

# Annual Report 2002



Since 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 addresses 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 Industry Advisory Council and its Operations Committee. Members include trade associations, product manufacturers and suppliers, government agencies, developers and individual builders and remodelers. This level of industry involvement ensures that 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 direct funding from the Pennsylvania Builders Association (PBA), the home building industry, and the Commonwealth of Pennsylvania through the Department of Economic and Community Development. Contract funds are also received from sponsors of specific projects. The Hankin Endowment also contributes support.

This year the PHRC added two new staff members: Ken Sagan who is our Training and Education Development Specialist provides leadership and direction for the development, implementation and management of technical training programs for builders and remodelers, design professionals and building code officials. Scott Brown, P.E., our Land Use and Development Specialist, is responsible for the development of research programs and other activities related to land development and storm water management.

## Training, Education and Outreach Activities

---

The PHRC provided a wide array of training, education and technology transfer services to over 2,580 individuals at 73 workshops, seminars, and other outreach initiatives in 2002.

**10<sup>th</sup> Annual PA Housing Conference** – The PHRC's 10<sup>th</sup> annual PA Housing Conference was highly successful. The program was held in three different locations: Monroeville, Philadelphia, and State College. The program focused on mold in houses, design and construction issues, basements and crawlspaces, and an update on the Uniform Construction Code. Over 300 builders, developers, code officials, and government representatives attended the three sessions.

## Pennsylvania Housing Research/Resource Center

Phone: (814) 865-2341  
Fax: (814) 863-7304  
e-mail: PHRC@psu.edu  
www.engr.psu.edu/phrc

The Pennsylvania State University  
219 Sackett Building  
University Park, PA 16802  
Director: Mark R. Fortney  
Director of Research: Eric F. P. Burnett

**Speaker Service** – The PHRC offers a speaker service to local and regional associations. Eight presentations were made to the numerous organizations, including:

- Rotary Club of Huntingdon, PA
- Builders Association of Pike County
- Builders Association of Clearfield County
- Home Builders Association of the Alleghenies
- Pennsylvania Career and Technical Education Conference, Seven Springs
- Lezzer Lumber, Clearfield
- Builders Association of Westmoreland County
- Westmoreland Professional Builders Association

**Workshops and Training** – Topics included the following:

***Comprehensive International Residential Code:*** This 2-day program provides an understanding of the IRC and Pennsylvania’s Uniform Construction Code (UCC) legislations. During 2002, over 980 individuals attended 28 workshops.

***Overview of the IRC Plumbing Requirements:*** The focus of this program was on common code violations as identified by Pennsylvania code officials, and on the new code requirements that differ from the old BOCA code. In addition to an overview of the UCC, participants became familiar with methods used for venting, the factors that impact water pipe sizing and water conservation requirements, and the design requirements of water distribution. This program was held twice in 2002.

***Overview of the IRC Mechanical Requirements:*** This program familiarized individuals with the mechanical requirements of the IRC. The program was held twice in 2002 and attended by more than 60 HVAC contractors, installers, design professionals and code enforcement officials.

***Pennsylvania's New Energy Code:*** The PHRC introduced its new energy code training program which is intended for building contractors, design professionals and code officials. The program involved a four-hour session covering the relevant requirements and the various compliance paths. This program also linked energy requirements and life-health-safety requirements. This program was offered twice in 2002 with more than 100 attendees.

***BOCA/CABO to IRC Transition Program:*** This 1-day program is intended to transition builders, remodelers, code officers and design professional to the new International Residential Code (IRC) 2000. The program also provides an overview of Pennsylvania’s Uniform Construction Code (UCC) legislation and regulations. During 2002, over 180 individuals attended the 5 workshops.

***Construction Code Training for Teachers:*** The PHRC, in conjunction with the Pennsylvania Department of Education, Bureau of Career and Technical Education, conducted three 2-day seminars for career and technical educators during August. The goal of the program was to help construction teachers prepare to incorporate Pennsylvania’s new building code requirements into their curricula.

***Wood Frame Design (NDS-97 Based):*** This 2-day program, held in Harrisburg PA, provided 25 engineers, architects, and code officials with an overview of wood frame building design and the application of the NDS-97 standards.

**Moisture Control Workshop:** Two one-day workshops were held in 2002. The first workshop was held in Harrisburg; the second was in Pittsburgh. The morning session was devoted to Building Science—the basic principles involved in not only the control of moisture but also the control of heat and air through the building enclosure. The afternoon sessions focused on the performance of enclosure components, i.e., roof systems, wall systems, both above and below grade, base floors, etc.

