items such as maximum fire areas or required draftstopping but instead was more a matter of enforcement and oversight. Financial constraints limited the number of building inspectors and thus the number of buildings that could be inspected. In the example below, draftstopping should divide the attic space so that it is not common to more than two apartments but it is unknown if these buildings in Garden City contain this draftstopping or not.
Building Construction

Era of Construction

This section will offer a building construction review and point out key differences that have an impact on fire behavior and structural stability. Recognizing the era of construction can greatly assist firefighters in understanding a building’s strengths and weaknesses. Therefore, the following eras are used to help predict construction materials and techniques that were common in each period.

- Historical Era – Pre-WWI (1850-1914)
- Industrial Era – Pre-WWII (1918-1939)
- Legacy Era – Post WWII (1945-1960’s)

Keep in mind that identifying an era is not an exact science and only allows us to infer a narrower list of techniques and materials that were used during a given period. You might have noted that there are year gaps in the eras listed. When a new technique or product is introduced in building construction there is typically a period of overlap. An architect, engineer or builder’s comfort with new construction techniques creates anomalies as some embrace new technology while others stick with methods more familiar to them. For example, when we look at the line between the legacy and modern eras it is far from exact. To help illustrate why, consider the following. The pre-engineered Gang Nail roof truss was developed in Florida and was patented in 1959. There was no doubt a notable lag before pre-engineered roof trusses began appearing in most Boise homes. Therefore, it is relatively safe to assume that a single family or multifamily dwelling built prior to 1960 has a conventionally built roof assembly unless it has been renovated to include pre-engineered lightweight trusses. Likewise, the lightweight engineered I-joist (TJI) was developed in Boise by Truss Joist MacMillan and was patented in 1969. By 1970 there were probably several TJI floor assemblies being installed in Boise homes.
Therefore, the construction type and style of a multifamily dwelling will vary based upon the era in which it was built. There are examples of all five NFPA 220 types of multifamily dwellings in the City. However, a majority of the multifamily dwellings in our region are ordinary (Type III) or wood frame (Type V) construction. Therefore, this guide will tend to focus a little more on those two types of construction.

Ordinary Construction (Type III) Review

Ordinary construction is defined as having brick or block load bearing walls and a wooden roof assembly. The floor assembly may or may not include wood joists. For the line firefighter, it is important to recognize three different eras of ordinary construction, each of which has significant tactical implications. Based upon the era in which the building was built this training guide will briefly discuss the following three categories.

- Unreinforced Masonry (URM) – Unreinforced masonry is the oldest form of ordinary construction and was built prior to 1935. It includes the use of sand lime mortar (water soluble) and was typically constructed without any steel reinforcement bars (rebar) or strapping. A modern masonry wall may be unreinforced if its use is not for load-bearing applications.
- Reinforced Masonry (RM) – Reinforced masonry was built in 1935 or later. This form of construction is much less susceptible to collapse due to the inclusion of Portland cement (non-water soluble) and rebar. Traditional clay brick was largely replaced by concrete masonry units (CMUs) by the 1950s. Reinforced masonry structures are some of the safest buildings we will operate in. Their resistance to collapse and, in older buildings, the use of conventional construction techniques causes them to have ample mass (over-engineering) as opposed to more modern lightweight structures.
- Modern Ordinary (MO) – Modern ordinary construction is typically CMU walls with lightweight pre-engineered wood trusses.

The unreinforced masonry (URM) structure is one of the most dangerous buildings for firefighters. Notable earthquakes, including the Long Beach, CA earthquake of 1933, exposed how unstable these buildings were and prompted building code changes enacted in 1935. Water soluble sand lime mortar joints, straight floor/roof sheeting (affixed perpendicular to joists) and tall unsupported parapets exposed to the weather were a few of the notable problems with URM that were addressed in what was called reinforced masonry.

Following the Tehachapi, CA earthquake in 1959, further modifications to the building code were made and were applied retroactively in some earthquake-prone areas. It is unknown for certain if Boise uniformly mandated these retrofits. Nevertheless, there are clues that at least some of the upgrades occurred including the addition of rafter ties and concrete bond beams or other wall caps that were placed atop URM parapet walls along sidewalks. The images below are included to illustrate some of these local building features despite the fact that they are not in multifamily dwellings.
Wood Frame Construction (Type V) Review

Early wood framed multifamily dwellings in Boise were made of balloon frame construction which created a series of interconnected voids between the basement, walls, floors and attic. This framing technique was very popular from about 1833 to 1940. Balloon framing may be present in some center hallway buildings and is present in several old style/converted multifamily dwellings in Boise.
Around 1930, the fire vulnerabilities of balloon frame construction caused the technique to begin being phased out in favor of platform construction. Again, note the period of overlap between construction styles. In platform construction, the walls were built one level at a time and placed atop the subfloor of the floor below. This effectively acts as fire blocking between the studs and eliminates the interconnected voids. Platform construction is still the technique most common today.
Platform Frame Construction (1930-Present)

It is easy to see that if the same fire were to occur in each of these buildings the fire behavior would be considerably different due to the influence of how they were constructed.

