

HOUSING RESEARCH CENTER

PURDUE UNIVERSITY

Department of Building Construction Management

401 North Grant Street

West Lafayette, In 47907-2021

ANNUAL REPORT – 2010

ORGANIZATION

The Purdue Housing Research Center is located in the Building Construction Management Program in the School of Technology. The Center activities are directed by Dr. Robert F. Cox as the Executive Director. This center works in conjunction with the Division of Construction Engineering & Management and the School of Civil Engineering with Professor Makarand (Mark) Hastak serving as the Research Director for Manufactured Housing. Professor Joseph Orczyk and Mr. Mark Schaufette, both from the Department of Building Construction Management, serve as Co-Research Directors for Re-Construction. Additional faculty involved include: Kirk Alter, Dr. Bryan Hubbard, and Dr. Randy Rapp.

2010 ACTIVITIES

1. Patel, Saumyang and M. Hastak. (2010). A strategic framework to construct two hundred homes in thirty days after disaster, MS Thesis Purdue University.
2. Patel, S. (2010). "Protocol to Construct Post Disaster Homes in a Short Time Span in the USA." Presented by Deshmukh, A. at 5th I-REC Conference & Workshop "Participatory Design and Appropriate Technology for Post-Disaster Reconstruction", CEPT University, Ahmedabad, Gujarat, India, July 15-20, 2010.
3. Hastak, M. (2010). "200 Houses in 30 Days after Disaster." Presentation at 2010 International Conference of Disaster Management organized by the International Institute for Infrastructure Renewal & Reconstruction (IIIR), University of Hawaii, Manoa, Hawaii, November 15-16, 2010.
4. **IHCDA Home Energy Conservation Program:** Technical Monitoring Services – Year 2, State of Indiana, \$579, 275. Alter, Kirk (PI)
5. **Haiti Housing Relief Competition for 2010** sponsored by the Department of Building Construction Management **Overview:** Working in interdisciplinary teams of 6 students, each team developed a design-construction-delivery concept for secure, long-term temporary housing (up to 3 years) to be provided in Haiti. The housing structures were designed to meet the basic needs for occupancy of a family of four and be able to be constructed / deconstructed in 2 days or less. The system needs to be planned for mass production and worldwide distribution to related relief efforts as a result of a disaster response. The houses were required to allow for repackaging and shipping to another disaster location. This

competition involved a total of 16 teams registered representing 103 students from 10 majors, including all departments in the College of Technology plus students from CE/CEM, LARCH, and ME. Please see video at: <mms://video.dis.purdue.edu/bns/fasttrack/fasttrack100212.wmv>

6. **Solar Decathlon House Competition Team.** An interdisciplinary team led by BCM and MET departments was successful in obtaining entry in to the International Competition sponsored by the Department of Energy. This campus wide effort is being led by William Hutzel (MET), Dr. Mark Shaurette (BCM), and Eric Holt (Ph.D. Student – BCM). The home is now under construction and will be on display in Washington, D.C. in October 2011.
7. **Glen Acres/Vinton Planning and Reconstruction of a Deep Energy Efficiency Retrofit Demonstration home** for Lafayette, Indiana. Awarded \$279,500 for research planning, demonstration, and educational programs to support the Better Buildings Lafayette energy efficiency retrofit loan and grant program. BCM assistant professor, Dr. Mark Shaurette (PI).
8. **Homebuilding Education Leadership Program (HELP)** (co-PIs, Robert F. Cox and Dale Koehler) Incorporated the CGP, CAPS, & RCS professional designations in the BCM curriculum as part of the Residential Construction Management Specialization coursework. Purdue BCM had NAHB Education License and approved instructors in place for the Spring 2008 semester. The CGP, CAPS, & RCS designation courses are incorporated into the Purdue Residential Construction Management Specialization courses. At the end of the 2010 Fall Semester, Purdue had a total of 95 students with 116 designations. The project received approval for a no-cost extension through December 2011.

# of Students	CGP	CAPS	RCS	Total
95	73	17	26	116

Purdue has worked with the local Builders Association of Greater Lafayette (BAGL) and the Indiana Builders Association (IBA) as part of our HELP grant agreement. A Purdue instructor is the Education Committee Chair for the BAGL Our NAHB Education Certified instructors are on the CGP, CAPS, & RCS Instructor list for the Indiana Builders Association.