**Accessibility Workshop:** The PHRC partnered with the Pennsylvania Council on Independent Living, the Paralyzed Veterans Association, and Life and Independence for Today (LIFT) to hold a workshop on the accessibility requirements of the International Building Code (IBC) and the accessibility standard ICC/ANSI A117.1 1998.

**Modular Housing Training Institute:** The MHTI offers a 2-day workshop focusing on four critical elements to the successful on-site completion of a modular home. The program was offered 11 times; 89 people attended.

**Manufactured Housing Resource Center:** The MHRC offers a 2-day workshop on the “Fundamentals of On-site Completion.” The program covers the HUD Code, Manufacturers’ Installation Instructions, site preparation, foundation and support concerns, and assembly. 146 people attended 12 workshops that were offered.

**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](http://www.engr.psu.edu/phrc)) to distribute information.

## **Developmental Activities**

---

In 1999, legislation was passed to adopt state-wide building codes – for housing, the IRC2000 was 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 has provided a simpler code that is focused on and better suited to Pennsylvania. The PHRC has submitted to the Department of Labor and Industry the **PA-Alternative Chapter 11** that is being considered for adoption.

The PHRC continued to support the **Pennsylvania Code Training Consortium**. 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 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.

The PHRC has entered into an agreement with the **Pennsylvania Concrete Masonry Association** to develop a training program for masonry contractors and code officials on the masonry related provisions to the IRC.

The PHRC has begun an initiative to bring together a coalition of local government officials, state agency representatives (Penn DOT, DEP, Governors Policy Office and Local Government Services Offices, etc.), builders, developers, architects, landscape architects, planners, engineers, environmentalists, and other

groups interested in improved residential development standards to form a **Land Development Coalition**. A strategy meeting was held at Penn State to outline an approach to coalition building. An initial group of key stakeholders was identified which will serve as the coalition's core. This group will consist of key state agency representatives, builders association representatives, and local government representatives. We are currently working to identify key members of this core group, of appropriate agency representatives, and generate high-level support for the coalition within the current administration. We plan to hold a meeting of this initial group of stakeholders in early summer to identify the goals and structure of the Coalition.

Through an agreement with the Centre County Commissioners, the PHRC provided technical assistance to the new county prison. The PHRC reviewed and critiqued designs for stormwater management.

## **Applied Research Activities**

---

*The Exterior Membrane to the Exterior Sheathing* – Conducted field investigations, laboratory testing and analysis of various housewraps and building papers to evaluate in-place performance in residential wall assemblies (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).

*Convective Drying in Screen Enclosure Wall Systems* – This is a multi-year project involving analysis (computer modeling) and both laboratory and full-scale field testing. The PHRC is partnering with Oakridge National Laboratory in Tennessee and the Building Engineering Group at the University of Waterloo in Canada (Burnett).

## **Publications**

---

### **Technical Reports:**

- Burnett, E.F.P., *'Housing Innovation – The University Housing Research Centers and the Building Codes.'* Proceedings of a session sponsored by the National Consortium of Housing Research Centers at the International Builders' Show, Atlanta, GA, PHRC Report #77, February 2002, 36p. Editor and contributor.
- Burnett, E.F.P., *The Concept of a Network of Full Service Housing Resource Centers*, a report prepared for the Consortium of Housing Research Centers, State College, PA, PHRC Report #78, February 2002, 85p.
- Memari, A.M., *Seismic Evaluation of and Recommendations for Superior Walls Foundation Wall Systems for use in Seismic Regions*, a proprietary report for Superior Walls of America, Ltd., PHRC Research Series: Report No. 79, March 2002, 80p.
- Burnett, E.F.P., *Wall Structures*, Proceedings of the 37<sup>th</sup> Meeting of the CIB, State College, PA, PHRC Research Series: Report No. 80, 2002, 133p.

## **Builder Briefs:**

- So You Want to Become a Construction Code Official, PHRC Builder Brief, BB0402.
- Window Technology, PHRC Technical Brief, TB0302.

