

The Year in Review - 2003



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.

Training, Education and Outreach Activities

The PHRC provided a wide array of training, education and technology transfer services to over 3,300 individuals at 97 workshops, seminars, and other outreach initiatives in 2003.

11th Annual PA Housing Conference – The PHRC held its Annual Housing Conference in Harrisburg PA in March 2003. The program registration was limited to 125 participants. The program consisted of four primary sections: The implementation of the UCC; The Liability Storm: changes in residential liability and reduced insurance coverage; flashing details that work; and PA's new storm water management policy.

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Workshops and Training:

PHRC Training Programs Delivered		
PROGRAM	Activities for 2003	
	# of Programs	# of Attendees
Comprehensive IRC Program for Code Officials	7	243
IRC's Plumbing Requirements for Code Officials	6	145
IRC's Mechanical Requirements for Code Officials	6	145
PA's New Energy Requirements for Code Officials	7	182
Comprehensive IRC Program	25	892
CABO to BOCA Transition Program	9	337
Overview of the IRC's Plumbing Requirements	5	123
Overview of the IRC's Mechanical Requirements	5	136
PA's New Energy Requirements	5	161
IRC Update Program	1	30
Comprehensive IRC-Masonry Related Requirements	10	384
Moisture Control	1	128
Stormwater Management in PA – A New Approach	3	318
Other	3	120
Total Programs Held	97	3,344

- **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. This program (manual and presentation) was updated to the 2003 IRC.
- **Pennsylvania's' New Storm Water Policy:** This two-hour program was offered in conjunction with the PBA leadership meeting in State College.
- **IRC Update Program:** The PHRC has developed a one-day program that enables attendees to brush up on the general IRC requirements and to gain an overview of the changes between the 2000 and 2003 IRC. The program also provides an overview of the UCC regulations and how they will be implemented.
- **Pennsylvania's Governor's Institute:** This annual conference is sponsored by the PA Department of Education and focuses on career and technical educators. This year's program was focused on the construction cluster. The PHRC provided a two-day training program to career and technical educators on the 2000 IRC. The program was attended by over 115 instructors from the carpentry, electrical, plumbing and HVAC trades.
- **Storm Water Management in Pennsylvania: a New Approach** - This one-day training program was held in five locations across the Commonwealth. The morning program was a policy-level discussion of Pennsylvania's new stormwater management policy and how it may be implemented. The afternoon was a technical discussion of infiltration processes and site-level hydrology. It was attended by over 318 township officials, county conservation districts and land development design professionals. The PHRC received sponsorship from the Pennsylvania Builders Association, PA DEP, ASCE's Pennsylvania Chapters, the PA State Association of Conservation Districts, PSATS, PSAB and others.

- **PA Construction Code Academy:** The PHRC has partnered with the DCED's Governor's Center for Local Government Services, the Pennsylvania State Association of Township Supervisors and the Pennsylvania State Association of Boroughs to provide training for the Pennsylvania Construction Code Academy (PCCA). The PCCA is the Commonwealth's mechanism to provide building-code-related training to local government officials and employees. Most of the CO (Code Official) programs on the table above were delivered through the PCCA. The following programs have been developed since:
 - **Plumbing Requirements of the IRC:** The PHRC developed this program to prepare participants for the plumbing inspector test required by PA's UCC. This 1.5-day program was developed to provide an understanding of the plumbing requirements of the IRC. The program development included the presentation, handouts, practice exams, and the training of eight instructors for the program. This program will be updated to the 2003 IRC and be expanded to two days by the end of the year.
 - **Mechanical Requirements of the IRC:** The PHRC developed this program to prepare participants for the mechanical inspector test required by PA's UCC. This 1.5-day program was developed to provide an understanding of the mechanical requirements of the IRC. The program was developed in the same manner as the plumbing requirements program and will be updated likewise.
- **PCMA Program:** 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 pilot program was held in January and 10 programs were delivered in 2003 to builders, masonry contractors, code officials, and design professionals in western PA.
- **Moisture Control Workshop:** A one-day workshop was held in Harrisburg in partnership with the Pennsylvania Association of Professional Engineers. 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. A second workshop for the insurance industries was held in December in Pittsburgh.
- **City of Philadelphia:** The PHRC provided 4 training programs to the City of Philadelphia's Department of Licensure and Inspection (DLI). Three of the programs were on the *International Energy Conservation Code* and the fourth was on *Mold in Houses*. The programs were attended by over 80 city employees. The PHRC is currently negotiating to conduct additional programs for the City.

