ICC CODE TECHNOLOGY COMMITTEE

BALANCED FIRE PROTECTION – FEATURES STUDY GROUP MEETING #8

August 1 – 3, 2007

DRAFT MINUTES

Embassy Suites Hotel O'Hare
5500 North River Road
Rosemont, IL 60018

Wednesday, August 1: **9:00 am – 5:00 pm**
Thursday, August 2: **8:00 am – 5:00 pm**
Friday, August 3: **8:00 am – 3:00 pm**

1.0 Welcome and introductions – Co-chairs Collins & Dargan
Call to order; introductions; welcoming remarks
The meeting was called to order at 9:00 am on August 1st, welcoming those in attendance. Self introductions were made.

Voting members present: Carl Baldassarra, Laura Blaul, Dave Collins (Co-chair), Sean DeCrane, Kate Dargan (Co-chair), Dave Frable, Sam Francis, Jonathan Humble (Aug 1st , alternate for Robert Wills), Jim Messersmith, Ron Nickson, Larry Perry, Dennis Richardson, Emory Rodgers, Jerry Sanzone, Jon Siu, Rick Thornberry, Robert Wills (Aug 2 -3), Carl Wren

Members absent: Paul Myers (non voting)

Staff liaison: Mike Pfeiffer

2.0 Approve agenda
Approved

3.0 Approve minutes of Meeting # 7 June 19, 2007
Approved as modified:
1.1: Jonathan Siu was not present
9.1(4): The financial estimate is $20,000

4.0 Administration – CTC Minutes
4.1 Study group procedures
The voting majorities of the Features SG procedures were established in an effort to achieve consensus, while at the same time understanding the diversity of the members on the SG. It was again noted that the by-product of the height and area provisions generated by the Features SG can be processed directly into the ICC Code Development process. For all other code topics, the Features SG operates no differently than any other CTC SG – the by-product of the SG is forwarded to the CTC for CTC consideration. Staff further noted that the CTC and all of its SG's are limited in scope in terms of their area of study as determined by the ICC Board.

4.2 Relationship to CTC study groups
See 4.1.

5.0 CTC study group reports related to BFP Features

5.1 BFP Methodology

The following was reported:

- Limited progress on this issue
- Risk analysis being performed by Prof. Noonan is related to this issue.
- This SG was originally looking at a broad application of the issue while the Features SG is looking at identified code topics under Balanced Fire Protection.

5.2 BFP Roof vents

The following was reported:

- The SG is somewhat at an impasse due to firm positions held by members of the group.
- Testing of roof vents at a military base in California is planned this fall.
- The SG has requested the opportunity to review and comment on the proposed testing protocol, once established.

5.3 BFP Vertical openings

The following was reported:

- A discussion draft utilizing a "clean sheet" approach has been the subject of the SG discussions to date.
- Major issue is the compartment size in terms of height and area
- Another issue is that of how the draft relates to current Chapter 7 requirements.
- The SG at this time has not created a consensus product

5.4 Care facilities

The following was reported:

- This SG impacts height and area as the SG is looking to revise the Use Groups in the IBC which impacts height and area considerations.
- The SG is not looking to reconcile state licensure issues as state laws vary considerably

6.0 2007/2008 BFP Features proposals - Working Groups

6.1 Exiting (Frable, Wren, Blaul, Richardson, Baldassarra)
6.2 Compartmentation (Collins, Wren, Perry, Messersmith, DeCrane)
6.3 Smoke management (Thornberry, Blaul, Baldassarra)
6.4 Fire resistance ratings (Sanzone, Siu)
6.5 Performance measures for building safety inspection and maintenance (Dargan)

Items 6.1 – 6.5: The SG met as a whole to discuss the process by which the individual agenda items would be addressed by separating into working groups. The groups broke out into individual sessions from 1:00 pm – 5:45 pm.

2007/2008 BFP Features proposals - Report/Discusion/Decissions

At 8:00 am on Thursday, the entire SG met. The focus of the discussion was item 6.2 – Compartmentation, followed by a discussion on the remaining items.

6.1 Exiting (Frable, Wren, Blaul, Richardson, Baldassarra)

Two handouts presented:

- A handout proposing a new table to IBC 1005 (exit width).
- Proposed revisions to the area of refuge/horizontal exit requirments.

