



DON'T GET BURNED

A Safe Community **IS** Affordable.

National Cost Comparison Study



FIRE is frightening



FIRE IS FRIGHTENING – especially in structures that may be housing the elderly, disabled, college students or even families. When a fire occurs in a single family dwelling, it will damage property and often take lives. But when a fire occurs in multi-residential structures – student housing, assisted living facilities, townhouses and small hotels – the damage can be much more dramatic. An unattended candle burning or cigarette left smoldering can cause a fire in one residence that can affect the lives and property of the many others. Firefighters who risk their lives to save others also deserve to be protected while doing their job.

HOW CAN WE BEST KEEP THE RESIDENTS IN OUR COMMUNITIES SAFE ?

BY CONSTRUCTING THESE MULTI-RESIDENTIAL STRUCTURES USING A CONCEPT CALLED **BALANCED DESIGN**, A THREEFOLD APPROACH TO FIRE SAFE CONSTRUCTION.

The first component is **COMPARTMENTATION** with structural walls, floors and ceilings of masonry and concrete products that provide a true 2 to 4 hours of protection with non-combustible structural materials. The second is **DETECTION** with smoke detectors to alert residents to evacuate. And the final component is **SUPPRESSION** using sprinklers to control the fire until the emergency responders arrive on the scene. Each of the three components is very important, working together in different ways to address the fire hazard. **BALANCED DESIGN** offers both an *active* and a *passive* method of protection to a structure. Using detection and suppression systems, which are both *active* systems, that require an input to operate properly. A water source, in the case of a sprinkler system, and mechanical and/or electrical systems, in the case of detection are subject to failure in some circumstances.

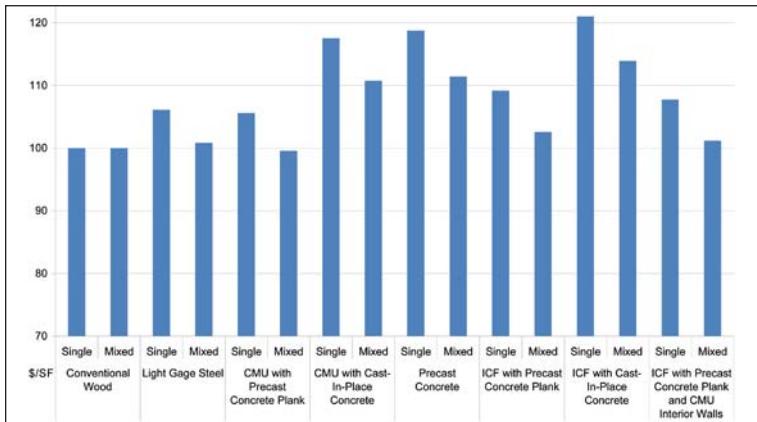
Containment with non-combustible compartmentation is a *passive* system that does not require any other force or system to activate. Compartmentation with concrete based products that will never burn and which will maintain its structural integrity is a vital part of the equation. If a fire were to start within a given room or compartment of a building, the non-combustible walls, floors and ceilings would contain the fire with *passive* protection. This coupled with active systems such as detection and sprinklers will allow the fire spread to remain small and for fire fighters to arrive and extinguish the flames, minimizing damage to the building and possible loss of life.



IS FIRE SAFE CONSTRUCTION AFFORDABLE ? YES, IT IS!

An independent cost comparison study was completed by John C. Haas Associates, Inc., an architectural and engineering firm based out of State College, PA. The objective of this study was to develop a construction cost model to accurately evaluate the relative construction cost of a multi-family building constructed using five different construction materials and two different dwelling unit configurations – single bedroom, to show dormitory type living and multi-bedroom to show apartment or condominium type living arrangements.