Speaker Service – As a service to the home building and remodeling industry in Pennsylvania, the PHRC offers a speaker service to local and regional associations. This service is provided at no charge to the local builders associations and other interested groups. The PHRC offers short (20 to 45 minutes) sessions, often technical, that address some of the issues or problems that builders and remodelers may be facing. The following presentations were made in 2003 by M. Fortney, E. Burnett, S. Brown and K. Sagan:

- *What Builders Need To Know About The UCC* – delivered to:
 - Your Building Center
 - BA of Central Pennsylvania
 - Builders Association of Butler County
 - BIA of Lancaster County
 - Endless Mountain HBA
 - Pennsylvania Heating & Cooling Contractors Association
 - Workforce Development-PBA
 - Central PA Institute of Science & Technology Advisory Board

- Eastern Westmoreland Career & Technical Institute
- *The Issue of Mold*– delivered to:
 - Westmoreland Professional Builders Association in Greensburg, PA

PHRC Newsletter – The PHRC produced two newsletters that described the PHRC’s projects, recent reports and other resources available to the housing industry in Pennsylvania.

www Site – The PHRC continues to improve the web site (www.engr.psu.edu/phrc) to help disseminate information. An executive summary from each of the reports as well as "builder," "research" and "technical" briefs are available on-line.

Other Related Activities in PA – Committees:

- PA Department of Environmental Protection – Stormwater Management Manual Oversight Committee
- Pennsylvania Builders Association (PBA):
 - Training and Education Committee
 - Editorial Review Board
 - Land Development Task Force
 - PHRC Committee
- Advisory Council for the Modular Housing Training Institute (MHTI)
- Advisory Council for the Manufactured Housing Resource Center (MHRC)
- Pennsylvania Concrete Masonry Association, Codes Subcommittee

Developmental Activities

Code Training Consortium – 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 PHRC organized CTC meetings on July 13th and October 8th in Harrisburg, PA.

Subdivision Design Guidelines – The PHRC has developed draft Subdivision Design Guidelines. These guidelines were developed at the request of the Pennsylvania Builders Association. The goal of this initiative is to develop a set of guidelines that could be adopted by municipalities to regulate land development activities for residential subdivision. The guidelines address street parking (cartway widths, curbs, shoulders, sidewalks, grades, pavement, etc.), construction standards, water supply (systems, capacity, placement, fire hydrants, etc.), sanitary sewer, and stormwater management.

PA Stormwater Management Policy – At the request of the PBA, the PHRC submitted formal comments critiquing DEP’s proposed stormwater management policy.

Applied Research Activities

Ventilation Drying of Walls - The PHRC is involved in two interrelated R and D projects. One is funded by ASHRAE and the other by the NSF. Both relate to the contribution of ventilation drying to the performance of wall systems with screen-type cladding, e.g., siding, masonry veneer, etc. One objective is to develop and publish guidelines for design and construction. This work will have a bearing on the choice and installation of sheathing membranes (housewraps and/or building paper), the sizing of drainage and ventilation capabilities, choice of cladding and the provision of weeps and vents. This program of work is being conducted in partnership with ORNL in Tennessee and the University of Waterloo in Canada.

In the Building Enclosure Test Laboratory (**BeTL**), we now have the following equipment:

- A large climate chamber to simulate enclosure elements (portions of a wall or roof, or windows or sections of materials) under indoor and outdoor environmental conditions including real time solar effects.
- An airflow chamber to model ventilation in representative wall enclosure systems.
- A ventilation drying chamber to model the drying or wetting capabilities of the outside air for representative wall enclosure systems.
- A general-purpose enclosure test facility that enables us to test the performance of materials and enclosures under air pressure differentials, rain and temperature variations.

Properties of wood composite materials and structural response of wood I-joists: Three journal articles have been written based on the work conducted by Dan Hindman for his Ph. D. program. Dr. Hindman has recently been appointed to a tenure track assistant professor position in Wood Science and Engineering at Virginia Tech University. A graduate student, Mr. Jesse Burow, is continuing investigation of the allowable lateral buckling loads of composite wood I-joists. The research goal is to identify the reason why the lateral buckling load for wood I-joists predicted by the current NDS criterion is only one half of the buckling load measured in the lab experiments.

Moment Capacity of Metal Truss Plate Connectors – Work to measure the moment capacity for a wide range of metal-truss-plate connected truss joints has been completed as have the calculations of the moment capacity for all the test connections using the TPI moment capacity equations. A report of findings has been submitted to TPI. Ms. Julie Masser, the graduate student who worked on this project, has recently been hired by TrusJoist, a Weyerhaeuser Business, in Morrillton, NJ.

“Visitability” – The PHRC is participating in a project to review the costs and benefits of visitability guidelines in Pennsylvania. This PHFA-funded project is a partnership between Life and Independence for Today and the PHRC. The PHRC has assisted in the identification of six to eight builders across Pennsylvania. By spring of 2005, the PHRC will develop a series of reports on the advantages, disadvantages, and technical considerations, as well as costs and benefits.

Publications

Builder Brief:

- Air Leakage in Recessed Lighting, PHRC Builder Brief, BB0502.

