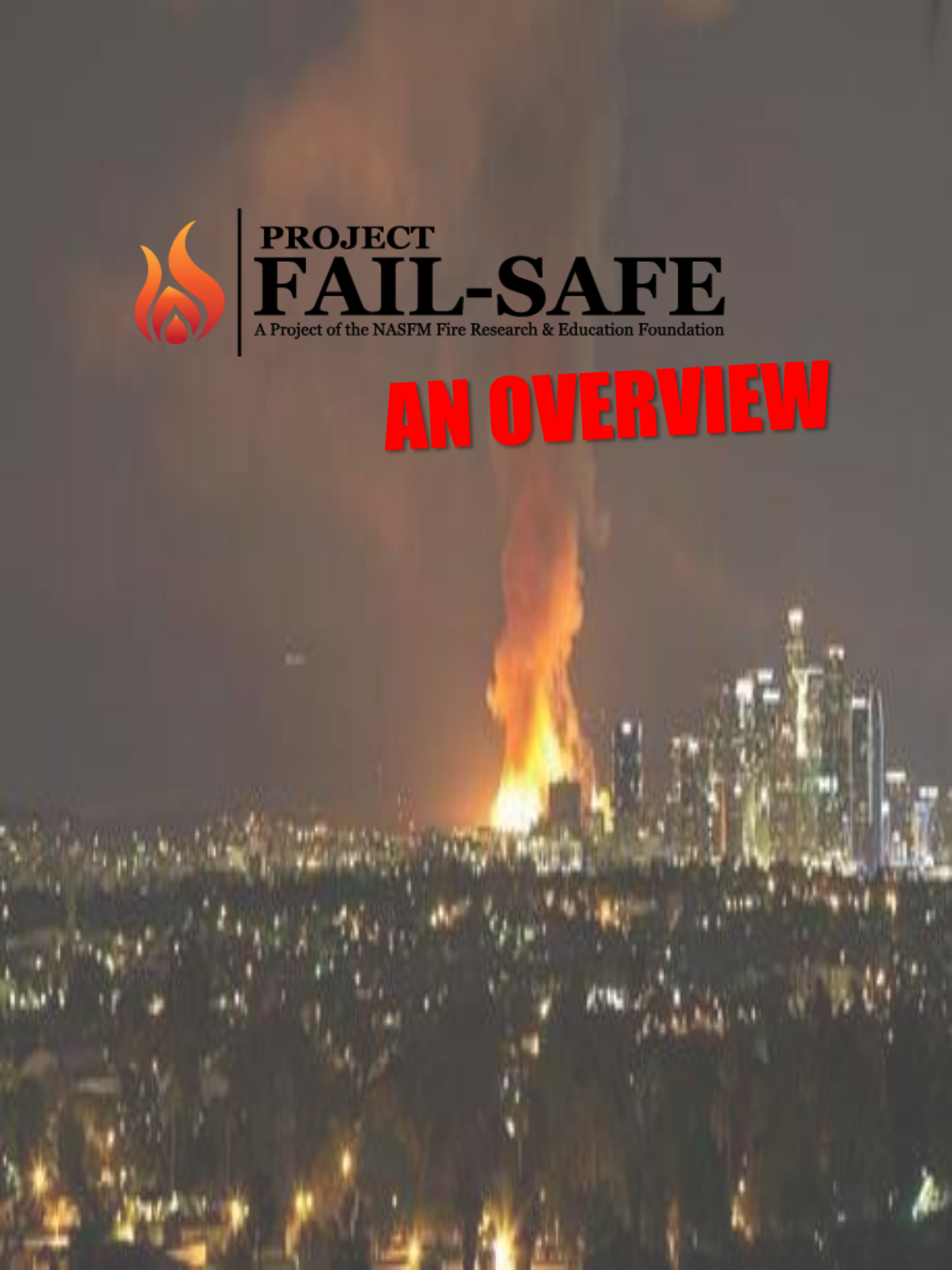
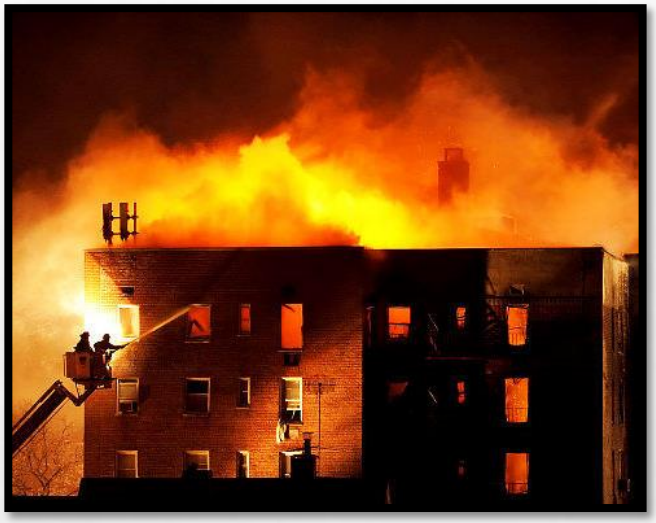

PROJECT
FAIL-SAFE
A Project of the NASFM Fire Research & Education Foundation
AN OVERVIEW

WHAT IS PROJECT FAIL-SAFE ?



