

Meeting Minutes

NFPA High Rise Building Safety Advisory Committee (HRB-SAC)

17-18 July 2007
Hilton Suites Chicago - Magnificent Mile
Chicago, IL

1. **Call to Order.** Chair Quiter called the meeting to order at 8:30 AM.
2. **Introduction of Members and Guests.** The following committee members were in attendance

Name	Representing
James Quiter	Arup
Richard Bukowski	US National Institute of Standards and Technology
Geoff Craighead	Securitas Security Services USA, Inc.
Jon Magnusson	National Council of Structural Engineers Associations
John Miller	Los Angeles City Fire Department/International Association of Fire Fighters
Jack Murphy	Fire Safety Directors Association of Greater New York
Steven Nilles	Council on Tall Buildings and Urban Habitat
Jake Pauls	American Public Health Association
Robert Pratt	Tishman Speyer Properties
William Stewart	Metropolitan Fire Chiefs
Charles Jennings (alternate member for Sally Regenhart)	The Skyscraper Safety Campaign
Kristin Collette	NFPA Staff

The following committee members were not in attendance:

Name	Representing
Sally Regenhart (principle member, Charles Jennings in attendance)	The Skyscraper Safety Campaign

The following guests were also in attendance:

Name:	Representing
Kathleen Almand	Fire Protection Research Foundation
Ron Coté	NFPA Staff
Dave Eckmann	Magnussen-Klemencik Associates

Casey Grant	Fire Protection Research Foundation
Glenn Hedman	University of Illinois at Chicago
Edwina Juillet	Fire/Life Safety for People with Disabilities
Robert Solomon	NFPA Staff
Antony Wood	Council on Tall Buildings and Urban Habitat
Kim Clawson	Council on Tall Buildings and Urban Habitat

3. **Agenda Review.** Chair Quiter reviewed the agenda and informed the committee that NFPA Staff Liaison Kristin Collette would be making a presentation prior to agenda item 4. Agenda items 6, 8 and 9 would be accommodated on the first day due to the availability of guests who would be discussing those specific subjects. The main goal coming out of this meeting will be for the committee to compile and submit public comments in the name of James Quiter by August 31, 2007.
4. **Approval of Minutes from 2006 October 4-5 Minutes.** The minutes were approved without any modification
5. **NFPA Staff Presentation and Updates.** NFPA Staff Liaison Kristin Collette presented "NFPA and Fire Safety in High Rise Buildings: *A Status Report*" (See Minutes Attachment A) to the committee. This presentation introduced to the committee the work that has been done at NFPA with regard to high rise building safety in response to the recommendations put out by NIST. Many of the items discussed in the presentation had previously been reviewed by HRBSAC and referred to specific NFPA technical committees for follow up action. It also introduced selected proposals that have been submitted on NFPA 101 and NFPA 5000 that may be acted on by the committee. The presentation was also accompanied by a brief update from NFPA Staff Ron Coté and Robert Solomon on the code revision process, formalizing public comments and the upcoming deadlines for the Annual 2008 meeting cycle.
6. **Review and Discussion of NFPA 101 and NFPA 5000 proposals relating to high rise buildings.** The committee began their review and discussion on the public proposals related to high rise buildings that were submitted for NFPA 101 and NFPA 5000 (Agenda Attachment C) as well as additional proposals brought to the committee's attention by Jake Pauls and Robert Solomon. Chair Quiter informed the committee that all proposals beginning with those from NFPA 101 would be briefly reviewed, in sequence order, and a decision would be made to return to them for further discussion and input if needed after all proposals were seen by the committee. After reviewing all proposals, the committee decided that 30 proposals needed further discussion and then a determination could be made whether or not the committee would submit a public comment for review by the TCs. From the 30 proposals which were re-addressed by the committee, seven committee recommendations/actions were created based on NFPA 101. Most of these subjects are also governed by NFPA 5000. It was determined that the focus would be on the NFPA 101 proposals and that the technical committees would be reminded to generate identical comments for NFPA 5000 when appropriate. Kristin Collette would formally write up the

committee actions as public comments to be voted on by each committee member. These comments must be voted on by HRBSAC and submitted by August 31, 2007. Kristin would also be in contact with the NFPA staff liaisons of NFPA 72 and NFPA 1221 to confirm their committees work with In-Building Radio Specifications as found in Proposals 101-457b and 101-457c. While some proposals were not addressed, various topical areas were highlighted as important issues that HRB-SAC and NFPA should continue researching and work to include more information in future editions of the codes. This included Risk Assessment, disability access and evacuation procedures