**Common Benefits**

- **Compartmentation** – The very nature of multifamily residential buildings requires numerous walls throughout the occupied spaces that provide for individual rooms in each apartment. These load-bearing and non-load bearing partitions limit fire spread and provide some structural stability to the building. Even though many structures incorporate large trussed roof assemblies, large generalized collapses are rare in completed structures due to this network of walls providing additional support.

- **Water Supply** – Most R-2 multifamily dwellings are located within municipalities with modern water supply systems capable of delivering required fire flows. Modern multifamily dwelling complexes have multiple hydrants located on the property that are required by the IBC. This reduces the length of supply lines that must be used to establish an adequate water supply.
• **Modern Systems** – Modern multifamily dwellings have much better alarm, alerting and suppression systems.

• **Fire and Draft Stopping** – Multifamily dwellings built after 1950 are almost exclusively built using the platform frame construction technique. Platform-frame construction acts as a firestop and eliminates the continuous vertical and horizontal void spaces that the wall framing and floor joists create in balloon framing. Starting in 1970 the Uniform Building Code, used in the west, required the installation of draftstopping (see below) to limit the volume of air available to feed a fire in unoccupied spaces such as floor-ceiling assemblies and attics to 3000 ft².

---

**Common Problems**
Below are some of the common issues experienced at multifamily dwelling fires. These vulnerabilities can be better or worse depending on the category of multifamily dwelling.
• **Apparatus Access** – Access to apartment buildings is often a problem for responding apparatus. This is especially true in garden apartments where buildings are usually constructed in a complex. Getting fire apparatus into the optimal position for operations is difficult. Narrow driveways, dead-ends, vehicle traffic, occupant parking, and additional structures such as storage and car ports provide minimal room for positioning of apparatus. This access limitation can increase the time required to perform a size up and may inhibit the use of aerials for roof access or rescue. Therefore, even when a working fire is obvious, it is the best practice to exercise discipline and stage units outside the entrance to the complex while early arriving units investigate and coordinate the best access routes.

• **Building Access** - Access to the interior of a building can also be challenging. Apartment units are boxed in on two and usually three sides with only one entry door. The primary, and in many cases the only, access door for many of these dwellings often opens into an alcove, breezeway, balcony or interior hallway corridor. All of these egress paths can become unpassable due to fire or smoke from adjacent or lower apartment units. Evacuation of residents will be time-consuming at best and impossible at worse. Trying to fit several companies through such a restriction can be challenging. This limited access can also become an egress issue for threatened firefighters.

• **Resources** – When there is a confirmed fire in a multifamily dwelling, call for additional resources early. The first alarm companies will rapidly be assigned. If initial efforts don’t control the fire quickly, additional help will be needed.

• **Life Safety** – The nature of multifamily dwellings increases the life hazard. As with other dwellings we must consider that every apartment unit is occupied 24 hours a day as occupants can have varying work and sleep schedules. There may be unattended children, elderly or other non-ambulatory residents present at any time. Migrant communities may introduce a high occupant load. There are a number of garden apartment complexes throughout the City that are home to migrant communities. Communication with occupants can be a challenge as there is often a language barrier. Building codes have drastically increased the safety in these buildings through the years. However, many obstacles present evolving challenges to life safety. Mature trees and landscaping can block ground or aerial ladder access to the roof or apartment windows. The integrity of firewalls and draftstopping can be compromised from penetrations. Fire door hinges are often broken, disabled or replaced with regular hinges. Built up floor coverings drag on the bottom of the access door preventing the fire hinge from closing the door. Above are but a few of the items that can change the inherent life safety value of a building as it ages. Lastly, the type and severity of life safety issues can vary based on the building’s configuration and is, in part, why this guide breaks down multifamily dwellings into different categories.

• **Wind** – Wind can create extreme fire behavior and present challenges to both civilians and firefighters. Often, firefighters think of high rise buildings when considering wind driven fires. However, the configuration of a multifamily dwelling may introduce additional concerns regarding wind. See further information regarding wind considerations in breezeway and alcove garden apartments.

• **Fire Hose Management** - Attempting to make access to the interior of the building, may require long hose stretches depending upon apparatus access and building setbacks. The variability of multifamily dwellings requires different techniques for efficiently stretching and advancing attack lines. In some cases, firefighters only have a small landing with which to place their charged hose lines prior to advancement. Preparation and practice with line management beforehand will pay dividends on the fireground.
• **Fire Spread** – Fire is a pressure phenomenon and will take the path of least resistance. Common avenues of spread are through the attic or cockloft, utility chases, floor plenums, interior stairs, or from auto exposure (lapping). Auto exposure often occurs from windows or balconies that can transmit fire from floor to floor if fire starts on the exterior or extends from interior to a balcony or out a window. This can quickly threaten the attic space in a wood framed building if the top floor is involved.

• **Brick Veneers** - Newer buildings often provide a brick veneer finish to improve building aesthetics. Keep in mind that these are not load-bearing and in fact introduce a collapse hazard that has seriously injured and killed firefighters.

