



Pennsylvania Housing Research Center

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Activity Report 2010

Training, Education and Outreach Activities

Workshops and Training – The PHRC delivered 29 technical workshops and webinars to 1,278 builders, remodelers, educators, design professionals and code officials during this reporting period (please see the table below for detail). This is on par with the programs during the previous reporting period. The PHRC anticipates the demand for training on building code issues to continue to decline to a maintenance level of between 20 to 30 programs a year. The PHRC has 37 programs scheduled so far through the end of the fiscal year.

Counting the above training and less formal speaker service and presentations at conferences, the PHRC has provided educational services to over 1,511 individuals during this reporting period.

PHRC Training Programs Delivered			
PROGRAM		Activities for	
		4/15/2010 – 10/6/2010	
		# of Programs	# of Attendees *
<i>Blueprint Reading Program</i>	<i>BP1</i>	<i>1</i>	<i>30</i>
<i>Comprehensive IRC Program</i>	<i>CO1</i>	<i>1</i>	<i>16</i>
<i>International Residential Code Inspection Essentials</i>	<i>CO2</i>	<i>1</i>	<i>22</i>
<i>IRC's Plumbing Requirements</i>	<i>CO3</i>	<i>1</i>	<i>15</i>
<i>IRC's Mechanical Requirements</i>	<i>CO4</i>	<i>1</i>	<i>6</i>
<i>Commercial Building Provisions of the IECC</i>	<i>CO5C</i>	<i>1</i>	<i>25</i>
<i>2009 IRC Update Program</i>	<i>CO6</i>	<i>7</i>	<i>193</i>
<i>Residential Decks: Design Construction and Inspection</i>	<i>D1</i>	<i>1</i>	<i>44</i>
<i>Electrical Essentials</i>	<i>EE1</i>	<i>1</i>	<i>14</i>
<i>Residential Mechanical Compliance Program</i>	<i>MC2</i>	<i>1</i>	<i>15</i>
<i>Two Family Dwellings and Townhouses Program</i>	<i>MF1</i>	<i>1</i>	<i>25</i>
<i>Residential Sprinkler</i>	<i>SP1</i>	<i>3</i>	<i>78</i>
<i>Webinars</i>	<i>W1</i>	<i>5</i>	<i>695</i>
<i>Wall Bracing Requirements</i>	<i>WB1</i>	<i>4</i>	<i>100</i>
Total Programs Held		29	1,278

* Note: Estimated—not all programs have submitted attendance reports

A. Program Development

Description: The PHRC will develop or update the following new training programs. These programs will address issues challenging the residential construction industry (builders, remodelers, building code officials, materials suppliers, etc.) During this period the following programs will be developed:

1. **2009 IRC Update Program** - Every three years the UCC updates its building code to the most recent version of the ICC's International Residential Code (IRC). This program will highlight the most significant changes between the 2006 and 2009 IRC, and identify potential impacts to builders, designers and building code officials. The result of this will be a new training program to be offered to builders and code official organizations.

REPORT: This program was developed during previous reporting periods. During this reporting period 7 programs have been held to 193 people and have received excellent reviews.

2. **Blueprint Reading Program** - This one-day workshop is designed to familiarize people with little or no construction experience with the technical components of blueprint reading. This program is intended to provide people who want to become residential inspectors or inspectors with this essential skill.

REPORT: This program was developed and produced during the previous reporting period. During this reporting period one program was held for 30 people and has received excellent reviews.

3. **Wall Bracing: Prescriptive Design and Plan Reviews** - The interest in this program continues to grow as builders and code officials struggle to implement the new requirement of the 2009 IRC. This workshop is designed to provide an overview of the 2009 IRC wall bracing requirements. The program provides a general understanding of structural principals of wood frame buildings as well as wind and seismic loading. The program also provides an emphasis on prescriptive design using the IRC versus when a building is exceeding the limits of this approach requiring a design professional. How to conduct wall bracing plan reviews is also emphasized.

REPORT: A second day has been added to this program with several exercises that put into practice the lessons learned during the first day of the program. The PHRC will be offering the program as either a one- or two-day program. The two-day program will debut in the first week of November. During this reporting period four programs have been held to 100 people.

Electrical Essentials –

4. Debuting in September 2010, this four-day program is a comprehensive review of Chapters 34-43 of the International Residential Code. It includes examples, exercises and case studies designed to illustrate daily practices performed by a Residential Electrical Inspector or Plans Examiner. Material includes a review of how the UCC amends certain provisions of the IRC, especially with regard to residential alterations and exclusions.