7. **Fire Protection Research Foundation Project Update.** Fire Protection Research Foundation staff, Kathleen Almand and Casey Grant presented the committee with an update on the various projects that have been recently completed as well as future work of the Foundation (See Minutes Attachment B). The presentation included information about the mission, research process and resources of the Foundation. Recently completed projects include:

- a. **Notification Effectiveness for Large Groups.** This was a project funded by USFA as part of larger study on notification effectiveness for NFPA 72. The project was an anecdotal study which consisted of a series of evacuation studies carried out in offices, libraries, etc. where tonal or voice alarms were provided to trained or untrained occupants, with or without trained staff assistance. From the project it was found that informed occupants evacuate more effectively and the effectiveness of notification systems that only *alert* the population of an incident (e.g., a tonal signal) is dependent on the level of training of the occupants or the reliable presence of trained staff. Other findings included staffing recommendations, types of guidance provided by notification systems and alternate means of notification.
- b. **Public Perceptions of High-Rise Building Safety and Emergency Evacuation Procedures.** This project was Funded by NFPA at request of HRBSAC and consisted of a survey of 244 residential building occupants located in Chicago, New York City, and San Francisco, and 228 commercial building occupants located in Boston, Chicago, Detroit, Houston, Los Angeles, Miami, and Philadelphia. These occupants were surveyed on general knowledge of high-rise building safety and emergency evacuation procedures and the attitudes and perceptions about high-rise safety and emergency evacuation procedures. It was found that eight in ten (83 percent) commercial building respondents reported they participated in a fire drill within the last year, compared to 18 percent of residential building respondents. The most frequent top-of-mind suggestion to building management to improve safety was “more fire drills” (11 percent of commercial and 18 percent of residential occupants). Almost all occupants (98 percent commercial and 95 percent residential) know where the fire exits are. Finally, most occupants (80 percent of commercial and 75 percent of residential) believe using elevators is unsafe. In contrast, 28 percent (for both

commercial and residential) believe that going to the roof is a possible alternative to using the stairs.

- c. **Fire Resistance Testing for Performance-based Fire Design of Buildings.** This project was funded by a consortium of government, test labs, and industry as recommended by NFPA response to NIST WTC recommendations. It consisted of a literature review and survey of FPE firms and resulted in a series of recommendations on how to make results of current test more useful for performance based design. Project results were in two areas; thermal aspects and structural aspects of the test. These include changes in instrumentation, changes in furnace control and recommendations for changes to structural measurements, design, conduct and record keeping.
8. **CTBUH Update.** Executive Director Antony Wood from the Council on Tall Buildings and Urban Habitat gave a presentation to the committee on the initiatives of the organization (See Minutes Attachment C). This included information about the CTBUH conferences, monthly newsletters, new CTBUH website, the creation of International Tall Building Resource Centre in CTBUH Headquarters at IIT and future work of the group.
9. **Status of Evacuation Planning Concepts/Directions for Inclusion in NFPA 1.** Jack Murphy presented the committee with an update on activities of the task group [Jack Murphy (chair), John Miller, Wes Shoemaker (former member), Robert Pratt and Charles Jennings], created from the October 2006 meeting. This update included a draft of the High-Rise Building Office Occupancy Guidelines To Develop Crisis Plans For Fire and All-Hazard Emergencies for which the committee was able to review and make brief comments. A majority of the report focuses on the various types of building emergencies and the responsibilities of the Life Safety Staff during these emergencies. Much positive feedback was provided to Jack Murphy and the task group on their efforts of completing the first draft of the document. The task group welcomed all feedback from the committee. Robert Solomon also suggested that Kristin Collette be in contact with the staff liaison for NFPA 1600 on the coordination/formatting of NFPA 1600 and the task group's report. After further discussion, the committee decided that the task group would complete a final draft of the document by the next meeting (TBD) that could be used in the next code revision cycle for NFPA 1, NFPA 101 and NFPA 5000. It was also suggested that the task group meet with the Fundamentals Committee either in September or at the ROC meetings in Providence, RI to make the technical committee aware of the work that HRB-SAC is doing with this report and its future place in the codes.
10. **News/Other Business.** Ron Coté and Dick Bukowski updated the committee on the progress of the ASME task groups' work on elevators for occupant evacuation and elevators for fire fighter use. The committee decided that they would wait until the completion of the work from the ASME task group before proceeding to push for any further proposals or code changes. Charles Jennings updated the committee on the Association of Public-Safety Communications Officials (APCO). Jack Pauls