41 CITIES WERE STUDIED THROUGHOUT THE UNITED STATES WITH THE FOLLOWING RESULTS:



| SUMMARY DATA | | Cost | Relative Cost | Inc/Dec |
|---|--|---------------|---------------|---------|
| Building System | | | | |
| CONVENTIONAL WOOD FRAMING SINGLE BEDROOM SCHEME | | \$ 11,628,254 | 100.0 | 0.0% |
| CONVENTIONAL WOOD FRAMING MIXED BEDROOM SCHEME | | \$ 12,513,054 | 100.0 | 0.0% |
| | | | | |
| LIGHT GAGE STEEL FRAMING SINGLE BEDROOM SCHEME | | \$ 12,322,872 | 106.0 | 6.0% |
| LIGHT GAGE STEEL FRAMING MIXED BEDROOM SCHEME | | \$ 12,577,064 | 100.5 | 0.5% |
| | | | | |
| MASONRY & PRECAST SINGLE BEDROOM SCHEME | | \$ 12,267,212 | 105.5 | 5.5% |
| MASONRY & PRECAST MIXED BEDROOM SCHEME | | \$ 12,413,040 | 99.2 | -0.8% |
| | | | | |
| FORM IN PLACE CONCRETE FLOOR ALTERNATE (SINGLE) | | \$ 13,706,792 | 117.9 | 17.9% |
| FORM IN PLACE CONCRETE FLOOR ALTERNATE (MIXED) | | \$ 13,882,879 | 110.9 | 10.9% |
| | | | | |
| PRECAST CONSTRUCTION SINGLE BEDROOM SCHEME | | \$ 13,773,304 | 118.4 | 18.4% |
| PRECAST CONSTRUCTION MIXED BEDROOM SCHEME | | \$ 13,880,240 | 110.9 | 10.9% |
| | | | | |
| ICF WALLS & PRECAST PLANK SINGLE BEDROOM SCHEME | | \$ 12,668,660 | 108.9 | 8.9% |
| ICF WALLS & PRECAST PLANK MIXED BEDROOM SCHEME | | \$ 12,813,815 | 102.4 | 2.4% |
| | | | | |
| FORM IN PLACE CONCRETE FLOOR ALTERNATE (SINGLE) | | \$ 14,123,938 | 121.5 | 21.5% |
| FORM IN PLACE CONCRETE FLOOR ALTERNATE (MIXED) | | \$ 14,287,689 | 114.2 | 14.2% |
| | | | | |
| INTERIOR CMU WALLS ALTERNATE (SINGLE) | | \$ 12,518,979 | 107.7 | 7.7% |
| INTERIOR CMU WALLS ALTERNATE (MIXED) | | \$ 12,636,817 | 101.0 | 1.0% |

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THE FOLLOWING CONSTRUCTION TYPES AND ALTERNATES WERE EVALUATED:

- Conventional wood framing with wood floor system
- Light Gage Steel Framing with cast-in-place concrete floor system on metal form deck
- Load bearing concrete masonry construction with precast concrete plank floor system
 - Alternate: Cast-in-place concrete floor system
- Precast concrete walls and precast concrete floor system
- Insulated Concrete Form (ICF) walls and precast concrete plank floor system
 - Alternate: Cast-in-place concrete floor system
 - Alternate: Interior bearing walls constructed of concrete masonry units (CMU)

WALTER SCHNEIDER, PHD PE, the lead engineer on the study, stated that, "Based on the cities where the study has been completed to date, the average cost increase associated with a move to a more robust concrete based compartmentation system is as small as 5.5 percent over conventional wood framing for the single bedroom layout and, is an overall savings of 0.8 percent compared with the conventional wood framing option when looking at the mixed bedroom layout.

These values both coincide with the load-bearing concrete masonry unit (CMU) wall system with the precast concrete plank floor.

For additional study results, log onto www.pafscac.org

MORE BENEFITS TO FIRE SAFE CONSTRUCTION

The minimal increase in construction cost can be paid for over the life of the structure. Materials like concrete masonry, precast concrete, and cast-in-place concrete have many other advantages beyond their inherent fire performance including resistance to mold growth, resistance to damage from vandalism, and minimal damage caused by water in the event of a fire in the building. In many cases, with this type of construction the damage outside of the fire compartment is minimal. This provides for reduced cleanup costs and quicker reoccupation of the structure.

Dr. Schneider also notes that "There are also quality of life benefits that reach beyond the cost of the building and affect us daily. The most noticeable of these is the sound control between dwelling units and the public spaces that is provided by this type of construction. One way to control the movement of airborne sound is through the use of mass in an assembly. The proposed concrete based construction assemblies all have inherent mass associated with them, providing excellent sound deadening properties and producing a quieter living environment."

**Insist on
BALANCED DESIGN
for Multi-Residential Structures**



Conclusion

We assume that when we send our children off to college to stay in student housing or an elderly parent to an assisted living facility or move our family into a townhouse or apartment that they will be safe. Occupants and emergency responders alike are at risk in the event of a fire without non-combustible concrete construction.

Insist on **BALANCED DESIGN** for the Multi-Residential Structures and exceed life safety requirements by providing additional time to control a fire, while sustaining the structural integrity of the building.

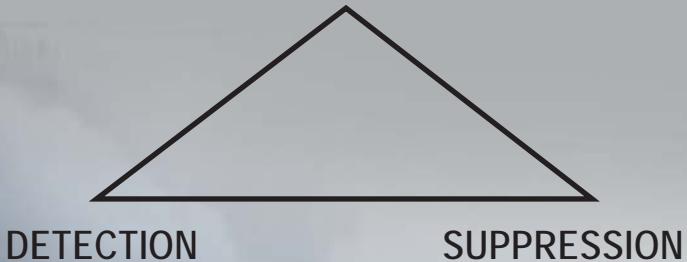
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BALANCED DESIGN

COMPARTMENTATION



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For a complete Executive Summary of the study results, call 1-866-SAFE-NC3 (866-723-3623)
or log onto www.pafscac.org or www.firesafeconstruction.org