• **Unstable Parapets and Facades** – Older multifamily dwellings may have unstable and weakened parapets that are very sensitive to hose streams or building shifts from walls or floors. This is especially true in unreinforced masonry (URM) buildings built prior to 1935. Newer buildings such as hotels often have pseudo-stucco cornices designed to improve aesthetics that are made of little more than Styrofoam adhered to the wallboard.

• **Common attic, floor and void spaces** – Depending on the year of construction there may be connected void spaces that adjoin as few as two apartments or the entire building. Buildings built since the 1970’s were required to include some form of draft-stopping which was intended to slow a fire’s growth once it entered the non-occupied spaces. Multifamily dwellings built prior to 1950 may contain balloon frame construction and are likely void of any fire or draftstopping.

• **Common plumbing and utility chases** – For economic reasons, when buildings were constructed with a multifamily dwelling use in mind they were typically built with common utility chases. This was done by apartment units being stacked and alternated in mirror images so that the same utility chases could be used for multiple apartments. These voids serve as a great avenue for fire spread.

• **Unprotected Areas** – Even when a multi-family dwelling has a fire sprinkler system, it is often only partially sprinklered as required by NFPA 13R. NFPA 13R, Chapter 6.6 (Location of Sprinklers), allows certain bathrooms, closets, balconies and patios to be void of sprinklers. Additionally, the standard states that sprinklers shall not be required in attics, penthouse equipment rooms, elevator machine rooms, crawl spaces, floor/ceiling spaces and elevator shafts.

• **Open Stair Treads** – Regardless if they are wood, steel or concrete, open stair treads are subject to degradation from weather or exposure to fire. The inherent moisture in concrete stair treads can cause them to spall and weaken or disintegrate (see photo below) when exposed to heavy fire conditions. It is best to walk towards the outside of the treads where they connect to the risers if the stairway has been exposed to fire.
Multifamily Dwelling Types

The Boise Fire Department has grouped multifamily dwellings into categories to better distinguish between differing construction types and layout which may have a direct impact on the strategy or tactic that may be successfully applied at various incidents. In some cases, the multifamily dwelling category is further divided into specific styles due to some notable differences. There are exceptions to these categories but most of the multifamily dwellings found throughout the City will fit into one of the categories below:

- Garden Apartments
- Center Hallway
- Old style/Converted
- Row Homes

Note: This training guide excludes residential high rise buildings. Residential high rises are covered in the high-rise training guide.

Garden Apartments

Basic Description
The term “garden apartment” is defined numerous ways within the fire service. For the purposes of the Boise Fire Department a garden apartment will be defined as a multiple dwelling in which each apartment unit opens directly to the exterior and the living space is confined to one floor. In other words, occupants enter directly into their apartment unit without having to enter an interior hallway or other common space first. Although the apartment building itself may be up to four floors, each apartment unit is usually only one story high. A notable exception are garden apartments that offer a two-story unit in an otherwise single-story apartment building. These are often called “townhouse” or “loft” units. These are typically on the top floor or the narrow ends of the building and, in addition to having more living space, include a second floor with an unprotected stairway to the upper floor of the unit.
The configuration of the entry into garden apartments generally falls into one of three categories:

**Breezeway** – In this style of garden apartment an exterior hallway/breezeway runs from what typically is the Alpha side of the structure through to the Charlie side with stairs on each side (A & C) of the breezeway. Each breezeway serves four (4) apartment units, two on the Alpha side and two on the Charlie side. Each apartment unit opens to one side of the building, typically with a patio (1st floor) or balcony (upper floors). Multiple breezeways may be found in one building, but typically there is one or two.

**Alcove** – In this configuration, access to individual apartment units will be located in a consolidated, dead-end alcove. These are short hallways (first floor) or small landings (upper floors) that provide access to two or four apartment units. This concentrates the entry/egress points for multiple units into one area. There is often limited room for hose deployment and fire personnel in the alcove entry area.

**Exterior hallway** – In this configuration, access to apartment units is not consolidated in one area like the breezeway or alcove style apartments. Instead, access doors to units are spread out on the long side of the building (typically Alpha side) with direct access to the first floor and a balcony that serves upper floor units. The balconies serving upper floors typically have access stairs on each end of the balcony and, if long enough, may have an additional stairway somewhere in the middle. Individual apartment units may run the full depth of the building with a patio or balcony on the Charlie side or they may run half the depth of the building and share a party wall with apartments that are accessed from the Charlie side.
Era Considerations
A majority of the garden apartments found in our jurisdiction were constructed in the modern era using wood frame construction. As such lightweight pre-engineered roof assemblies should be expected. Fire protection features such as draft stops and fire sprinklers may vary depending on the age of the building.

