CASE STUDY TO EVALUATE THE EFFECTS OF BUILDING CODE VIOLATIONS ON A FATALITY FIRE

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On a warm summer weekend night near midnight
A fire is noted, 911 called
Bystanders make efforts to alert the occupants
The Fire Department arrives from blocks away and are stunned by the following sight on arrival........

Events
The engines roll in 2 minutes
The engines arrive in 5 minutes
The building is largely involved and threatening other structures on arrival
They know there are trapped people

The Tragedy
Common Apartment Layout
Central Corridor
The initial fire occurs hidden from view
1977 Construction
5 structures all plans approved
Main entry to apartments in central corridor
T1-11 siding exterior
Building exterior
Central corridor
Plywood ceiling
Carpet in central corridor

Building Construction
The family in unit #6 was not aware of the fire
Adults heard commotion outside the complex
To investigate they opened the main entry door
They were overwhelmed by hot gases
They were not able to approach the door to close it
They exited out the rear slider
Two kids egress through 2nd story bedroom windows

Events in #6
The living room rapidly fills with smoke
The occupants attempt to egress by the balcony
Two are lost in the smoke and do not egress

Events #6 - continued
Once the fire is put out
The subject apartment is largely destroyed
The adjacent apartment is 50% destroyed
Three fatalities were found

The Scene
5 Buildings
Matching plans
Permitted at the same time
Used to reconstruct subject structure

Exemplar Structures
Evidence of AC smoke detector and power supply
Building construction
Evidence of ignitable liquids
Terrain level at structure perimeter
Electrical supply
Main entry door construction and hardware
Window size and location
Balcony location and height above terrain

The Investigation
1 hour fire resistive construction
Sec 3308 UBC
* at each entry door
Building Plans

1 hour rated door assemblies

Area = (21)(28) - (4.5) = 552 sq ft

Door size: 51" x 80"

Fire rating: 2 hours

Acc load: 3
Door Plate
1977 Construction
1973 and 1976 UBC evaluations
Sec. 4306 – self closing
Sec 3308 – one hour and self closing

Code Review
- Building occupancy – 28 (14 per floor)
- 1973 code required second exit when more than 10 are on a floor
- All main entry doors opened into covered entry

Occupancy and Egress
A continuous and unobstructed means of egress to public way
Balconies require a stairway as built

Exits - defined
T1-11 Siding
- Class III flame spread rating
Enclosed interior exit pathway
- All doors opened into the corridor
- Class II flame spread limitation

Central Corridor
Corridor exceeds flame spread limit
Doors not one hour
Doors had no closing hardware
Two exits required, only one for 2nd floor units
Corridor slightly longer than 20’

Building Code Violations
- Building code violations don’t cause deaths
- How do you demonstrate that door closures would have made a difference?
- How do you demonstrate that excessive flame spread played a role?

Building the Case
This was common construction
It was approved by the building department
It was inspected by the fire department
It was an incendiary fire, how can the building be responsible
They could easily jump 10’ down from the balconies
Fire doors were installed, the occupants opened the door

Defense Points
1996 Aloha Oregon fire (8 fatalities)
- 3 level apartment
- The occupants unaware of the fire
- Opened the door and could not close it
- The fire trapped the victims in the 3rd floor apartment

Historical Reference
❑ FDS 4.07
❑ June 2009
❑ Geometry - Chief Architect
❑ Material Properties of T1-11 and carpet-
❑ MDE Cone Calorimeter

FDS Modeling
4.07 was used
5.0 had been released
- Coding
- Material
- Familiarity
Plaintiff used 4.07, Defense used 5.0
Models were very similar

Model Specifics
- Domain was extended upward and beyond the walls
- Wind was applied to two domain boundaries
- 291,600 cells
- 0.1m cell size (4")
- Model time 1500 seconds (25 minutes)
- 12 hour CPU time

Model Specifics 2
- T1-11 Plywood
- Commercial carpet
- Gypsum sheetrock

- MDE Cone Calorimeter
  - Heat Release
  - Ignition temperature
  - Critical Radiant Flux

Material Properties
The wood walls and ceiling turned a small fire into an untenable environment.

Non-combustible wall, ceiling and floor was tenable with prescribed initial fires as large 500 kW.

The pressure on the door was not so great that a door closure would not have functioned at least partially.

FDS Model Summary
Untenable Environment
Door Pressure vs. Closing
Depose the experts
Code references
Display the Fire Models

Preparing for Mediation
Mediation
Confidential Settlement
The two damaged buildings rebuilt with fire sprinklers

Resolution
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Questions?