The project is designed to make people, property, and communities more **resilient** and **resistant** to fire by examining the value and effectiveness of how **passive** and **active** fire safety systems interact holistically.

The project consists of four key steps.

Code analysis: An examination of the 2015 International Building Code (IBC) to explore the relationship of trade-offs with both building type and occupancy type

Literature review: Aimed at identifying and understanding existing gaps in the current knowledge of fire safety system trade-offs

Computer modeling: Understanding better how fire and its byproducts move, and how structural components react to fire

Matrix development and analysis: Development of a web-based app capable of intaking data about a particular structure and generating a fire safety analysis for comparative analyzation of risk potential

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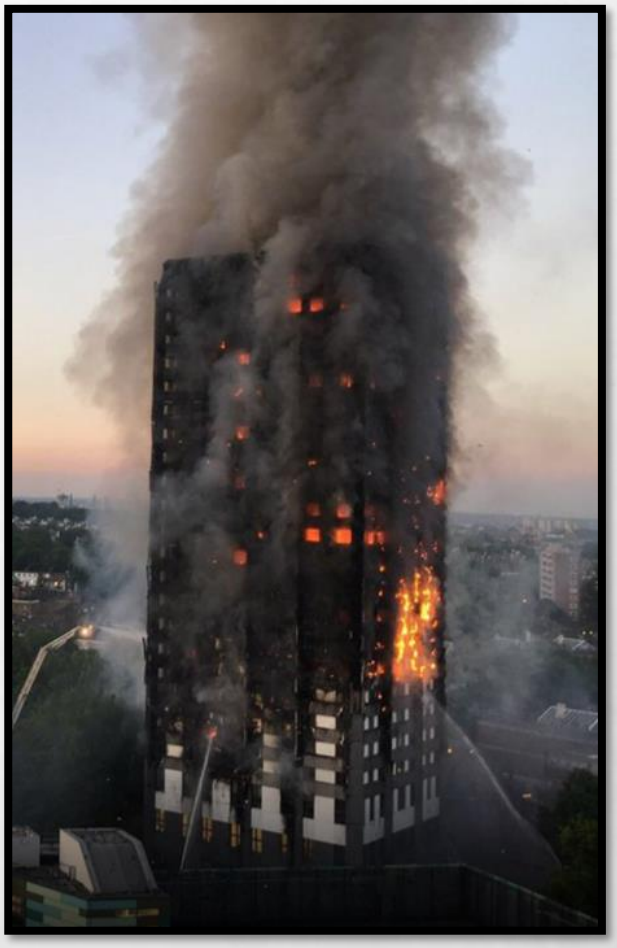
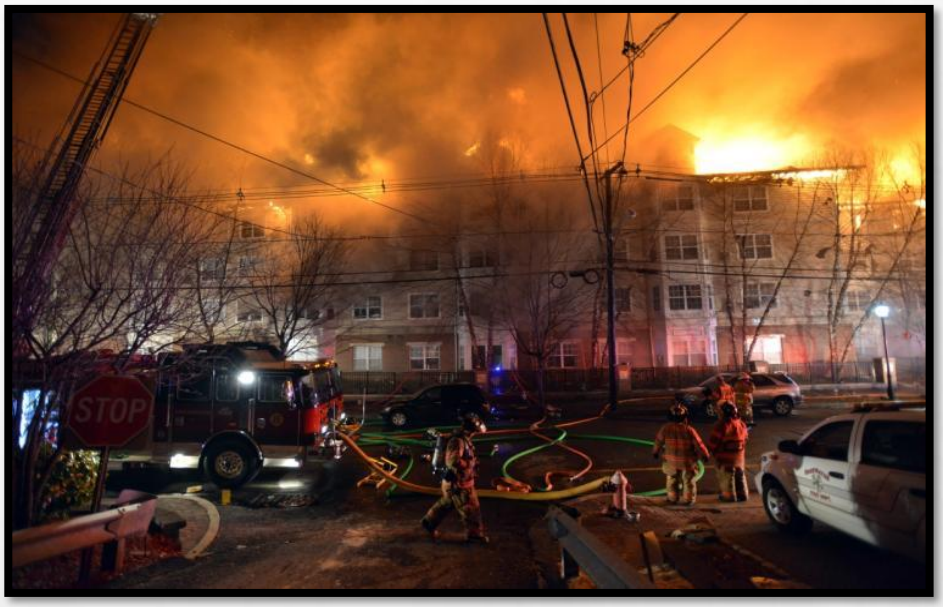
FIRE SAFETY SYSTEMS AND "TRADE-OFFS"