No action by SG.

6.2 Compartmentation (Collins, Wren, Perry, Messersmith, DeCrane)

A handout entitled "Compartmentation based on specific occupancy" was distributed and briefly discussed. See attachment A. No action taken.

A memo dated July 30th to the SG entitled "NFPA 5000 Heights & Area Limits in Chapter 7 and Annex D" was distributed but not discussed. No action.

The focus of the discussion was the fire flow provisions of Appendix B of the IFC and how to translate those requirements into proposed area revisions in the IBC. Issues:

- Sprinkler vs non sprinkler thresholds – 2000 gpm fire flow provisions vs 1500 gpm provisions
- The end result seems to be to allow an increase in building area beyond that currently allowed by the IBC
- Fire flow has two components - the flow available vs the flow that can be delivered. The code can address "the flow available" not "the flow that can be delivered"
- What happens if the AHJ does not have 1500 gpm capability?
- The values for 1500 gpm fire flow may compel owners to sprinkler the building
- H & A structural collapse issues is not a Features issue – this is being looked at by others such as NCSEA.
- Compartment issues
    - Rated construction?
    - Non rated floors provide some level of fire barrier even thought not "rated" per the code.
    - Continuity in terms of stacked compartments and rated construction.
    - No sprinkler trade-offs
    - Need enhanced fire compartments
        - 1.5 hr dampers
        - 1 hr doors
        - Vertical extension at roof ?
        - Fire fighter access per the IFC
    - 20 minute finish rating to achieve continuity?
- Compartment objective;
    - Address fire fighting capabilities – ability to contain and suppress a fire - yes
    - Property protection – no
    - Life safety – no
- Need to define/re-define:
    - Building
    - Fire compartment
    - Fire zone

The entire issue of compartmentation, including 6.3 for smoke management was placed before the SG. Issues:

- Compartment seems to be an improvement over the current code.
- There are clearly details that need to be worked out in terms of this being part of a system.
- There is still a concern relative to the number of compartments and the resulting building size.
- The proposed method of limiting area as a function of fire flow is rational and has a documented and defensible basis.

The SG agreed to pursue the proposal for compartmentation in the 2007/2008 cycle.
Action Items:

- Dave Collins to refine the fire flow table, provide definitions.
- Rick Thornberry and Jon Siu to refine the smoke management matrix.
- Kate Dargan to generate the reason statement as to why the SG is pursuing this revision.
- Rick Thornberry and Laura Blaul to create the reason statement as to the smoke compartment philosophy.
- Carl Wren, Dave Colliins and Carl Baldassarra to create the technical logic portion of the reason statement

6.3 Smoke management (Thornberry, Blaul, Baldassarra)

A handout entitled "ICC CTC Balanced Fire Protection Features Study Group Smoke Management and Control" was distributed. This was cited as reference material which noted:

- The current code requirements
- Purpose and goals
- Methods and strategies
- When required
- Balanced Fire Protection Design

A handout "smoke matrix for compartments" was distributed. The purpose of the criteria is to address smoke between compartments. See Attachment B.

During the discussion, the SG agreed by a vote of 12 – 4 to provide an exception for non sprinklered single story buildings and remove Group E.

6.4 Fire resistance ratings (Sanzone, Siu)

A handout entitled "Fire Resistance Ratings Report" was distributed and briefly discussed. This report focused on a review of the tables in IBC 720 and included a matrix, by occupancy, of the different types (and ratings) of separation noted in the code. No action.

6.5 Performance measures for building safety inspection and maintenance (Dargan)

The following was reported:

- This is probably a 10 year effort.
- Encourage business to embrace by providing incentives.
- Fire prevention effectiveness depends on:
  - As approved by the building official and fire chief.
  - As accredited by authorized agencies
- Where an effective program is in place: use a building 1.5 multiplier to be applied; or a 1750 gpm fire flow shall be used

Action item:

- Kate Dargan to investigate the possibility of a 2007/2008 code change. May or may not be a SG proposal

7.0 2007/2008 BFP Height and area proposals

7.1 Height/Story reductions for unrated construction (Wills)

Submit the proposals for Groups B, M, R, S-1 and S-2 in the 2007/2008 cycle. These were developed at the last meeting.