recommended a follow up action by the committee on the Research Foundation's report on "Public Perceptions of High-Rise Building Safety and Emergency Evacuation Procedures". It was agreed by the Committee that this be an agenda item for the next meeting. Jake Pauls also recommended that the action to create new Technical Committees dedicated to high rise buildings for the next cycle of NFPA 101 and NFPA 5000. This would also be an agenda item at the next meeting. Robert Solomon opened the opportunity for each committee member to provide a formal alternate to serve on the committee in their absence.

11. **Scheduling of next meeting.** It was decided that the committee did not need another meeting until the summer of 2008 and could possibly meet with the Standards Council during their meeting in Boston in July 2008. If any further issues arose from the public comments the committee could have a conference call in late winter
12. **Adjournment.** The meeting was adjourned by Robert Solomon (Chair Quiter had to leave the meeting at 10:00 am) at 12:00 pm on Wednesday July 18, 2007.

Meeting minutes prepared by,



Kristin Collette
Staff Liaison

Minutes Attachment A

NFPA and Fire Safety
in
High Rise Buildings
A Status Report
(June 2007)

Milosh Puchovsky, P.E.
Assistant Vice President
Codes & Standards Administration



Agenda

- High Rise Advisory Committee
- Key Considerations
- NIST Recommendations
- NFPA Initiatives
- Proposals for NFPA 101 & NFPA 5000



High Rise Building Safety Advisory
Committee (HRBSAC)

- NFPA funded activity
- Identify high rise safety issues and help focus discussion
- Aid in implementation of NIST recommendations
- Provide measured, capable, intelligent responses



NIST Recommendations

- 30 recommendations addressing a broad range of subjects that impact numerous NFPA documents
- Origins of many prior to 9-11
- Calls for better understanding of threats, physical phenomenon of fire and building performance, and human behavior



NIST Recommendations

- Do not indicate that current methods, thresholds or requirements are flawed or inadequate
- Call for improvements and more technical basis for code provisions



NIST Rec. # 4 – Construction Classification & Fire Resistance

- Thresholds for high rise buildings
- Concepts require further study



NIST Rec. #16 – Training on Occupant Preparedness for Evacuation (cont.)

- Disability Access Review and Advisory Committee
- Emergency Evacuation Planning Guide for People with Disabilities



NIST Rec. #17 – Timely Full Building Evacuation

- Specific to threat/hazard
- Occupant behavior
- Evaluation tools and data
- Systems performance
- Hazards associated with rapid evacuation
- Planning & training
- Use of non-traditional means of egress (elevators)
- Counter-flow by emergency responders



NFPA 1, 101 & NFPA 5000

- Current editions 2006
- Next editions 2009
- Technical Committee meetings to address proposals for next editions - Nov 2006 / Jan 2007
- Correlating Committee meeting to address proposals for next editions – April 2007
- ROP to be published June 22, 2007



Balanced Egress (101-130)

- For other than existing buildings, where more than one means of egress is required, the means of egress is to be of such width and capacity that the loss of any one means of egress leaves available not less than 50% of the required capacity.



Minimum Stair Widths (101-89a)

- Proposal to increase minimum stair widths for all stairs serving stories with an occupant load in excess of 50 to 56 inches.
- Proposal not accepted.



