

Annual Report 1999-2000



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, thus fostering a synergistic combination of research, application and training capabilities. Through its access to faculty, staff, students and external consultants, the PHRC can and does address many issues related to housing.

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

The following is a brief listing of PHRC activities and accomplishments during the 1999-2000 fiscal year.

Training, Education and Outreach Activities

8th Annual Housing Conference: Home Building for the 21st Century

This year, the 8th Annual Pennsylvania Housing Conference was held at two locations: Monroeville on February 29th and Valley Forge on March 1.

The first part of the program was directed at issues specific to Pennsylvania:

- Demographic Trends, Labor, Money and Markets
- Status of the State-wide Building Code and Implications
- Workforce Development: Supply and Training
- Technical Trends

The second part of the program provided a rare opportunity to learn about innovations being adopted by larger builders across the nation:

- The Building America Program
- Simple Ways to Better Homes
- High Performance on a Shoe String: An Affordable Starter Home for a Cold Climate
- Cost and Affordability: Lessons Learned from the Building America Program

These conference sessions were jointly sponsored by the PBA, PHRC, the U.S. Department of Energy and the local Builder Associations.

Speaker Service – The PHRC offers a speaker service to local and regional groups associated with the residential construction industry. We can provide short (15 to 60 minutes) technical programs at no charge to the local associations. The programs are intended to provide information on issues or problems that affect the housing industry. The following presentations were made during FY 1999-2000:

- *Design Considerations When Using Steel Studs* - Pocono Home Builders Association
- *Innovations in Masonry* – Bucks-Mont Chapter of NARI
- *Homes for Life Workshop* – Self Determination Housing Project, Philadelphia, PA
- *What Builders need to know About Pennsylvania’s Uniform Construction Code (UCC)*:

Lebanon County HBA	Mercer County Builders Association
Builders Association of Central Pennsylvania	BIA of Northeastern Pennsylvania
Central Susquehanna Builders Association	HBA of Berks County
Erie County Builders Association	Lawrence County Builders Association
Elk and Cameron County Builders Association	Huntingdon County Builders Association
Lehigh Valley Builders Association	Indiana-Armstrong Builders Association
York County Builders Association	Franklin County Builders Association
HBA of Metro Harrisburg	HBA of Bucks-Montgomery Counties

Workshops and Training – The PHRC organized a series of technical workshops for builders, remodelers, educators and code officials. These workshops were sponsored by a variety of organizations involved with the residential construction industry. Topics included the following:

Building with Engineered Wood Products – This half-day workshop in Harrisburg, PA covered common design and installation problems for engineered lumber and floor and ceiling trusses and how to avoid them.

Homes for Life – This full-day workshop in Warrendale, PA addressed the design and construction challenges to delivering homes that are more ergonomically designed to better meet trans-generational needs. Marketing and sales approaches were also discussed.

Introduction to Building Codes - This half-day workshop in Harrisburg provided an overview of building codes, administrative and enforcement provisions and model residential codes.

Code Compliance Workshop – This half-day workshop in Harrisburg, PA discussed common code compliance violations by builders and their subs and how to avoid them.

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 with which staff members have been involved:

Pennsylvania Focus:

- Pennsylvania Builders Association (PBA):
 - Training and Education Committee
 - Housing Finance Committee
 - Editorial Review Board
 - Small Contractors Council
 - 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)

National Focus:

National Research Council: Committee to Review and Assess PATH
NAHB: Housing Affordability Through Design Efficiency (HATDE) Committee
Consortium of Housing Research Centers -Chair for 2000 and 2001
US Department of Energy's (DOE) Peer Review Committees for:
 Building Enclosure Program at Oak Ridge National Laboratory
 Build America Program
Building Environment and Thermal Envelope Council (BETEC) - Board Member and Vice-Chair
Planning Committee for Bugs, Mold and Rot III Conference (Washington, DC, June 1999)

International Focus:

Planning Committee for ICBEST 2000 (Ottawa, Canada, June 2000)
CIB (International Council for Building Studies and Documentation)
 Commission W23 – Bearing Walls (Host for the August 2000 meeting at Penn State))
 Commission TE25 – Façade Systems and Technology

MHTI -- The Modular Housing Training Institute (MHTI) provides a series of courses for the home building professionals that provide information and special skills needed during the on-site completion process. The program has been offered seven times in Williamsport PA and will be offered through Northeastern U.S. in the next fiscal year.

MHRC – The Manufactured Housing Resource Center (MHRC) is a partnership between the Pennsylvania Housing Resource Center (PHRC) at Penn College, Pennsylvania Department of Community and Economic Development (DCED), Pennsylvania Manufactured Housing Association (PMHA) and the Pennsylvania Housing Research Center. The MHRC is developing training programs that will provide an understanding of the HUD Code and Manufacturers Installation Instructions for the onsite completion of homes. The training programs are scheduled to start in the next fiscal year.

Workforce Development – The PHRC partnered with the Pennsylvania Builders Association (PBA) to conduct an assessment of workforce development issues. This included a survey of members of the residential construction industry and a report to PBA. The report provides an evaluation of various workforce development efforts, labor shortages, and recommendations for future activities.

Building Code Training – The PHRC has partnered with the PBA to develop training programs on the new requirements that will be created by the passage of Pennsylvania Uniform Construction Code Legislation. (Act 45 of 1999). The five programs being developed will be targeted to the varying needs of members of the residential construction industry. Delivery of the programs will start in the next fiscal year.

WWW Site – The PHRC has developed and maintains a web site (www.engr.psu.edu/phrc). Basic information about the PHRC and relevant links are provided. The executive summaries of PHRC reports and the builder briefs are also available from the web page.