Throughout the ‘90s, hundreds of unsprinklered apartment buildings were constructed around the city. When looking at these buildings it seems obvious that they are three story apartment buildings. However, to avoid the costly sprinkler requirement, buildings were designed with dirt back-filled around the perimeter of the structure to just below the bottom of the first-floor windows. Therefore, while we in Operations would call this a 3-story apartment building, the plans describe it as a 2-story apartment building with a basement. Therefore, berms can be a good indication of the era and the likelihood of not being protected with fire sprinklers.

Construction Considerations
Breezeway Apartments – Breezeway apartment construction really took off in the 1980’s and is still a popular style today. The overwhelming majority of breezeway apartments are of wood frame (Type V) construction and incorporate pre-engineered roof trusses and lightweight pre-engineered I-beams, open web parallel-chord wood trusses (PCT) or solid wood floor assemblies. Solid wood joists are usually 2” x 8” or 2” x 10” in dimensions. Joists are commonly topped with tongue and groove plywood and a ¾” layer of lightweight concrete.

The breezeway allows a number of apartments in a building to be configured in such a way that each apartment’s front door opens to a passageway that is open to the atmosphere at its ends. This allows the products of combustion to be vented out of the structure rather than accumulating within an enclosed common hallway. So long as fire doesn’t enter the breezeway, this maintains the visibility and tenability of the passageway much longer for neighboring apartment occupants to egress during a fire emergency. The breezeway style apartment also provides quick access from the front of the building to the back without having to walk completely around the building. Incident Commanders (ICs) may consider this fact when choosing how to organize their functional supervisors.
The breezeway often provides a designed break in the attic’s continuity. Therefore, it becomes more economical for the builder to simply connect multiple sections of a building with breezeways. From a fire suppression standpoint this interruption in continuity can be used as a line to mount an attack where the building construction can be used to our advantage. In the picture of the Whitewater Park Apartments above you can see where above the breezeway the building necks down and provides a narrow recessed throat where the apartment air conditioning units reside up and out of sight. The picture of the Park Apartment fire below shows how the different sections of the building are joined by a breezeway.

Alcove Apartments – Alcove apartments do not have front to back access like breezeway apartments (see photo below) but instead have a dead-end alcove that provides access to a group of apartments. Like in breezeway apartments, the most common construction is wood frame (Type V) incorporating pre-engineered light weight assemblies. Depending on the size of the building, there may be one or several alcoves in the same building. Nevertheless, one must walk all the way around a building to get from the front to the back. This increased travel time may cause an IC to structure his division boundaries and/or functional supervision differently than in a breezeway apartment building.

In this building, the alcoves are only found at the ends of the structure. Alcoves can be positioned on any or all sides of the building depending on the building and apartment layouts. Like in breezeway apartments,
each unit’s front door opens to an area that can vent smoke to the exterior and provides for better occupant egress. The key in determining if it is an alcove-style apartment building is if there is a single stair case recessed into the building with a concentration of apartment entrances serving that area. This concentration creates a single egress point for upper level apartments. The downside to this configuration is that a fire that starts in or enters the alcove area can quickly spread to the combustible siding and/or stairs and trap unsuspecting occupants. Below are images from an alcove style apartment fire in EB’s area on Camas St. (The Chaparral Apartments, 2017). The fire started inside a ground floor apartment and extended to the alcove.

Chaparral Apartments, 5149 Camas Ln. – 2017 (Est. 1977)

As was mentioned above, the building code has required for decades that draftstopping be installed in multifamily dwelling attics to slow the spread of heat and available oxygen should a fire enter the space. This draftstopping requirement may cause building architects to design barriers to meet the code while introducing variation and texture as in the case of the Eagle Point (alcove) apartments (pictured below).

Eagle Point Apartments (Alcove Style), 1837 W. Boise Ave. (Est. 1972)
Exterior Hallway Apartments - Exterior hallway apartments have passageways running along the exterior of the building that serve the individual apartments. This configuration tends to be a little safer for occupant egress in that they may offer a place of refuge on the exterior of the building, remote from the fire apartment. In apartments that have multiple stairways, fleeing occupants have more than one option to get to the ground floor. The exterior hallway building doesn't usually have the bottle neck that the alcove apartment has, nor the air draft that a breezeway apartment may have.

In some cases, current apartments may have begun their life as motels (R-1 Occupancy Group) whereby traveling motorists would typically have 360-degree access to park just outside their hotel room for their temporary lodging. The individual rooms were accessed from the exterior ground floor sidewalk or by the exterior walkways on the front and back of the building.

The R-1 occupancy group is reserved for transient uses such as motels, hotels, or boarding houses. Because of the temporary lodging they provide, the building code for years has required additional non-occupied space separations (draftstopping) to slow fire spread due to the inhabitants being less familiar with their surroundings. Some of these 1-3 story former motels have been converted into apartments.

