

Annual Report 2001



Since July 1988, the PHRC has served the housing industry in Pennsylvania by carrying out applied research and delivering education, training and technology transfer. The PHRC is located both at the Pennsylvania State University in State College and at the Pennsylvania College of Technology in Williamsport.

The PHRC operates with extensive industry input and involvement. Projects are selected with input and approval from the PHRC's Industry Advisory Council. Members include trade associations, product manufacturers and suppliers, government agencies and individual builders and remodelers. This level of industry involvement ensures that the projects and services meet the needs of the housing industry.

In addition to support from Penn State and the College of Engineering, the PHRC receives funding from the Pennsylvania Builders Association (PBA), the home building industry, and the Commonwealth of Pennsylvania through the Department of Economic and Community Development and the Department of Labor and Industry and the U.S. Department of Energy. Contract funds are also received from sponsors of specific projects. The Hankin Endowment also contributes support.

Training, Education and Outreach Activities

The PHRC provided a wide array of training, education and technology transfer services to over 2,700 individuals in 2001.

9th Annual PA Housing Conference - The New Statewide Building Code: Who ~ What ~When – The 9th Annual Pennsylvania Housing Conference was held at three locations: Monroeville on February 21, Harrisburg on March 7 and New Cumberland on March 15. The program focused on the changes in regulations and some of the technical issues that may be encountered in complying with Pennsylvania's new Uniform Construction Code. Over 700 builders, remodelers, design professionals and code officials attended the three meetings.

Speaker Service – The PHRC offers a speaker service to local and regional associations. The following presentations were made:

Design Considerations When Using Steel Studs

Homes for Life

What Builders need to know about Pennsylvania's Uniform Construction Code to:

- Home Builders Association of the Alleghenies, Johnstown, PA
- Mifflin County Builders Association, Burnham, PA
- Greater DuBois Builders Association, DuBois, PA
- Builders Association of Metro Harrisburg, Halifax, PA
- Builders Association of Northwestern PA, Erie, PA
- Tri-County Builders Association, Clarion, PA
- Polyisocyanurate Insulation Manufacturers Association, Pittsburgh, PA

Workshops and Training – The PHRC organized a series of technical workshops for builders, remodelers, educators and code officials. Topics included the following:

Streamlining the Building Regulatory Process – This half-day program held in Harrisburg PA provided an overview of innovative information technologies systems and organization approaches to the building regulatory process. This includes zoning, subdivision design, building code, property maintenance and other building regulation. This program was held in partnership between the National Conference of States on Building Codes and Standards and the South-Central Pennsylvania Center for Effective Governance.

Wood Frame Design (NDS-97 Based) – This 2-day program held in State College PA, provided engineers, architects, and code officials a overview of wood frame building design and the application of the NDS-97 standards.

Moisture Control Workshop – This 1-day program, held in Valley Forge PA, provided an overview of common moisture problems and provided attendees an understanding of the ir causes and how to avoid them. This program was attended by builders, engineers, architects, and code officials.

Comprehensive International Residential Code: This 2-day program provides an understanding of the IRC and Pennsylvania’s Uniform Construction Code (UCC) legislation and regulations. Topics ranged from foundations to roofs, and from general code administration issues and design details, to relations between builders and code officials. Over 840 individuals have attended the 21 workshops so far.

BOCA-CABO to IRC Transition Program: This 1-day program is intended to transition builders, remodelers, code officers and design professionals who are used to using the CABO and BOCA codes to the new International Residential Code (IRC) 2000. The program also provides an overview of Pennsylvania’s Uniform Construction Code (UCC) legislation and regulations. Over 250 individuals have attended five workshops.

Pennsylvania’s New Energy Code Program: This 1/2-day program provides builders, code officials and design professionals an understanding of the new energy code requirements and the various approaches to comply.

Modular Housing Training Institute: The MHTI offers a 2-day program focusing on four critical elements to the successful on-site completion of a modular home. Lecture and hands-on exercises are utilized. This program held 10 workshops with 169 participants.

Manufactured Housing Resource Center: The MHRC offers a 2-day program “Fundamentals of On-site Completion.” This program covers understanding the HUD Code program, Manufacturers’ Installation Instructions, Site preparation, Foundation and Support, Assembly. This program held 7 workshops with 110 participants.