PHRC Newsletter – The PHRC produces 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.

Applied Research Activities

Applied Research Projects:

- **Membranes on 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 experimental simulation of exterior wall systems to assess the performance of steel stud framing in relation to the control of heat, air and moisture (Burnett).
- **Remediation and Repair of Masonry** – Laboratory testing has been performed on brick masonry wall assemblies to assess the effectiveness of various methods of repairing masonry walls. Of particular interest was the use of helical stainless steel as reinforcing bars and lateral ties for masonry (Boothby, 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).
- **Basement Performance Modeling** – Development of a computer software tool for the analysis of two and three-dimensional heat flow in basements, crawl spaces and slabs-on-grade floor systems. This work is also in support of redevelopment of the DOE2 Software (Bahnfleth).
- **Glazing Characteristics of New Housing in Pennsylvania** – To supplement work on codified energy provisions, a study of the nature, distribution and relative proportions of windows was conducted (Fortney, Burnett).

Developmental Activities

- In late 1999 legislation was passed to adopt state-wide Building Codes – for housing the IRC2000 is likely 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 and, 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 **PA-Alternative Chapter 11** to replace the International Residential Code, Chapter 11, *Energy Efficiency*. Five PHRC reports (numbers 68, 69, 70, 71, and 72) have been produced to supplement the new alternative code chapter.
- The PHRC initiated the **Pennsylvania Code Training Consortium**. The development of the Consortium was first discussed in the PHRC Report No. 61 “*Building Code Training Needs in Pennsylvania*.” Its function is to identify the building-code-related training and educational resources and needs for various groups across the Commonwealth. The consortium provides a forum for its members to share information on building code needs and recourses 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. Interest in membership in the Consortium is increasing as the group comes together. The following groups are members of the CTC:

ABC-Keystone Chapter	Local Government Academy
ABC-Lehigh Valley Chapter	MaGrann Associates
ABC-Southeast Pennsylvania Chapter	National Conference of States on Building Codes and Standards
BOCA Eastern Regional Office	Pennsylvania Association of Code Officials
BOCA Professional Chapter of Western Pennsylvania	Pennsylvania Builders Association
Building Codes Assistance Project	Pennsylvania Building Officials Conference
California University of South Pointe	Pennsylvania College of Technology
Commonwealth Building Officials	Pennsylvania Department of Labor and Industry
Eastern Paralyzed Veterans Association	Pennsylvania State Association of Boroughs
Harrisburg Area Community College	Pocono Builders Association
International Conference of Building Officials	South Central Assembly for Effective Governance
Jack Murphy	VFIS
Lebanon County Planning Department	York City Department of Fire/Rescue Services

Other Activities

Invited Conference/Seminar Presentations:

NAHB's International Convention, Dallas, January 2000:

- Innovation – Disconnects and Diligence
- Housewraps and their Installation

Energy Efficient Builders Association (EEBA) Excellence in Building Conference, Baltimore, November 1999:

- Short Course on Heat, Air and Moisture Control: Principles and Cases

PHFA *Housing from the Ground Up* Conference, Hershey, PA, February 2000:

- Houses for a Lifetime
- New Synergies in Construction
- Energy Efficiency in Housing

Durability and Disaster Mitigation in Wood Frame Housing, PATH Conference, Madison, WI, November 1999:

- Rain Penetration in Walls

Homes for Life Forum, Philadelphia, PA, September 1999:

- Housing for a Lifetime

Publications

Technical Reports:

- House Building Industry: Educational Needs Assessment, PHRC Research Series: Report No. 65, July 1999.
- Residential Site Improvement and Subdivision Design Standards: A Review, PHRC Research Series: Report No. 66, July 1999.
- Wood Structural Systems and the PHRC: A Strategic Plan for Collaborative Industry/PHRC Education and Research Programming In Wood Structural Systems, PHRC Research Series: Report No. 67, December 1999.
- Glazing Proportions for New Housing in Pennsylvania, PHRC Research Series: Report No. 68, May 2000.
- Climatic Zones for Energy Conservation in Pennsylvania, PHRC Research Series: Report No. 69, May 2000.
- Thermal Envelope Assessment of Energy Code Provisions for Pennsylvania, PHRC Research Series: Report No. 70, May 2000.
- Evaluation of Energy Code Trade-offs for Pennsylvania, PHRC Research Series: Report No. 71, May 2000.
- Energy Code Provisions for the Use of Light-Gauge, Cold Formed Steel Framing, PHRC Research Series: Report No. 72, May 2000.
- Analytical Study of Air Leakage Paths in Houses, PHRC Research Report, July 1999.

Other Technical Publications:

- Straube, J.F. and Burnett, E.F.P., "Rain Control and Design Strategies", *Thermal Envelope and Building Science*, Volume 23, July, 1999, pp. 41-56
- Wisniewski, B., Manbeck, H.B., Janowiak, J.J., "Creep Response of Engineered Wood I-Joist and Oriented Strand Board (OSB) Floor Systems", Presented at the Forest Products Society in Lake Tahoe, June 2000, 8p.
- Structural Performance of the Blok-Lok Helical Tie Dry-Set in Normal Weight Concrete Block, Brick and Mortar. December 1999, 24p.
- Tensile and Compressive Load-Displacement Characteristics of Blok-Lok Helical Ties. October 1999, 27p.
- New and Improved Basement Wall Systems, PHRC Builder Brief, BB0199.
- Wood I-Joist/OSB Residential Floors, PHRC Builder Brief, BB0200.
- Composite Action and Floor System Stiffness, PHRC Research Brief, RB0199.

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