Basic electricity concepts are introduced along with common electrical terms and materials plus an overview of basic wiring and protection is presented. The relationship between the electrical provisions of the IRC and the NEC are discussed. Building permit issuance is discussed with an emphasis placed on the most important issues to be addressed and resolve during the review process.

Interactive learning is implemented through conducting virtual inspections. Emphasis will be placed on addressing electrical system installation issues that should be resolved at the permit application stage of the project.

Topics include:

- General electrical requirements
- Residential services
- Branch circuits and feeders
- Wiring methods
- Bonding and Grounding
- Power and lighting distribution
- Devices and luminaries
- Appliance installation
- Swimming pools, spas and hot tubs
- Power-limited circuits

5. **Residential Sprinkler** – Designed for residential plan reviewers, inspectors and contractors but open to any interested party, this two-day session will assist participants with learning how to design and review residential fire sprinkler construction documents in compliance with the applicable building codes for fire protection and life safety requirements in one- and two-family dwellings and townhouses.

B. PHRC Workshops

Description: Every year the PHRC provides workshops for builders, remodelers, design professionals, educators, trade contractors and building code officials. These programs will be administered directly by the PHRC.

REPORT: The following activities are planned:

1. Residential Fire Sprinklers
2. Currently one program is scheduled to be held in the fall of 2010. It is anticipated that several more of these programs will be scheduled in the spring following the anticipated date of implementation of sprinkler requirements for single-family homes (January 1, 2011).
3. Residential Mechanical Performance
Currently one program is scheduled to be held in the fall of 2010.
4. Residential Deck Design, Construction and Inspection
5. Wall Bracing: Prescriptive Design and Plan Reviews
6. 2009 IRC Transition Program

The PHRC will deliver at least four workshops across the Commonwealth

C. PHRC Training Provided Through Industry Partnerships

Description: The PHRC has developed and maintains a wide array of training for all sectors of the construction industry with a focus on residential construction. These programs are intended to address technical issues facing the industry. Additionally the PHRC will customize programs to better meet a need of an industry partner. Each program is developed with a particular audience which may include builders, remodelers, trade contractors, design professionals, teachers, building code officials, etc.

These programs are intended to be offered through our industry partners who may include trade associations such as the Pennsylvania Builders Association or their 42 local associations, professional

associations, building code associations as well as the Pennsylvania Construction Code Academy (PCCA).

REPORT:

PCCA: PCCA has held 15 programs during this reporting period and 26 programs are scheduled through the end of the fiscal year.

Builders Associations and other groups: The PHRC has held 7, 2009 IRC Transition programs with local association across the Commonwealth.

FirstEnergy/Performance Systems Development: The PHRC plans to deliver 6-8 half-day training programs that provide an overview of FirstEnergy's new homes energy efficiency program and explains various energy efficient construction techniques and technologies. Locations and marketing for these programs will be performed by Performance Systems Development.

D. Web-Based Training

Description: The PHRC's Industry Advisory Council has requested the development and deployment of web-based training. There is a need for technical programs with a lower-cost delivery mechanism than a formal classroom setting. This initiative will seek to develop interactive web-based training that can be available both live and archived for future viewing.

The following are some of the topics that are being considered for web-based training:

REPORT: The following programs were held during this reporting period:

- An Introduction to Advanced Framing: Reducing Costs While Improving Building Performance – May 11, 2010 (~109 attendees)
- IRC Update for Code Officials – July 15, 2010 (~19 attendees)
- Special Webinar – Coordination of the 2009 IRC Energy Requirements with Industrialized Housing Installation – July 22, 2010 (~132 attendees)
- Special Webinar – Act 46 – The Permit & Approval Extension Act – What is its Impact on You? – August 3, 2010 (~346 attendees)
- Building Permit Fees in PA – Overview of Center for Rural PA Study – September 14, 2010 (~ 89 attendees)

For more information or to see recordings of all of the PHRC webinars go to: www.engr.psu.edu/phrc.

E. Builder Briefs

Description: Continuation of the series of short technical documents - two to four pages in length - that address specific issues that have been identified by builders or remodelers. These documents are intended to be quick to read with much information presented graphically or pictorially.