Other examples of exterior hallway apartment buildings (see photos below) were built under the R-2 occupancy group (permanent residence) from the beginning. The R-2 group is not quite as restrictive as the R-1 group but the 1970 edition of the Uniform Building Code used in Boise had the draftstopping requirement for attic spaces, which limited the attic to 3000 ft² between draft stops.
Fire Problems and Tactical Considerations

Apparatus access will be the most challenging in garden versus the other types of apartments, as they are built as a complex of multiple apartment buildings whereas the other types typically are not. One of the first things we can do to address the issue of access for apparatus is to exercise discipline in staging and then spotting apparatus. Priority should be given for spotting the fire attack engine and truck companies. As units arrive they should stage outside of the complex until assigned and only commit to the complex if access for the truck can be ensured. It is perfectly reasonable to leave your apparatus parked outside the immediate incident area and walk in with tools if it is not needed for a specific assignment.

Fire spread in garden apartments includes the problems common to other types of apartments such as the attic space and void spaces. Vertical fire spread in alcoves and the stairways leading from one breezeway floor to another is a particular hazard that should be considered in garden apartments. As mentioned before, a fire in a first-floor apartment can spread upward and cut off escape for occupants or possibly threaten firefighters operating on upper floors. Door control of the involved apartment unit should be a high priority for the safety of occupants and firefighters. The door to the involved unit should only be opened after the common areas above in a breezeway or alcove have been cleared.

Vertical fire spread can also happen rapidly from one balcony to the next as these are not only constructed with combustible materials but have combustible materials stored on them. Fire spread from one floor to the next and then into the attic is a critical problem that must be given a high priority if exterior balconies are involved with fire.
Special Hazards

Breezeway Apartments - as the name implies, a breezeway creates a potential wind tunnel of increased velocity when the wind is blowing in the wrong direction. Consider the inverse relationship between pressure and volume in fireground hydraulics to illustrate this point. If the same volume (GPM) of water flowing through a 2 ½ inch line is flowed through a 1 ¾ line, there will be an increase in velocity. Likewise, when a gentle head or crosswind is pushing against the side of a building and the predominant opening is a breezeway, there will be increased velocity in that flow path. Below is an example where a fire in Engine 9’s district took control of the breezeway.

Breezeway at Arbor Crossing Apartments, 5122 W. Stoker Ln. – 2016

Alcove Apartments – Firefighters are frequently told to consider wind direction before horizontally ventilating. If a headwind is present, most firefighters recognize that creating an opening could create a wind driven event. Consider that in an alcove apartment configuration, if an alcove is pressurized by a headwind, the firefighter on the leeward side venting a window could be completing the flow path for a wind driven event and place interior crews in imminent danger. It is important for firefighters and fire officers to consider more than just the wind condition of where they are currently standing. It is a good practice to assess and consider wind conditions while responding as well as when walking around a structure after receiving an assignment.

Center Hallway Apartments

Basic Description
Multifamily dwelling designs where access to individual apartments is made through common interior hallways on each floor. These hallways are enclosed inside the building which means that the front doors of
individual apartments do not open to the exterior of the building or into a corridor that is permanently open to the exterior. Instead, these interior center hallways are enclosed and controlled by entry points. This presents a number of challenges for fire departments and occupants once an interior fire starts. These buildings are between 1 and 4 stories in height before specific high rise building features begin to appear. Center hallway buildings are commonly built for apartments, dormitories, condominiums and hotels.

**Era Considerations**

Center hallway multifamily dwellings have been built in every era of our building construction history. Many of these buildings exist around the city and were some of the first iterations of medium and large multifamily dwellings. These dwellings are usually found in the more densely populated areas of cities and have been built using unreinforced or reinforced masonry, conventional or modern lightweight wood framing or with concrete floors and steel bar joists trusses.

Historic (1850-1914), Industrial (1918-1939) and Legacy era (1945-1960s) buildings used conventional construction techniques that did not use light weight pre-engineered floor or roof assemblies. Newer center hallway apartments are platform built and include lightweight roof assemblies and nominal dimension floor joists or larger lightweight I-Joists (TJJs).

Wellman Apartments, 5th and Franklin St. - Unreinforced Masonry (Est. 1930)
Walker Apartments, 914 N. 8th St. - Reinforced Masonry (Est. 1939)

Holiday Inn, 2974 Elder St. - Wood Frame (Est. 2007)

The hotel above is an example of a modern predominantly wood frame center hallway structure (R-1 occupancy). Below is an example of a non-combustible (Type II) center hallway dormitory at Boise State that incorporates pre-cast concrete floor decks with a lightweight concrete roof supported by open web steel bar joist trusses.
Construction Considerations

Center hallway buildings offer a benefit that none of the other multifamily dwellings typically enjoy. That is, with interior hallway corridors, firefighters can quickly move from apartment to apartment through the entire length of the building conducting searches. On the top floor, checking for fire extension in the cockloft with pulling tools is easier with quick access to adjacent apartments through the center hallway. Nearly every other type of multifamily dwelling requires firefighters to travel up and down separate stairs to access different sections of the top floor of the same contiguous building. This may again affect how an Incident Commander chooses to establish division boundaries.