7.2 10 ft sprinkler allowance/podium buildings (Thornberry, Richardson, Siu, Nickson)
The SG re-considered item 7.1 from the June/2007 meeting to create a correlative change for podium buildings. The SG decided that it would not propose a code change to address the issue of automatic sprinkler increase relative to height and area.

7.3 One story non conforming existing buildings (Richardson)
The SG agreed to support a code change to address existing buildings. The key to the proposal is that of allowing additions to existing buildings provided the building's height and area complies with the code under which the building was originally constructed.

7.4 Group I-1 [tabled at Meeting #8] (Messersmith)
This proposal was withdrawn in light of the activity of the CTC SG on care facilities and how they are addressing height and area.

7.5 Inconsistencies in Table 503 (Messersmith, Thornberry)
Numerous tables and documents were introduced, citing primarily the "double dipping" of the IBC relative to increases for both height and area for sprinklers. Due to time constraints, the SG was asked if they wanted to continue with the review of the documents presented. Due to the press of time, the SG decided that it did not have time to adequately address the issue in advance of the 2007/2008 code change deadline.

8.0 Development of basic quantitative and qualitative measuring assessments
Frank Noonan presented a Powerpoint presentation entitled "Risk Assessment using Scoring System Methodology (SSM) as holistic substitute for IBC Height & Area Table." Excerpts from select slides:

The challenge:
- H&A Table overly prescriptive?
- Incomplete with respect to assessing all relevant factors that make a given building size safe or unsafe.
- Goals:
  - Holistic approach.
  - Acceptable level of fire safety for communities, occupants, emergency responders

Risk Metric Narrative:
- "Building Safety" is defined as the aggregate effectiveness of the mitigation features ((Active and Passive and Emergency Response) in a building that are provided to protect the structure, occupants, emergency responders, and property from losses associated with anticipated hazards primarily due to fire exposure and subsequent collapse.
- "Building Safety Success" can be defined as meeting the goals for the reduction of life and property loss that are acceptable and economically supportable. This is the core concept of acceptable risk. Acceptable building safety risk is that level of anticipated loss that each entity impacted can accept if a hazardous event occurs. It is based on the probabilities that the various mitigation strategies will perform as intended and it can be measured as a quantitative value, a qualitative value, or both.
- Identify and analyze a building's hazards and the potential mitigations of those hazards that positively impact building safety and also considers their probability for successful performance

Risk factors:

- ☐ 1. Exiting
- ☐ 2. Compartmentation
- ☐ 3. Smoke Management
- ☐ 4. Automatic Sprinklering
- ☐ 5. Fire-Resistive Construction
- ☐ 6. Structural Integrity
- ☐ 7. Better Inspection and Maintenance Compliance
- ☐ 8. Emergency Response
- ☐ 9. Occupancy Type

Schedule:

- Project timeframe: March 8, 2007 – February 28, 2008.
- 1st draft of risk factors: August 3rd
- Risk factors complete: September 5th
- Initiate voting: September 7th
- Post results: Round 1: Sept 18th; Round 2: Sept 28th
- Initiate calibration of scoring model: October 1st
- Complete calibration of scoring model: November 1st
- Post prototype model: Jan/Feb '08

A de-brief with the SG was held. Issues:

- Cost around $16,000.
- AFSCC has agreed to underwrite but is hoping for additional financial assistance from others.
- The effort is not a ICC sponsored project or an ICC contract.

9.0 Height and area future direction

Not discussed.

10.0 New business

None

11.0 Future meetings and Assignments

November 27 – 28: Location TBD. Preferred location – Dallas

January 15 – 16, 2008 (tentative). Location TBD

12.0 Adjourn

The meeting was adjourned at 3:00 pm on August 3rd.