REPORT: A series of three Builder Briefs were developed—BB0510: Insulating Basements: Part I Fundamentals; BB0610: Insulating Basements: Part 2 Materials; BB0710: Insulating Basements: Part 3 Basement Wall Systems.

F. Technology Transfer & Outreach

Description: Continuation or expansion of activities to get information and publications to builders, remodelers, design professionals, building code officials and others involved in the residential construction industry.

1. **Annual Pennsylvania Housing and Land Development Conference:** For over 18 years this conference has been the premier technical conference for housing and land development issues in Pennsylvania. This two-day conference provides the latest information on emerging technologies and how to resolve problems facing the housing industry. The conference is intended for all sections of the housing industry including builders, remodelers, code officials, educators, design professionals and modular and HUD-code builders. The second day of the conference serves as an annual forum that addresses emerging planning, design, and regulatory issues affecting the land development industry in Pennsylvania. This day is intended for anyone involved in land development activities including builders, developers, design professionals, planners and regulatory officials. We will also hold training sessions related to the housing industry on Day 2.

REPORT: The following are the key activities that have been accomplished for the 2011 PA Housing and Land Development Conference:

- a) This year’s conference will be held February 23 - 24, 2011.
- b) Secured the venue for the conference – Holiday Inn Conference Center of York.
- c) Two electronic surveys were conducted of past attendees to help identify and prioritize potential topics for the conference.
- d) Save the date postcards have been developed and will be printed.
- e) The Housing Steering Committee conference call was held and they prioritized sessions and identified some possible presenters for the first day of the conference. The following are some of the subjects to be addressed.

Early Morning	Late Morning	Early Afternoon	Late Afternoon
2009 IRC Compliance Challenges – Lessons learned after one year of implementation	Improving Energy Performance of Existing Homes	New Utility Energy Efficiency Incentive Programs	Marketing green building to customers
	Alternative deck attachment details and free-standing decks: Avoiding hold-down tension devices	Residential Fire Sprinklers – What Builders Should Know	Meeting the Demands of the Baby Boomer Generation: accessibility and visitability
	2009 IRC Compliance Challenges Continued	Changes in IRC 2009 Wall Bracing	2009 Energy Codes: The PA Alternative versus REScheck

- f) The Land Development Steering Committee conference call was held. We will have a full-day program. The topics prioritized by the Steering Committee include:

- Chesapeake Bay Total Maximum Daily Load (TMDL) & impact of the TMDL on the development community
 - Chapter 102 storm water updates
 - Post Construction Storm Water Management – Operation & Maintenance, deeding/legal issues, DEP regulations
 - Nitrate issues with on-lot septic systems
 - Best Management Practices (BMPs) - technical issues of installation, operations, data on effectiveness
 - Green site design and zoning issues related to green design, BMPs, alternative energy
- g) The following are topics for the Training Sessions on Day 2: Residential Fire Sprinklers, Advanced Framing, Energy Incentives for New Homes, Solar/Electric Systems/Installation.
- h) The *PHRC Leadership Reception* will be held the evening of February 23rd. The venue has yet to be determined.
2. **Speaker Service:** The PHRC will hold and/or participate in talks and seminars directed at the housing industry. This may include trade and professional association functions and regional meetings, local association meetings, or state or national conferences.

REPORT: The following presentations have been provided during this reporting period:

- Turns, M., *2009 IRC Update*, PA Rural Electric Association, State College, PA, April 22, 2010 (23 people)
 - Turns, M., *Advanced Framing*, Mifflinburg Lumber, Mifflinburg, PA, April 30, 2010 (10 people)
 - Fortney, M., *Building Planning & Common Code Violations Pertaining to the 2009 IRC*, Towanda, PA, June 1, 2010 (14 people)
 - Turns, M., *Impact of the Uniform Construction Code in Rural Pennsylvania*, presentation to the board of the Center for Rural Pennsylvania, August 10, 2010, Bradford, PA (15 attendees)
 - Buddenbohn, B., *Overview of the UCC and Common Inspection Items*, presentation to U.S. Department of Agriculture loan officers, Pittsburgh, PA, September 1, 2010 (93 people)
 - Turns, M., *What is the PHRC?*, Mifflintown-Juniata Builders Association, Mifflintown, PA, September 14, 2010, (18 people)
3. **Outreach Activities:** This includes activities to let builders know about the PHRC and the services and publications it provides. These activities may include the PHRC newsletters, mailings, promotional pamphlets, and advertisements in trade journals, phone calls, and the PHRC's Web site.