Older center hallway apartments were built using conventional construction techniques which included greater mass and an absence of pre-engineered light weight trusses unless the building was altered in subsequent years. However, some of these older buildings have been standing for over a century which has meant years of exposure to the elements, gravity and building alterations. In brick and mortar buildings, firefighters can expect interconnected voids commonly found in conventional ordinary construction. The number of windows can be a tip off that it is likely a post and beam skeleton supporting the floors rather than floor joists being recessed (let) in load bearing masonry walls.

Fire Problems and Tactical Considerations

A fire apartment door left or propped open can quickly contaminate the public hall and cause occupants to retreat into their apartments which may necessitate rescue from windows above ground level. Additionally, long interior corridors may cause access and egress to be delayed if the closest stair or access point isn’t utilized. Rapid fire spread can be anticipated through pipe chases, vertical shafts and common attics. A high priority should be placed over gaining control of the stairs and interior hallways. Vertical ventilation of the public hallway will improve tenability when coordinated with fire attack.
Special Hazards
Fire Engineering’s *The Art of Reading Buildings* lists common attics, asphalt siding (gasoline siding), collapse of brick veneers and a lack of fire sprinklers as some of the common problems. Many of the modern hotels use Exterior Insulation and Finish System (EIFS) siding which is a modern method of providing better insulation and aesthetics. This system uses expanded polystyrene (EPS) foam which provides great R-value and can be shaped into decorative shapes for corners and cornices. However, the system quickly breaks down under fire conditions if the base and finish coats break down exposing the nylon reinforcing mesh or EPS. Once the EPS and nylon is involved, rapid vertical fire spread can be expected. Numerous recent fire examples exist including the disastrous Grenfell Tower fire in July of 2017.

**Old Style and Converted Apartment Buildings**

**Basic Description**

Old style and converted apartments were categorized together due to some of their common construction features and tactical needs. *Old style* apartment buildings were built originally with the multifamily dwelling use in mind. *Converted* apartment buildings were originally large single family dwellings that were subdivided or normal-sized residential structures that were expanded to accommodate a multifamily dwelling use.
Old Style - White Savage Apartments, 571 N. 13th or 1305 W. Washington St. - Unreinforced Masonry (Est. 1910)

Old style apartments may have multiple addresses assigned to the same building. For example, the White Savage Apartments (pictured above) contain different addresses based upon where the apartments are located within the building. Apartments accessed off the 13th Street side of the building are addressed as 571 N. 13th, whereas the apartments accessed from the Washington Street entrance are addressed 1305 W. Washington St. Each have apartment numbers tied to the different addresses. Converted apartment buildings just have the original address with apartment numbers assigned to the different units.

Converted Apartments - Former mansion and fraternity house 140 Main St. (Est. 1899)

**Era Considerations**

Most of these buildings were originally constructed in the historic or industrial eras which can present fire departments with several challenges. If an older home was renovated into a converted apartment in the modern era and appropriate permitting was followed, then additional safety features may be present such as egress windows or secondary egress stairs. Codes require sleeping areas to have primary and secondary egress exits.
Due to their age, many of these buildings possess some of the old law tenement building characteristics that prompted the New Law Tenement act of 1901 to be passed in New York City following several disastrous fires. The rest of the country would soon follow suit with building code changes. Some of these characteristics include interior stairway connections between the basement and common areas used for apartment egress, combustible public access stairs and trim (see photos below), wood non-self-closing apartment doors, and no glass skylights (wire screen) above public stairs.

Construction Considerations
Old style apartments were built using conventional construction techniques which include greater mass and an absence of pre-engineered light weight trusses unless the building has been altered. However, as with older center hall apartments, many of them have been standing for over a century which has meant years of exposure to the elements, gravity and building alterations. Additionally, due to the era of construction, balloon frame construction was often used, which creates interconnected voids between the basement, walls, floors and attic.

Town Square Apartments, 708 W. Hays St. (Est. 1910)

**Fire Problems and Tactical Considerations**

Like in center hallway buildings, public access stairs and vestibules on the interior of the building allow products of combustion to quickly accumulate, obscuring visibility and trapping residents when the fire apartment door is left open. Due to the building’s age, self-closing fire doors are not typically installed on hallway doors. Additionally, the open apartment door contributes to rapid fire extension from the apartment of origin into other parts of the building.

Rapid fire spread can be anticipated through pipe chases, vertical shafts and common attics. A high priority should be placed over gaining control of the stairs and interior vestibules. Vertical ventilation of the public stair will improve tenability when coordinated with fire attack. Old style apartments may have wire screen skylights located above the common interior stair which provides natural light and allows for a quick method for vertically ventilating the public stairs.

Regardless if the building is ordinary or wood frame, firefighters can expect hidden voids to be a challenge.
Specific Hazards
Transom windows (pictured below) were also a common building feature installed to aid in building ventilation prior to modern HVAC systems. Open or broken transom windows above the smoke layer have contributed to rapid fire and smoke spread and have contributed to firefighter line of duty deaths (NIOSH F2005-03).