Reports and Publications

1. Alhaj Ali, Souma, Ayman Abu Hammad, M. Hastak, and M. Syal. (2010). "Analysis of a Modular Housing Production System Using Simulation" Jordan Journal of Mechanical and Industrial Engineering, Published by the Jordanian Ministry of Higher Education and Scientific Research in corporation with the Hashemite University, Jordan. 4(2), 256-269. (1st tier category).

2. Jeong, Jae G, Hastak, Makarand, Syal, Matt, and Hong, TaeHoon. (2010). "Internal Supply Chain Modeling and Optimization for the Manufactured Housing Industry" Paper accepted for publication in the Journal of Automation in Construction. (1st tier category).
3. Jeong, Jae G, Hastak, Makarand, Syal, Matt, and Hong, TaeHoon. (2010). "Framework of Manufacturer-Supplier Relationship in the Manufactured Housing Industry" Submitted to the International Journal of Expert System with Application. (1st tier category).
4. Fernandez, Marcela, Naderpajouh, N. and Hastak, M. (2010). Risk Assessment for the Housing Market in Mexico." Paper submitted to the ASCE Journal of Management in Engineering. (1st tier category).
5. Patel, S., Naderpajouh, N. and Hastak, M. (2010). "Protocol to Construct Post Disaster Homes in Short Time Span in the USA." 5th I-REC Conference & Workshop "Participatory Design and Appropriate Technology for Post-Disaster Reconstruction", CEPT University, Ahmedabad, Gujarat, India, July 15-20, 2010.
6. Hutzler*, W.J., Kilmer, W.H., Kilmer, R.L., Qian, Z.Y., Cory, C.A., Horton, T., Shaurette, M., and Hassan, R.P. (2011). Preparing for the 2011 Solar Decathlon. *Proceedings of the American Society for Engineering Education, 2011 Annual Conference & Exposition*, Vancouver, BC. 9 pages
7. Rapp, R., R., Lew, J., & Hubbard, B.J. (2010). Some Observations and Lessons Learned: Katrina, Wilma, and Iraq, Project Perspectives, The Annual Publication of International Project Management Association, Vol. 33, pp. 16-21.

Planned or Anticipated Journal Publications

1. Patel, S. and Hastak, M (2011). "Post Disaster Housing: Constructing 200 Homes in 30 Days after Disaster." Abstract accepted for the journal paper in the International Journal of Disaster Resilience in the Built Environment.
2. Garcia, Juan Pablo, Jae G Jeong, Makarand Hastak, and Matt G. Syal. (2010). "Alternative Housing Systems: Hybrid Home Concept" In Preparation.
3. Alter, K. & Li, M. (2011). Life Cycle Cost Analysis of Building Envelope Insulation in Weatherization Projects. To be submitted to *Energy & Buildings*, Spring 2011.
4. Alter, K. & Li, M. (2011). Analysis of Cost Metrics for Common Weatherization Measures & Development of Standardized Cost Indices. To be submitted to *Building Research & Information*, Spring 2011.
5. Alter, K. (2011). Efficacy of Publicly-Funded Residential Energy Conservation Measures. To be submitted to *Energy & Buildings*, Spring 2011.
6. Alter, K. (2011). Passive House Energy Performance in the U.S.: A Critical Evaluation. To be submitted to *Journal of Building Physics*, Spring 2011.

7. Alter, K. & Li, M. (2011). Adopting Passive House Building Strategies in Rural Chinese Villages. To be submitted to *Sustainable Development*, Spring 2011.
8. Rapp, R. R. (2011). Panic rooms or safe rooms. In A. T. Carswell (Ed.), *Encyclopedia of Housing*, 2nd Ed. Draft submitted December 2010.
9. Rapp, R. R. (2011). Housing Restoration. In A. T. Carswell (Ed.), *Encyclopedia of Housing*, 2nd Ed. Submitted.

Center of Re-Construction

1. A Center of Re-Construction is in the process of being established.
2. On a broad basis the Center will work in the areas building rehabilitation as the result of disaster or natural deterioration.

NAHB Student Chapter

1. 37 members
2. Meetings are held each month with speakers, participation in the local chapter of NAHB, and fund raising activities to off set costs to travel to the national convention.
3. Professor Eric Holt serves as the faculty advisor.