Technical Reports:

The following reports for ASHRAE have all to be published in 2004:

- **Ventilation Drying in Screened Wall Systems: a Physical Demonstration**, (PHRC/PSU, Task 5a)
X. Shi, C. Schumacher, E. Burnett, J. Straube
- **Characterization of Airflow Behind Vinyl Siding**, (BEG/UW, Task 3a)
R. VanStraaten, J. Straube, E. Burnett
- **Characterization of Ventilation Airflow in Screened Wall Systems**, (PHRC/PSU, Task 3b)
J. Piñon, D. Davidovic, E. Burnett, J. Srebric

- **Field Characterization of Airflow Behind Brick Veneer**, (BEG/UW, Task 4)
R. VanStraaten, J. Straube J. Piñon, E. Burnett
- **Ventilation Drying under Simulated Climate Conditions**, (PHRC/PSU, Task 5b)
X. Shi, C. Schumacher, E. Burnett, J. Straube
- **Ventilation Drying under Natural Exposure Conditions**, (BEGUW, Task 6)
R. VanStraaten, J. Straube, C. Schumacher, E. Burnett
- **Synthesis Report and Guidelines**, (PHRC/PSU, Task 8a)
E. Burnett, J. Straube, A. Karagiozis, Schumacher, X. Shi, R. VanStraaten, J. Piñon, D. Davidovic

Other Publications:

Chris Schumacher, Xing Shi, Danko Davidovich, Eric Burnett and John Straube, **Ventilation Drying in Wall Systems**, Proceedings of the Second International Conference on Building Physics, 14-19 September, 2003, Leuven, Belgium, pp 479-486

Eric F. P. Burnett, **Below-grade Enclosure Construction: Characterization and Categorization**, Proceedings of the Ninth Canadian Conference on Building Science and Technology, Vancouver, British Columbia, February 27 and 28, 2003, pp 238-249

Eric F.P. Burnett, Invited Presentation – **Whose Needs, Expectations and Performance?** Submission to the Global Policy Summit on the Role of Performance –Based Regulations in addressing Societal Expectations, International Policy and Local Needs. November 3-5, 2003, Washington, D.C.

Burnett, E.F.P. and Fortney, M.R., **The 11th Annual Housing Conference**, Proceedings of the 11th Annual Pennsylvania Housing Conference, The Pennsylvania Housing Research Center, Harrisburg, March 6, 2003, 178p. Editors and Conveners.

Masser, J. E., H. B. Manbeck and J. J. Janowiak. 2003. **Moment Capacity of Metal-Truss-Plate Connectors**. ASAE Paper No. 03-4003. St. Joseph, MI.

Hindman, D. P., H. B. Manbeck and J. J. Janowiak. 2003. **Torsional Rigidity and Lateral Stability of SCL and I-Joist Beams**. ASAE Paper No. 03-4001. St. Joseph, MI.

Masser, J. E., H. B. Manbeck and J. J. Janowiak. 2003. **Moment Capacity of Metal-Truss-Plate Connectors**. Proceedings of the 57th Annual Meeting of the Forest Products Society. Seattle, Washington.

Hindman, D. P., H. B. Manbeck and J. J. Janowiak. 2003. **Torsional Rigidity and Lateral Buckling Loads of SCLs and Wood I-Joists**. Proceedings of the 57th Annual Meeting of the Forest Products Society. Seattle, Washington.

Wisniewski, B. and H. B. Manbeck. 2003. **Residential Floor Systems: Wood I-Joist Creep Behavior**. Journal of Architectural Engineering (ASCE). 9(1):41-45.

Eric F. P Burnett, **Roofing Systems Categorization**, 2003 Building Envelope Technology Symposium, Roofing Consultants Institute, Dallas, 6-7 November, 2003, 22 pages.

Eric F .P. Burnett, **Membranes and their Functions**, BETEC (Building Energy and Thermal Envelope Council), Spring Symposium, Washington, D.C., June 2003.

Eric F .P. Burnett, **Building Enclosure Categorization, etc.**, Westford Symposium, Westford, Mass., 3-6 August, 2003.

Eric F .P. Burnett, Chris Schumacher, John Straube and Achilles Karagiozis, **Ventilation for Enclosure Systems** Westford Symposium, Westford, Mass., 3-6 August, 2003.

Eric F .P. Burnett, **Weather-Resistive Membranes**, Energy Design Update, April, 2003.

Eric F. P. Burnett, **Envelopes and Reservoirs**, Energy Design Update, October, 2003.

Other Activities

PennBOC Conference – The PHRC held two workshops as part of the PennBOC Conference in October 2003 in Hidden Valley, PA. The first program, *Masonry Requirements of the IRC*, was attended by 60 people and the second, *Updating to the 2003 IRC Program*, was attended by 28 people.

The PHRC delivered presentations at the following conferences:

- Affordable Comfort Conference: Mark Fortney presented a session “*Building Codes and Building Science: Is There a Link?*”
- Pennsylvania State Association of Township Supervisors Conference: Scott Brown provided a presentation on “*Site Level Hydraulic Process*” to over 55 township engineers.
- Pennsylvania State Association of Township Supervisors Conference: Scott Brown provided a presentation on “*Management Practices for Post Construction Stormwater Control*” to over 105 township officials.
- 2003 Pennsylvania Stormwater Symposium: Scott Brown presented a session on “*DEP’s SWM Manual Oversight Committee*”.
- 2003 Your Building & Remodeling Show: Ken Sagan presented sessions on “Uniform Pennsylvania Building Code,” and “How the New Uniform Code will impact your business”

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
- Pennsylvania Concrete Masonry Association Codes Committee

National Focus (M. Fortney and E. Burnett):

- 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 (E. Burnett):

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