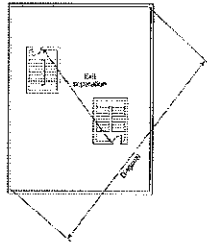
Capacity for Wider Stairs (101-134)

- Capacity factor for stairways wider than 44 inches increased.
- Incentive for constructing wider stairs.



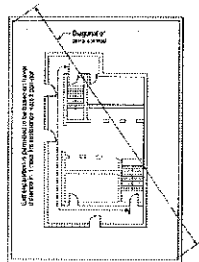
Remoteness of Exits in High Rise Buildings (101-143)

- 1/2 diagonal required for new high rise
- Proposal not accepted



Remoteness Measured in Rated Corridors (101-143a)

- To be measured along shortest corridor path



Elevators for Occupant Evacuation (101-166)

- Prior to phase I Emergency Recall
- Elevators not credited for satisfying number, capacity or arrangement of means of egress
- Evacuation plan incorporating elevators
- Elevator signage
- Additional conditions to be satisfied



Situational Awareness of Egress Usage (101-165)

- Video camera, monitoring and recording equipment to be used by building staff and emergency responders to capture real-time information on egress and counterflow in exit stairs.
- Proposal not accepted.



Elevators for First Responders (5000-194)

- Elevator for use by first responders in buildings over 120 ft. in height
- Proposal not accepted
- Awaiting ASME A17 task group hazard assessment and recommendation

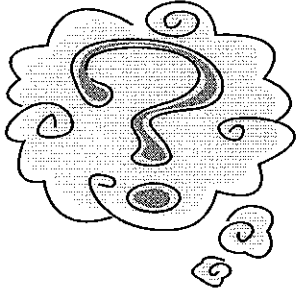


Fire Department Communications in High Rise Buildings (5000-237)

- In-building radio system specification addressing coverage, amplification, testing and inspection
- Proposal not accepted
- Task Group of TC on Building Service and Fire Protection Equipment to report during comment stage



Thank You



Minutes Attachment B



Recent Activities

Presentation to NFPA HRBSAC
July 17, 2007



Outline

- Foundation introduction
- Recently completed projects of interest
- Newly initiating projects



Foundation Mission

Plan, manage and communicate
research in support of the NFPA
mission



Resource to Technical Committees

- Short term technical questions
- Integrating new technology
- Request for a new standard.
- Long term regulatory challenges



Research Process

- Research Projects Initiation:
 - Need for research identified by technical committee, organizations/associations, manufacturers, end user groups, other affected interests
- Core Planning Meeting:
 - Outline goals, scope, tasks, schedule
 - Develop preliminary work plan
 - Determine likely funding sources and secure sponsors



Research Process (cont'd.)

- Project Technical Panels:
 - Principal sponsors, code enforcers, code writers, technical experts, NFPA committee liaison
 - Determines technical details of the project, oversees contractor, reviews and approves progress and reports
- Research Performed:
 - Primary Contractor selected
 - All sponsors receive early access to program results
- Research Reports Published:
 - Final reports published and available to all



Current Projects

- compendium of test data
- compact mobile shelving protection
- combustible liquids in composite IBCs
- FDS for incipient fire detection
- FDS for sloped ceilings
- CO detector spacing
- PPV fire fighting tactics
- heat capacity test method
- breathing apparatus for overhaul
- roadway tunnel detection
- research needs workshop - tunnels
- measuring effectiveness of fire prevention
- research issues - protection of retail fireworks facilities
- dust explosion model evaluation and application
- gas vent sizing
- hydrogen research advisory panel
- aging of residential wiring
- classifying oxidizers - validation plan



Recently Completed Projects Of Interest

- Notification Effectiveness for Large Groups
- Public Perceptions of High-Rise Building Safety and Emergency Evacuation Procedures
- Fire Resistance Testing for Performance-based Fire Design of Buildings



Notification Effectiveness for Large Groups - Study

- Funded by USFA as part of larger study on notification effectiveness for NFPA 72
- A series of evacuation studies in offices, libraries, etc. were carried out
- Tonal or voice alarms were provided to trained or untrained occupants, with or without trained staff assistance.
- Anecdotal study (ie different populations)



Notification Effectiveness for Large Groups - Findings

- Informed occupants evacuate more effectively
- The effectiveness of notification systems that only *alert* the population of an incident (e.g. a tonal signal) is dependent on the level of training of the occupants or the reliable presence of trained staff.
- This type of staffing effort should be supported by other means of informing occupants of the incident (such as a voice notification system), in order to provide redundancy in the system.
- It is critical that a voice notification system provide information in an authoritative and consistent manner; and clear regulatory guidance should be developed in this area.
- Consideration should be given to alternate means of notification, such as visual or tactile systems.