General Outreach– The PHRC publishes a newsletter three times per year to inform readers about events, projects, recent reports, resources, and activities that relate to the housing industry in Pennsylvania. The PHRC also maintains a web page (www.engr.psu.edu/phrc) to distribute information.

Developmental Activities

In late 1999 legislation was passed to adopt state-wide Building Codes – for housing the IRC2000 is to be selected. The passage of the Uniform Construction Code (Act 45 of 1999) requires the Pennsylvania Department of Labor and Industry (DLI) to promulgate regulations for prescriptive methods to implement energy requirements that take account of the various climatic regions in the Commonwealth. The PHRC was asked to provide a document that is simpler, more flexible, and focused on and better suited to Pennsylvania. Over a period of five months the PHRC put a great deal of effort into developing and justifying an alternative, prescriptive energy code for Pennsylvania. The PHRC has submitted to the Department of Labor and Industry the **PHRC PA-Alternative Chapter 11** to the International Residential Code, Chapter 11, *Energy Efficiency*. Five PHRC reports (numbers 68, 69, 70, 71, and 72) have been produced to document the development of the new alternative code chapter.

The PHRC initiated the **Pennsylvania Code Training Consortium**. Its function is to identify the building-code-related training needs and educational resources for various groups across the Commonwealth. See PHRC Report No. 61 “*Building Code Training Needs in Pennsylvania*.” The consortium provides a forum for members to share information on building code needs and resources within Pennsylvania. The Consortium consists of interested organizations, associations and state agencies that either provide building code training or represent groups that need access to training.

Applied Research Activities

Membranes on the Exterior Sheathing – Conducted field investigations, laboratory testing and analysis of various housewraps and building papers to evaluate in-place performance, especially their effectiveness as an air barrier in residential wall assemblies (Burnett).

Steel Framing Systems – Analysis (computer modeling) and some simulation of exterior wall systems to assess the performance of steel stud framing in relation to the control of heat, air and moisture (Burnett).

Performance of Wood Floor Assemblies – Experimental and analytical investigation, with particular interest in the long term creep response, of floor systems constructed of engineered wood I joists and oriented strand board (OSB) sheathing (Manbeck).

Composite Action in Residential Floor Systems – Laboratory testing and analysis of the performance enhancement that results from composite action using different nailing and gluing techniques in floor systems involving engineered wood products (Manbeck).

Pressure Moderation and Convection Drying in Screened Enclosure Wall Systems – This is a two-year project involving analysis (computer modeling) and both laboratory and full-scale field testing. (Burnett)

Publications

Technical Reports:

- *Evaluation of Energy Code Trade-offs for Pennsylvania*, PHRC Research Series: Report No. 71, The Pennsylvania Housing Research Center, University Park, PA (May 2000, Revised December 2001), 19p.
- *Code for the Conservation of Space Conditioning Energy for Housing in Pennsylvania: The PHRC Alternative to Chapter 11, Energy Efficiency in the International Residential Code (IRC) 2000*, for use in Pennsylvania, May 2001, 13p.
- *Glazing Proportions for New Housing in Pennsylvania*, PHRC Research Series: Report No. 68, The Pennsylvania Housing Research Center, University Park, PA (May 2000, Revised August 2001), 27p.
- *Climatic Zones for Energy Conservation in Pennsylvania*, PHRC Research Series: Report No. 69, The Pennsylvania Housing Research Center, University Park, PA (May 2000, Revised August 2001), 11p.
- *Moisture Related Concerns*, A confidential report prepared for the Housing Authority of Dauphin County, PHRC Report #76, The Pennsylvania Housing Research Center, University Park, PA (May 2001), 5p.
- Training Manual—Pennsylvania's Uniform Construction Code (UCC) (ACT 45 of 1999) and 2000 International Residential Code (IRC) ~ “*Just tell me what I need to know!*” (2001), 249p.

Builder Briefs:

- Mold and Buildings, PHRC Builder Brief, BB0301.
- Blower Door Testing, PHRC Builder Brief, BB0201.
- Site Design Considerations for Manufactured Housing, PHRC Technical Brief, TB0201.
- Soil Freeze Depth Guide for Manufactured Housing in PA, PHRC Technical Brief, TB0101.