- A **trade-off** is the relaxation of certain parts of building and fire safety codes because the presence of fire sprinklers is perceived to be "enough" to protect the building. An example would be requiring lower levels of fire rated materials and increasing travel distance to exit doors.
- **Active safety systems** are those that actively "fight" the fire – such as fire sprinklers.
- **Passive systems** are those that are already in place that make it harder for a fire to spread, such as fire-resistant doors, higher-rated walls, smoke dampers, and more.
- It is important to think of fire safety in a holistic way, with **redundant systems** in place to prevent tragedy.



NASFM unequivocally endorses **fire sprinklers**, which have revolutionized fire safety, and are extremely effective life-saving devices, protecting both potential victims and first responders. However, they are not the only factor when it comes to fire safety. It is important that we understand how sprinklers interact with other fire safety systems and building elements.

WHAT IS IN THE LITERATURE REVIEW?

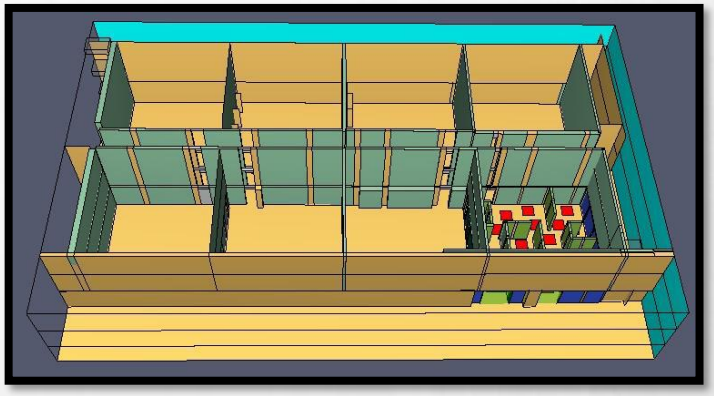


A Comprehensive Review of Existing Research on Fire Safety System Trade-Offs

Key findings include:

- Many provisions in existing fire safety and building code are empirical, and are not based on any sort of data.
- Many building code trade-offs (due to the presence of sprinklers) lack a scientific basis.
- Building code trade-offs could be detrimental to overall disaster resilience of buildings.
- While sprinkler systems can significantly improve firefighter safety by reducing the risk of the fire, building code trade-offs may offset those advantages should sprinkler systems not perform as designed.

WHAT IS THE COMPUTER MODELING, AND WHAT DOES IT CONCLUDE?

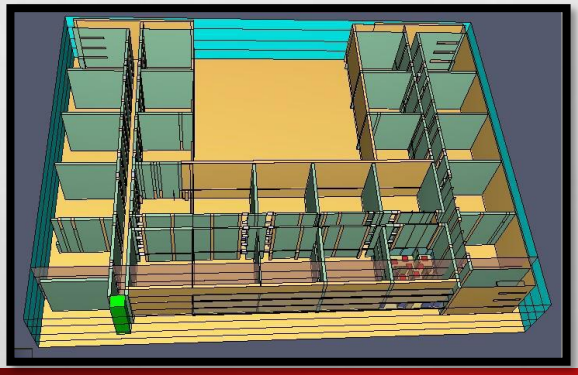


The Modeling Design

- Comparative analysis of fire protection system impacts on fire behavior, occupant survivability and structural resiliency
- Three major sprinkler trade-offs including Egress, Unprotected Opening Area (UOA) and Fire Resistance Rating (FRR) were examined
- Modeling performed for R-2 Occupancy with Type VA and VB construction, both with and without sprinklers present and functioning

Research Conclusions and Recommendations

- Single largest impact on occupant egress survivability is compartmentation of smoke and multiple egress routes
- Major conclusions of UOA modeling is that minimum FSD should be kept no less than 6ft instead of 3ft listed in the IBC code
- Size of UOA has little relevance on building to building fire spread, separation distance and exterior flammability are the keys



- FFR findings show fire will demonstrate more robust spread horizontally through fire separations than vertically
- A hybrid performance/prescriptive approach to structural stability should be pursued to enhance FRR features

WHAT IS THE RISK EVALUATION MATRIX?