Public Perceptions of High-Rise Building Safety and Emergency Evacuation Procedures - Study

- Funded by NFPA at request of HRBSAC
- A survey of 244 residential building occupants located in Chicago, New York City, and San Francisco, and 228 commercial building occupants located in Boston, Chicago, Detroit, Houston, Los Angeles, Miami, and Philadelphia.
- Surveyed on:
 - general knowledge of high-rise building safety and emergency evacuation procedures,
 - attitudes and perceptions about high-rise safety and emergency evacuation procedures.



Public Perceptions of High-Rise Building Safety and Emergency Evacuation Procedures - Findings

- The events of September 11, 2001 have heightened occupants concerns about safety in high-rise buildings.
- Eight in ten (83 percent) commercial building respondents reported they participated in a fire drill within the last year, compared to 18 percent of residential building respondents. The most frequent top-of-mind suggestion to building management to improve safety was "more fire drills" (11 percent of commercial and 18 percent of residential occupants).
- Almost all occupants (98 percent commercial and 95 percent residential) know where the fire exits are.
- In keeping with conventional wisdom, during a fire, most occupants (80 percent of commercial and 75 percent of residential) believe using elevators is unsafe. In contrast, 28 percent (for both commercial and residential) believe that going to the roof is a possible alternative to using the stairs.



**Fire Resistance Testing for Performance-based
Fire Design of Buildings - Study**

- Funded by a consortium of gov't, test labs, and industry as recommended by NFPA response to NIST WTC recommendations
- Literature review, survey of FPE firms
- Series of recommendations on how to make results of current test more useful for performance based design
- Phase II validation under consideration



Recommendations - Thermal Aspects

- Changes in instrumentation - plate thermometers, pads for unexposed surface temperature, total heat flux on the unexposed side, temperature profile through the test specimen, ceramic fiber furnace lining, propane fuel
- Change in furnace control -plate thermometer temperature control, furnace pressure specification, oxygen concentration specification, high rise time temperature curve, change in burner type, secondary air control, and exhaust control.



**Recommendations – Structural
Aspects**

- Measurements - end restraint, deflections and strain
- Design – use of structural scaling rules
- Conduct – hydraulic loading mechanism, test to failure
- Record keeping – thermal and structural properties of specimen (at room and elevated temperature)



**New Projects of Interest
– funded by USFA**

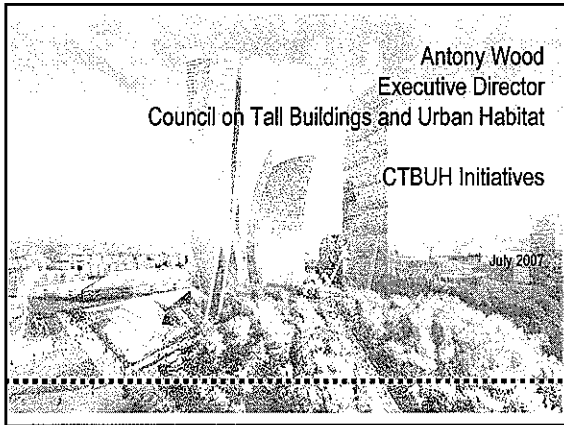
- Fire Fighting Tactics Under Wind Driven Conditions (Part B)
- Measuring the Effectiveness of Fire Safety Code Compliance (Part A1)
- Leadership in Life Safety Design (LLSD) Feasibility Study (Part A2)



**Leadership in Life Safety Design
(LLSD)**

- Sub-component of larger study on Measuring Effectiveness of Fire Safety Code Compliance
- Focus on generating conceptual white paper
- Funded by USFA

Minutes Attachment C



• Recent Initiatives

CTBUH 2006 Conference

"Thinking Outside the Box: Tapered, Tilted, Twisted Towers"

- Most successful single-track conference in CTBUH history, based on attendance and feedback.
- 758 attendees, from 25 countries (incl. 168 students)
- Reknown speakers including Daniel Libeskind, Ken Yeang, Patrick Schumacher etc.
- Awards dinner at IIT, honouring Ken Yeang and Hal Yeangar

Chicago 2006 Video Conference Proceeding – production of 10 DVD set (including all presentations given at the Conference).