CTC website for posted materials: **http://www.iccsafe.org/cs/cc/ctc/balanced.html**

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List of Attendees

Ken Kraus	Los Angeles Fire Dept.
Bob Kleinheinz	National Fire Sprinkler
Gregory Keith	The Boeing Company
Richard Schulte	Schulte & Associates
Bob Perry	Door and Hardware Institute
Jason Krohn	PCI
Dan Smits	Jorgensen/Wilder
Bill McHugh	FCIA
Farid Alfawakhiri	AISI
Jonathan Humble	AISI
Greg Keith	Boeing
Vickie Lovell	Intercode, Inc.
Mike Ashley	AFSCC
John Valiulis	Hilti, Inc.
David Dratnol	Isolatek International

Attachment A

COMPARTMENTATION BASED ON SPECIFIC OCCUPANCY
2006 IBC

OCCUPANCY GROUP	THRESHOLDS	TYPE OF SEPARATION	NOTES
A-1	None required		
A-2	None required		
A-3	None required		
A-4	None required		
A-5	None required		
B	None required		
E	None required		
F-1	None required		
F-2	None required		
H-1	Sections 307.1, 414.2 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Walls: min. 2 hours; 1 hour up to 3rd story above grade plane, or 2nd story below grade plane (Table 414.2.2) • Floors: min. 2 hours; 1 hour in Types IIA, IIIA, & VA if sprinklered and ≤ 3 stories (414.2.4) • Number of control areas/floor limited based on location (story) in building (Table 414.2.2) • MAQ's are reduced based on location (story) in building (Table 414.2.2) • Automatic Sprinkler is required to be designed to Sections 903.2.4.1 through 903.2.4.3 • Corridors by one row of sprinklers maximum allowed is 13 heads. • Section 415 and provisions of table 415.5.1 may require a separate building to comply.
H-2	Sections 307.1, 414.2 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Same as H-1

OCCUPANCY GROUP	THRESHOLDS	TYPE OF SEPARATION	NOTES
H-3	Sections 307.1, 414.2 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Same as H-1
H-4	Sections 307.1,		

	414.2 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Same as H-1
H-5	Section 307.1, 414.2, 415.8 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Same as H-1 • Fabrication areas to be separated from other parts of the building by 1-hour fire barriers, with ¾ hour doors and windows (415.8.2.2) • Max. 4 stories • Liquid storage rooms to be separated from other parts of the building by 1-hour fire barriers (≤ 150 sq ft) or 2-hour fire barriers (> 150 sq ft)
I-1	Section 419.2, 419.3 Dwelling/sleeping units to be separated from each other	Fire partitions & horizontal assemblies	• Min 1-hr rating (min ½ hour if sprinklered in Types IIB, IIIB, and VB) • Min ¾ hour rating for doors (1/3 hour for ½ hour fire partition)
I-2	Section 407.4 • Stories used for patient sleeping or treatment rooms • Other stories with occupant load ≥ 50	Smoke barrier	• Min 2 compartments per story • Max 22,500 sq ft compartment area • Max 200' travel distance to smoke barrier door • Min area req'd per patient for refuge area • Independent egress req'd from ea. compartment
I-2	Section 407.3 Corridors	Smoke partitions	Non-rated doors, "effective barrier to limit transfer of smoke"
OCCUPANCY GROUP	**THRESHOLDS**	**TYPE OF SEPARATION**	**NOTES**
I-3	Section 408.6 Occupant load ≥ 50	Smoke partitions	• Min 2 compartments per story • Max 200 occupants per smoke compartment • Max 200' travel distance from any location to smoke barrier door, 150' from required room exit access door to smoke barrier door • Min area req'd per occupant for refuge area • Independent egress req'd from ea. compartment • Exception if provided with direct exits to "safe" place
I-3	Section 408.7.1 Sleeping areas to be separated from corridors and adjacent common	"Smoke-tight partition"	Doors to be "substantial…,of construction that will resist the passage of smoke."

	spaces: • Occupancy Condition 3 & 4 (free movement w/in smoke compartments & movement restricted in occupied spaces), and • Travel distance from sleeping area through common space to the corridor > 50 ft		
I-3	Section 408.7.2 Sleeping areas to be separated from other sleeping areas, corridors and common spaces: • Occupancy Condition 5 (staff-controlled manual release from sleeping areas)	"Smoke-tight partition"	Doors to be "substantial…,of construction that will resist the passage of smoke."
I-3	Section 408.3.6 Vertical exit enclosure		• Glazing up to 5000 sq in protected by sprinklers allowed at each floor in one exit enclosure • Doors allowed to be ¾ hour rated
I-3	Section 408.5 Vertical openings		Height-limited openings in floors allowed without shaft construction
I-4	None required		
OCCUPANCY GROUP	**THRESHOLDS**	**TYPE OF SEPARATION**	**NOTES**
M	Section 414.2.5 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Walls: min. 2 hours; 1 hour up to 3rd story above grade plane, or 2nd story below grade plane (Table 414.2.2) • Floors: min. 2 hours; 1 hour in Types IIA, IIIA, & VA if sprinklered and ≤ 3 stories (414.2.4) • Number of control areas/floor limited based on location (story) in building (Table 414.2.2) • MAQ's are reduced based on location (story) in building (Table 414.2.2)
R-1	Section 419.2,		