## **Other Publications:**

- Burnett, E.F.P. and Fortney, M.R., “*Development of an Alternative to Chapter 11 of the IRC 2000 for use in Pennsylvania*”, Proceedings of the Consortium of Housing Research Centers – Educational Seminar “Housing Innovation – The University Housing Research Centers and the Building Codes” presented at the National Association of Home Builders Convention in Atlanta, February 6, 2002, 12p.
- Burnett, E.F.P. and Fortney, M.R., “The 10<sup>th</sup> Annual Housing Conference”, Proceedings of the 10<sup>th</sup> Annual Pennsylvania Housing Conference, The Pennsylvania Housing Research Center, University Park, PA, February 20 and 28 and March 7, 2002, 199p.
- Memari, A.M., Burnett, E.F.P. and Kozy, B.M., “Seismic Performance of Masonry Ties Used in Brick Veneer Walls,” *Construction and Building Material Journal*, Volume 16, Issue 7, October 2002, pp. 397-407.
- Memari, A.M. and Getz, D., “Seismic Performance of Autoclaved Aerated Concrete (AAC) Cladding Panels,” Proceedings, 12<sup>th</sup> European Conference on Earthquake Engineering, September 9-13, 2002, London, UK, CD-ROM, pp. 1-10.
- Roeder, R.W. Jr., H.B. Manbeck and J.J. Janowiak. 2002. Creep behavior of solid-sawn and wood I-joint floors. Proceedings of the World Conference on Timber Engineering (WCTE-2002). Selangor, Malaysia. 7pp.
- Hindman, D.P., H.B. Manbeck and J.J. Janowiak. 2002. Test method effects on shear moduli of wood and wood products. ASAE Paper No. 02-4004. St. Joseph, Michigan. 7pp.
- Roeder, R.W. Jr., H.B. Manbeck and J.J. Janowiak. 2002. Creep behavior of solid-sawn and wood I-joint floors. ASAE Paper No. 02-4005. St. Joseph, MI. 12pp.

## **Other Activities**

---

### **Conference and Other Presentations:**

*Pennsylvania Housing Accessibility Conference* – Housing accessibility and Pennsylvania’s Uniform Construction Code, State College, PA, March 2002.

“Indoor Air Quality” a presentation to the Modular Housing Industry Annual Conference in Williamsburg, VA, March 2002.

*Pennsylvania Association of Code Officials* – Overview of the 2000 International Residential Code, April 2002.

“The Education of Engineers for Built Facilities” – ASEE (Zone 1) and U.S. Military Academy at West Point, Conference Celebrating 200 years of Engineering Education at West Point, April 2002

“WUFI/ORNL Hygrothermal Analysis Software” – This meeting was held on campus under the auspices of BETEC, Oak Ridge National Laboratories, the Fraunhofer Institute and PHRC and PSU, May 2002.

NIBS/NIST Strategy Session for the Structural Engineering Profession on “Structural Integrity”, June 2002.

North-East Energy Efficiency Partnership, Energy Code Workshop, PA’s Statewide Building Code, June 2002.

Energy Efficient Builders Conference in Phoenix, AZ, October 2002.

Pennsylvania Building Officials Conference, Annual Conference, The UCC and PA’s New Energy Code, Philadelphia, PA, October 2002.

NIST/HUD Strategy Session on “Mold” in Gaithersburg, MD, October 2002.

Mold Presentation at the Westmoreland Professional Builders Association in Greensburg, PA, November 2002.

Building Codes for Housing in PA-“The Future of Housing in our Community”- Presentation for the Pennsylvania Housing Finance Agency in Harrisburg, November 2002.

DOE Roadmapping Session on “Building Enclosures” – Chicago, IL, December 2002.

Pennsylvania Housing Workshop, Pennsylvania Housing Finance Agency, November 2002.

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

**Pennsylvania Focus:**

- Pennsylvania Builders Association (PBA)—(Training and Education Committee, Editorial Review Board and PHRC Committee)
- Advisory Council for the Modular Housing Training Institute (MHTI)
- Advisory Council for the Manufactured Housing Resource Center (MHRC)
- Builder Association of Central Pennsylvania

**National Focus:**

- Advisory Council for the Building Codes Assistance Program (BCAP)
- National Consortium of Housing Research Centers, Chair 2000-2001, Board Member.
- Building Environment and Thermal Envelope Council (BETEC) Board Member, Chair 2001- 2002
- National Institute for Building Sciences (NIBS), Board Member 2002-2003.
- National Research Council, Committee to assess the Partnership for Advancing Technology in Housing (PATH) programs (2000-2001)

**International Focus:**

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