140 Main St. (Est. 1899)

Carriage House Apartments, 145 W. Idaho and 112 N. 2nd St. (Est. 1900)
Row Homes

Basic Description
Row Homes are 2 to 4 story dwellings that are deeper than they are wide and typically include 4 or 5 occupancies within the same building. Each row home extends from the bottom floor up to the top floor. Row Homes do not meet the R1 or R2 categories but are included in this training guide due to the similar tactical and management priorities required at multifamily dwelling fires. These connected dwellings are configured the same and are placed in series in a single continuous building. The row home eliminates required adjacent property line setbacks and therefore the actual property line may be the party wall(s) shared with their neighbor. For the purposes of BFD there are a minimum of 4 units per building to fit this category.
Row Homes, 8000 Block Shoup Ave. (Est. 2014)

**Era Considerations**
A majority of the townhouses and row homes in our city have been built in the Modern Era (1970-Present). Therefore, firefighters should expect some level of pre-engineered light weight roof and/or floor assemblies in these structures.

**Construction Considerations**
Wood frame row homes are built using platform construction and typically use pre-engineered light weight assemblies. One of the biggest differences in terms of construction is driven by whether the building was constructed in accordance with the International Residential Code (IRC) or the International Building Code (IBC). This difference can have a big impact on how well a fire will be contained to a single unit.

If the building is constructed in accordance with IRC requirements, then each dwelling is classified as a single family dwelling (SFD). Therefore, each dwelling purchased includes the soil beneath the dwelling, the interior and exterior of their section of the building and a limited amount of air space above the individual row home. Between each SFD unit the IRC requires a two-hour separation. In wood frame construction this is usually achieved by sandwiching two 5/8" thick sheets of sheetrock on either side of the party wall studs. This in effect creates two 1-hour fire walls back to back. Lastly, being classified as a SFD eliminates the fire sprinkler requirement.

In row homes constructed in accordance with the IBC, each unit is purchased (or rented) in a condominium type arrangement. The property beneath, in front or behind the building is not owned by the purchaser but instead is jointly owned by all the owners. Therefore, the IBC classifies the building as an R-3 multifamily dwelling and requires fire sprinklers. This reduces the two-hour fire wall separation between units to 30 minutes. The inclusion of fire sprinklers may contain or extinguish an incipient fire but will likely be an NFPA 13R system omitting coverage in non-occupied spaces.
Fire Problems and Tactical Considerations

One of the biggest issues firefighters will face is rapid fire spread between the open stairs from bottom to top of the row frame. Sleeping areas are typically found on the top floor where products of combustion and heat will quickly accumulate. With the stairs being the dominant vertical channel in the building occupants may have no choice but to close their door and await rescue. This places search and rescue of the top floor high on the priority list. As with draft stopping and other fire separations in multifamily dwellings, their performance is predicated on original workmanship and a lack of penetrations made in subsequent years due to repairs or modifications.

Specific Hazards

Enclosed garages are often included in row homes, either below grade or at ground level. Typical fire separations of 1 hour are included surrounding the garage.

Common Tactics and Assignments at Multifamily Dwelling Fires

- **Fire Attack** – First arriving *Engine Officers* should consider utilizing a deck gun attack to reset the fire and buy some time to stretch hose lines. This can be especially helpful when the fire involves a balcony and is extending up and threatening the attic space. It is recommended that the engine does not completely drain the booster tank with the deck gun.

  *Truck Officers* should consider where and how they position their aerial apparatus. In a best-case scenario, the pedestal can be placed at a corner that would allow for the aerial to be placed to the roof to provide access to the roof or an elevated master stream. This is especially challenging in garden apartment complexes where numerous obstructions exist (garages/car ports, trees, etc.).

  It is best if ICs can assign and position separate hoselines in the apartments involved and/or threatened to avoid having to repeatedly reposition hoselines. Additionally, Officers should try and avoid stretching numerous (more than two) hoselines up the same access stair to avoid confusion and entanglement. One line on the stair treads and one line stretched up the outside of the stairs (e.g. drop bundle technique) tends to minimize this issue.

- **Search, Rescue, Evacuation** – Removing occupants will be a time-consuming and challenging endeavor in an apartment building. The rescue size up priorities found in the *BFD Rescue EOG (Former SOP 202.04)* are a good guide on prioritizing this effort. Certainly, the most threatened occupants are the highest priority. Addressing this high priority life hazard necessitates an aggressive, rapid primary search of these areas by fire department personnel. However, conserve scarce fire department resources by using law enforcement officers for evacuation of non-IDLH areas. Never assign law enforcement to evacuate apartments directly above the fire or in the same breezeway or alcove regardless of current conditions. Once the fire apartment door is opened conditions can change rapidly and endanger anyone in these areas.

  Sheltering residents in place is a viable option for those that are not imminently threatened and allows early arriving fire department resources to focus on aggressive fire suppression to limit fire spread in the building. If occupants are trapped on balconies or at upper floor windows, don’t be drawn into immediate rescue of
these people unnecessarily. Often these occupants are in a place where they are not in immediate danger. So long as there is a barrier between them and the fire (a closed door, a wall, etc.) rescue may not be an immediate priority and resources can be focused on fire attack and search. If, however, heavy smoke is issuing out the window above them or fire is threatening the balcony they are on, rescue becomes a high priority.