The RISK EVALUATION MATRIX™ is a proprietary tool developed by the NASFM Foundation to aid in the measurement of fire safety, providing a framework for the collection and analysis of data relating to building and fire safety codes. It is being used to:

- Compare buildings and fire safety before and after the implementation of the IBC in 2000
- Scientifically evaluate the impact of fire sprinkler trade-offs

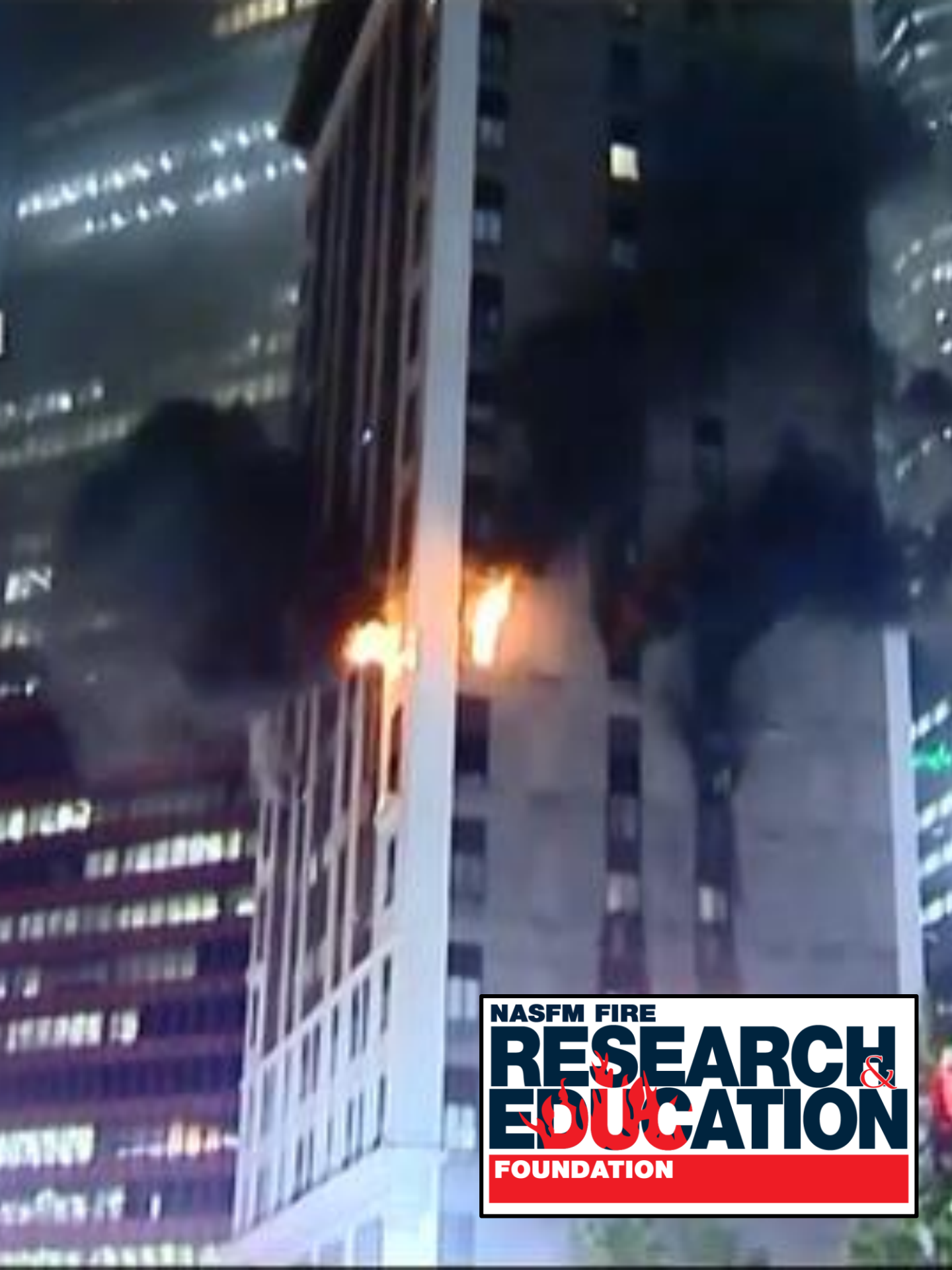
Key Findings Include:

Overall building safety scores decreased, suggesting increased risk:

- Fire safety score decrease of 23.4 percent
- Means of egress score decrease of 18.4 percent
- General safety score decrease of 13.2 percent

The implementation of the IBC had a wide range of individual systems impacts:

- Increased reliance on active fire protection systems in scoring
- Means of egress capacity (the ability of a building to evacuate occupants) scores increased, suggesting decreased risk
- Standpipe (rigid, vertical pipe systems firefighters connect handheld hoses to) scores decreased , suggesting increased risk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