	419.3 Dwelling/sleeping units to be separated from each other	Fire partitions & horizontal assemblies	• Min 1-hr rating (min ½ hour if sprinklered in Types IIB, IIIB, and VB) • Min ¾ hour rating for doors (1/3 hour for ½ hour fire partition)
R-2	Section 419.2, 419.3 Dwelling/sleeping units to be separated from each other	Fire partitions & horizontal assemblies	• Min 1-hr rating (min ½ hour if sprinklered in Types IIB, IIIB, and VB) • Min ¾ hour rating for doors (1/3 hour for ½ hour fire partition)
R-3	Section 419.2, 419.3 Dwelling units to be separated from each other	Fire partitions & horizontal assemblies	• Min 1-hr rating (min ½ hour if sprinklered in Types IIB, IIIB, and VB) • Min ¾ hour rating for doors (1/3 hour for ½ hour fire partition)
R-4	None required		

OCCUPANCY GROUP	THRESHOLDS	TYPE OF SEPARATION	NOTES
S-1	Section 414.2.5 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Walls: min. 2 hours; 1 hour up to 3rd story above grade plane, or 2nd story below grade plane (Table 414.2.2) • Floors: min. 2 hours; 1 hour in Types IIA, IIIA, & VA if sprinklered and ≤ 3 stories (414.2.4) • Number of control areas/floor limited based on location (story) in building (Table 414.2.2) • MAQ's are reduced based on location (story) in building (Table 414.2.2)
S-2	Section 414.2.5 Hazardous materials exceed Maximum Allowable Quantities (MAQ's) => control areas	Fire barriers & horizontal assemblies	• Walls: min. 2 hours; 1 hour up to 3rd story above grade plane, or 2nd story below grade plane (Table 414.2.2) • Floors: min. 2 hours; 1 hour in Types IIA, IIIA, & VA if sprinklered and ≤ 3 stories (414.2.4) • Number of control areas/floor limited based on location (story) in building (Table 414.2.2) • MAQ's are reduced based on location (story) in building (Table 414.2.2)
U	None required		

Notes on matrix:

1. Does not include requirements for mixed uses (incidental, accessory, separated/non-separated), Section 508
2. Does not include requirements for fire areas for sprinkler requirements, Section 903

Attachment B

Smoke Management/Control for Carl's Compartments

(X) indicates only allowed when sprinkler protection is provided

	Doors	Windows	Penetration	Joints	Vertical Openings *	Air Movement**
Smoke barriers						
Smoke partitions						
Horizontal assemblies w/smoke			X	X	X	X
Fire walls						
Fire walls w/smoke	X	X	X	X	X	X?
Fire barriers						
Fire barriers w/smoke	X	X	X	X	X	X
Fire partitions						
Shaft enclosure					X	
Pressurization					X	
Pressure differential	X	X	X	X		
Air flow	(X)	(X)			(X)	
Smoke/Fire dampers						X
Mechanical smoke exhaust	(X)	(X)	(X)	(X)	(X)	(X)
Natural ventilation						

* stair, elevator, escalator, ramps, refuse/laundry chutes; atria per current code
**ducts, plenums, hoods

Goal: limit smoke spread to other compartments in multistory and high risk occupancies

When:

- Non Sprinklered:The compartments are interconnected and not protected with an automatic fire sprinkler system

  Exception: one story

- Sprinklered: Adjacent compartments are interconnected, a floor is more than 2 stories above grade plane and of occupancy groups:
  - A
  - ~~E~~
  - I-1
  - Floors of I-2

Rationale

- Limit smoke spread between compartments in buildings without sprinklers
- Applies in buildings with 3 – 7 stories
- Occupancies A, E, I-1, I2
  - Longer egress time or shelter in place (larger numbers, compromised)
  - Challenging rescue