Other Publications:

- Burnett, E.F. P. and Bombino, R., “Heat and Moisture Control Considerations with Steel Framing in Low-rise Residential Construction.” *Proceedings of the Performance of the Exterior Envelopes of Whole Buildings VIII Conference*, Clearwater Beach, FL, December 2-7, 2001, 14p.
- Burnett, E.F. P. and Fortney, M., “The Development of an Alternative to Chapter 11 of the IRC 2000 for use in Pennsylvania.” *Proceedings of the Performance of the Exterior Envelopes of Whole Buildings VIII Conference*, Clearwater Beach, FL, December 2-7, 2001, 13p.
- Burnett, E.F.P. and Fortney, M., “The New Statewide Building Conference When~What~How”, *Proceedings of the 9th Annual Pennsylvania Housing Conference*, The Pennsylvania Housing Research Center, University Park, PA, February and March 2001, 84p.
- Burnett, E.F.P. and Arenja, A., “Housing Innovations-Healthy Environments for Living and Learning.” *Proceedings of a Session Sponsored by the National Consortium of Housing Research Centers at the International Builders’ Show*, Atlanta, GA, PHRC Report #74, February 2001, 51p.

- Burnett, E.F.P., Shi, X. and Chamra, T., “The Functions of the Exterior Sheathing Membrane in Screen Type Enclosure Wall Systems.” *Proceedings of the International Conference on Building Envelope Systems and Technologies (ICBEST)*, Ottawa, Canada, June, 2001, pp. 59-65
- Lau, A., Fortney, M., Bahnfleth, W. and Burnett, E.F. P., “Evaluation of Energy Code Trade-offs.” *Proceedings of the Performance of the Exterior Envelopes of Whole Buildings VIII Conference*, Clearwater Beach, FL, December 2-7, 2001, 16p.
- Memari, A.M., Burnett E.F.P, and Kozy B.M., “Seismic Response of a New Type of Masonry Tie Used in Veneer Walls”, *Conference on Structural Faults and Repair 2001*, London, June 2001.
- Straube, J.F. and Burnett, E.F.P., “Chapter 5: Overview of Hygrothermal (HAM) Analysis Methods”, ASTM Publication, MNL40, *Moisture Analysis and Condensation Control in Building Envelopes*, 2001, pp. 81-89.

Other Activities

Conference and Other Presentations:

Performance of the Exterior Envelopes of Whole Buildings VIII Conference, Clearwater Beach, FL, December 2001

- Heat and Moisture Control Considerations with Steel Framing in Low-rise Residential Construction
- The Development of an Alternative to Chapter 11 of the IRC 2000 for use in Pennsylvania
- Evaluation of Energy Code Trade-offs

International Conference on Building Envelope Systems and Technologies (ICBEST), Ottawa, Canada, June, 2001

- The Functions of the Exterior Sheathing Membrane in Screen Type Enclosure Wall Systems

Pennsylvania Independent Living Conference, Harrisburg, October 2001

- The New IRC and its Impacts on Home Accessibility
- Overview of Pennsylvania’s Uniform Construction Code (UCC)

Conference on Structural Faults and Repair 2001, London, June 2001

- Seismic Response of a New Type of Masonry Tie Used in Veneer Walls

National Consortium of Housing Research Centers at the International Builders’ Show, Atlanta, GA, February 2002

- An Innovative Building System and the Indoor Environment

PA State Weatherization Conference, Williamsport, PA, March 2001

- Overview of the State Building Code and Possible Implications for Weatherization Programs

DOE State Energy Code Conference, Burlington VT, July 2001

- Industry Partnerships to Promote Effective Energy Codes

Industry Liaison: The PHRC works closely with various national, state and local groups to support efforts that are targeted at the housing industry. The following is a list of the various groups and committees various staff members of the PHRC have been involved with:

Pennsylvania Focus:

- Pennsylvania Builders Association (PBA):
 - Training and Education Committee
 - Editorial Review Board
 - PHRC Committee
- Advisory Council for the Modular Housing Training Institute (MHTI)
- Advisory Council for the Building Codes Assistance Program (BCAP)
- Advisory Council for the Manufactured Housing Resource Center (MHRC)
- Builder Association of Central Pennsylvania

National Focus:

- National Consortium of Housing Research Centers, Chair 2000-2001
- Building Environment and Thermal Envelope Council (BETEC) Board Member, Vice-Chair
- National Research Council, Committee to assess the Partnership for Advancing Technology in Housing (PATH) programs

International Focus:

- CIB (International Council for Building Studies and Documentation)
- Commission W-23 – Bearing Walls
- Commission TE25 – Façade Systems and Technology

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