CTBUH Monthly Newsletters – new HTML format

CTBUH March 2007 Newsletter

What's Inside

- London Heights
- Sensei Blocks
- Broken Glass
- Singapore Tower
- Judith Tower
- Revitalize or Ruin?

News Bites

- New York, NY: New 12-story tower to be New York's second tallest and most energy efficient office tower built.
- London, UK: Richard James discusses his views on sustainable, mixed-use design.
- Dresden, MA: Demolition of the Blue Cross/Blue Shield building and construction of new 33-story high-rise is delayed.
- London, UK: Roles just chosen "historic mix" residential tower in London Borough Link.
- André Bruce McLaren works with Aedas on a new tower with "handy-essou" abstract

Features News

London Heights in the midst of ongoing plans to build the city of London's tallest and tallest, the long senses heritage White Paper was released. It proposes zones around 25 UK heritage sites where the buildings cannot be constructed. This is an attempt by numerous parties to maintain current heritage from and by area and has gotten extra publicity due to its direct impact on two large proposed projects: 29 Fenchurch Street (shown here) and "Victors tower, Link Link-Victoria, Link (Reservoir)

Launch of new CTBUH website
www.ctbuh.org

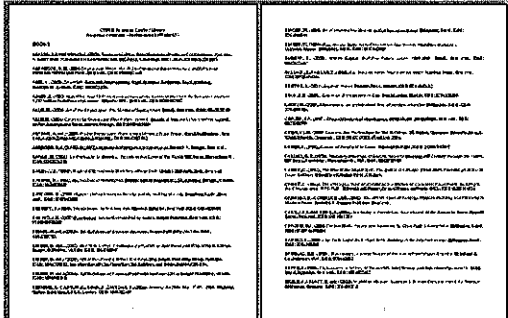
Welcome!

- Council → For details on the Council's role, organizational structure and reports, visit our website.
- Initiatives → Our mission is to promote the development of tall buildings and urban habitat, and to provide a platform for the exchange of ideas and information.
- Publications → Download
- Events → Announcements
- Partners →
- Sponsors →

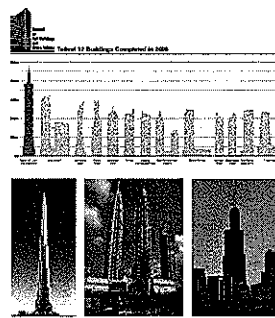
Thank you to our Supporting Committee:

- Blume Foundation
- DESIMONE

Creation of International Tall Building Resource Centre in CTBUH Headquarters at IIT - currently over 300 tall building books, journals, reports & conference proceedings



CTBUH / IIT International Tall Building Height Criteria Meeting. Thursday 24th May. IIT. 30 CTBUH organisational member attendees internationally



- Balassiano, Carl
 - Burns, Joseph
 - Clayson, Kim
 - Colville, Alastair
 - Edwards, Maljacob
 - Geronzi, Marshall
 - Heller, Jeffrey
 - Johnson, Chris
 - Johnson, Tim
 - Kery, Geil
 - Kirschner, Daniel
 - Kirkbride, Charles
 - Krisanovic, Ron
 - Malvern, William
 - McCool, Tom
 - Riesch, Jerry
 - Reid, Charles
 - Robertson, Dennis
 - Scott, David
 - von Koenig, Jamie
 - Wolmar, Peter
 - Wood, Anthony
 - Yi, Prof. Whan-Ho
 - Zilk, John
- Schimler Engineering
 - Thomson Tomasetti
 - CO-IB
 - David Langdon LLP
 - Illinois Institute of Technology
 - CTBUH Database
 - Heller Mathus
 - Nalsett
 - NBSU
 - CTBUH Manager of Operations
 - Emporis
 - Pickard Chilton
 - Magnusson Kemmeca Engineers
 - CTBUH Country Leader, Qatar
 - Turner Construction
 - Hanwha Reser COO / CO-IB
 - Gale Corporation
 - Illinois Institute of Technology
 - CTBUH Chairman
 - KPF
 - SOAR
 - CTBUH Executive Director
 - Architecture Institute of Korea
 - CTBUH Previous Committee

• Plans for the next 12 months....