- **Water Supply** – If the first arriving Engine Officer is able to position their engine closer to the fire building of the access road it may allow for the water supply engine to perform a reverse lay to a hydrant deeper into the complex and keep the access roads open for other responding truck companies. The water supply engine officer may want to stage his engine at the first hydrant (used for forward lay) and walk in or contact the fire attack engine driver to verify there is room to get by the fire attack engine before committing in for a reverse lay.

Engine Officers should identify hydrants that are strategically placed to provide water to all sides of the structure. If the building is lost it may be necessary for a secondary water supply to be established to prevent extension to adjacent buildings.

- **Ventilation** – Vertical ventilation can assist at reducing the pressure from the draftstopping or firewall during an attic or top floor fire. Vertical ventilation over the public hall or vestibule in center hallway or old style/converted apartments can improve visibility and tenability of the public hall. However, be aware that vertical ventilation must be done in conjunction with suppression from below as there will be an increase in the heat release rate (HRR) and therefore an increase in attic fire behavior if not quickly suppressed. Additionally, inspection holes should be cut prior to the heat hole to ensure you are over the fire area to avoid putting additional pressure on the draft stop by drawing the fire. The variations in building design makes reliably predicting exactly where draftstopping is located difficult at best. If an inspection hole is made from the roof or below from the ceiling and little smoke is showing, suspect a draft stop when a working attic fire is certain. There is an exception granted and draftstopping is not required when the building has a NFPA 13 fire sprinkler system which requires the floor and attic voids to be protected.

Another option that is being tested and considered is the placement of fog nails through the roof decking to increase the thermal ballast in the attic space without providing the additional oxygen a vertical ventilation opening provides.

- **Roof Report** – When a truck company is assigned to provide a roof report, the roof report should be brief but might include:
  1. Type of roof
  2. Conditions on roof
  3. Conditions from roof vents
  4. Concentrated loads (If present)
  5. Firewalls (If present)
  6. Basic Layout (If abnormal)
  7. Actions being taken

If the company provides vertical ventilation, they should provide a follow up report once the assignment is completed:
  1. Where you cut (above fire apartment, public hall, etc.)
2. What affect it had
3. Conditions in the attic/cockloft

- **Utilities** – The utilities can be located on any side of the building and possibly in a breezeway but typically are not on the front side of the building. The ISO or RIT company can secure these as appropriate. It is helpful to know which apartments crews are operating in to be able to prioritize securing those utilities first.

- **Search/Evacuation** – In areas safe to operate in offensive mode, a primary search should be completed. In areas where a defensive mode is utilized, a primary search will not be conducted. The IC must verify evacuation of the immediate exposures, which is usually completed by companies assigned to these areas. PD resources may be used to evacuate non-IDLH areas.

- **Exposure Divisions** – As soon as you have addressed the fire apartment, priority should be given to immediately adjacent apartments and void spaces. The most severely threatened may be the apartment above the fire apartment. The Battalion Chief assuming command should consider the type and layout of the building when establishing divisions or groups.

- **Laddering** – In multi-story apartment buildings, providing secondary egress and escape for occupants on upper floors is essential. Waiting until a ladder is needed to decide to throw it may cause a critical delay in rescuing a civilian or a firefighter. Laddering upper floors ought to be considered proactively after higher priorities have been addressed. Truck companies may consider bringing ladders with them to the fire building proactively, regardless of their assignment. Even if the ladders are dropped in the yard they will be readily available to be thrown.

- **FDC/Sprinkler System** – If a FDC is present it is typically a 1 ¾ connection to support the residential sprinkler system. The exception to this is the few exterior or center hallway apartments that may have standpipes.

- **RIT** – Once the initial tactical areas discussed above have been addressed, a RIT should be established to facilitate a rapid intervention size-up.

- **Safety** – An Incident Safety Officer can be a critical position that can provide vital recon information such as the type and layout of the apartment building. Understanding the exact location of specific apartments is challenging at best for the IC. Safety drawing a quick sketch of the building and apartment numbers can be a big help. Additionally, Safety should assist with an on-going size-up and risk analysis.

- **Medical** – At least one medic unit should be staged and be prepared to treat any injuries. If the medic unit is assigned to assist civilian victims, an additional unit should be requested for fire suppression forces.

- **Rehab** – A formal rehab should be established for rest, re-hydration and medical evaluation for prolonged incidents or during extreme weather conditions.

- **PIO** – These incidents will attract a lot of media attention. The IC should anticipate this and request PD to put up scene tape and assign a PIO to provide media briefings.

- **Perimeter Control** – Consider use of law enforcement to assist with perimeter control and accounting for occupants. Tenants will often attempt to reenter occupancies.
• **Overhaul/Salvage** – Remember that with any significant fire, once the fire is out, an evaluation should be made of the stability of the structure in the area of the fire before performing thorough overhaul and salvage. The IC should consider calling for and communicating with the fire investigator before extensive overhaul is done.