CTBUH 2008
8th World Congress

TALL & GREEN: Typology for a Sustainable Urban Future

March 3-5, 2008
Grand Hyatt Dubai
Dubai, United Arab Emirates

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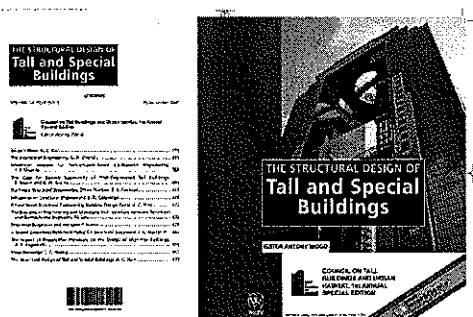
- Al Gulf Journal
- Arabtec
- Major Richard Dawkins
- Chancellor
- Talbot Hotel
- Talbot Hotel
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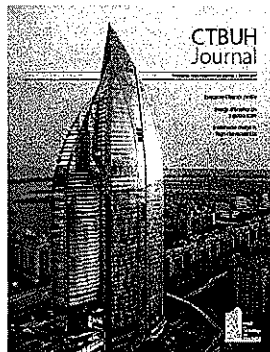
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CTBUH 8th World Congress, Dubai, 3-5 March 2008:

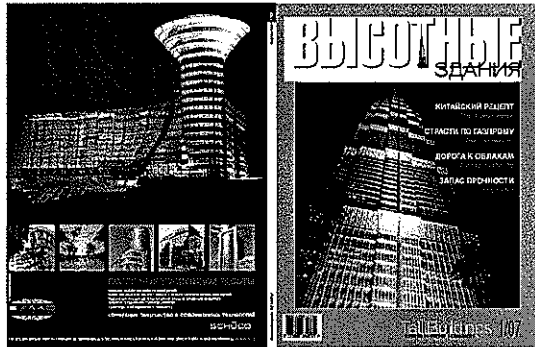
CTBUH Special Annual Edition of the Journal on Structural Design of Tall and Special Buildings (John Wiley & Sons)



CTBUH Journal, Summer 2007 Issue: Tall Building Sustainability

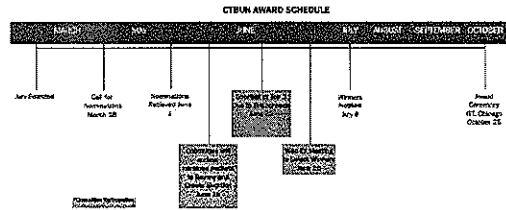


Russian Tall Building Journal - CTBUH collaboration, 2007.



CTBUH 2007 Awards Dinner, Crown Hall, IIT, October 25th, 2007

- Lynn S. Beedle Medal
- Fazlur Rahman Khan Medal
- Best Tall Building
- Best Sustainable Tall Building



Working Groups Established:

- | | |
|----------------------|---|
| Seismic | Co-chairs: Ron Klemencic and Michael Willford |
| Progressive Collapse | Co-chairs: Bob Smilowitz and Craig Gibbons |
| Sustainable Design | Co-chairs: Sadhu Johnson and Antony Wood |
| Fire Safety | Co-chairs: Simon Lay and Daniel O'Connor |
| Project Management | Co-chairs: David Crowell and Ian Eggers |
| Economics | Co-chairs: Steve Watts |

Other:

- Applications for CTBUH / IIT Tall Building Research & PhD Studentship Funding.
- Book Proposals:
 - 'Encyclopedia of the Skyscraper' (in collaboration with Dr. Ken Yeang)
 - 'History of the CTBUH' (for the 40-year anniversary: 2009)