Conference Presentations: (UPDATE)

- Turns, M., *2009 IRC Update*, Pro-ASHI (American Society of Home Inspectors) Regional Conference, Pittsburgh, PA, September 10, 2010 (60 people)

Pennsylvania Focus Committees:

- Industrialized Housing/Buildings Advisory Group
- Pennsylvania Builders Association (PBA)—(Training and Education Committee, Land Development Task Force, Housing Finance Committee, and PHRC Committee)
- Advisory Council for the Modular Housing Training Institute (MHTI)
- Advisory Council for the Manufactured Housing Resource Center (MHRC)
- Builder's Association of Central Pennsylvania
- Pennsylvania Concrete Masonry Association, Codes Committee

National and International Focus Committees:

- National Consortium of Housing Research Centers
- Forest Products Society, Wood Engineering Award Committee
- RILEM, Technical Committee TC 215 AST Chair
- National Institute for Building Sciences (NIBS)
- International Council for Research and Innovation in Building and Construction – Working Commission W-18 – Timber Structures
- International Scientific Committee for the International Conference on Structural Health Assessment of Timber Structures - SHATIS'11, Lisbon Portugal
- Editorial Board Wood Science Journal
- Editorial Advisory Committee, Materials and Structures
- Guest-Editor, Journal of Architectural Engineering—Housing Issue

Publications

Research Papers:

The research publications not only disseminate the technical information to the public but increase the state, national, and international reputation of the PHRC. As such, they are an important component of our mission.

Horvath, B., I. Peszlen, P. Peralta, B. Kasal, and L. Li. 2010. Mechanical properties of young genetically engineered Aspen with modified lignin content and/or structure. *Wood and Fiber Science*. In print.

Horvath, B., I. Peszlen, P. Peralta, B. Kasal, and L. Li. 2010. Effect of lignin genetic modification on wood anatomy of aspen trees. *IAWA Journal*, Vol. 31 (1), 2010: 29–38.

Applied Research

A very important function of the PHRC is to undertake or stimulate research and development on materials, products, procedures, etc. These efforts may have a longer-term and/or a more fundamental focus than other projects. The projects that are listed below foster partnerships and draw on the expertise and strengths of the persons, groups and facilities available at both the Pennsylvania State University and the Pennsylvania College of Technology.

A. Guidelines for Efficient Basement Insulation

Description: This project was built on two previous projects conducted by the PHRC involving sophisticated testing of the performance of basement wall systems. This project synthesizes the results of previous work to develop simplified guidelines for energy-efficient and healthy basement insulation based on the latest knowledge. Typical basement insulation details were developed and their positive and negative attributes assessed. The target audience for this document will be builders, design professionals as well as building code officials.

REPORT: We have finished testing several interior insulation strategies comparing permeable and non-permeable insulations under basement-like conditions. Available materials and publications regarding basement insulation systems were collected and studied.

A series of three Builder Briefs were developed that synthesize previous research findings as well as current literature. The Brief series covers the fundamentals of below-grade building physics, relevant material properties of common components of basement wall systems, as well as a presentation of typical basement wall system configurations. The final brief includes comparisons between typical wall systems, including a discussion with regard to cost and risk implications associated with each system.

The Guidelines for Efficient Basement Insulation are complete.

Land Development

The land development process is a key component of providing affordable homes; however, there is no single group looking at land development practices in Pennsylvania. These initiatives are part of the PHRC's long-term effort to provide technical input and guidance and leadership to these issues. The following program and tasks have been identified by builders and the PHRC Operations Committee as a high priority project for Pennsylvania's home building industry. Katie Blansett has been hired to teach the undergraduate course on residential development and is currently working part-time (4 hours/week) to develop a strategic plan to address how the PHRC should move forward with land development activities. It should be noted that the Land Development Specialist position at the PHRC is currently vacant as a full-time position. It is assumed that Katie Blansett will continue part-time in this position at 20-hours/week for the spring semester, starting in January 2010 and proceed to full-time in May 2010 upon completion of her Ph.D. dissertation.

A. Pennsylvania Standards for Residential Site Development

Description: The residential development standards project was finalized in April 2007. These are a set of consensus standards that allow for the most up-to-date design innovations and provide flexibility needed for sustainable land development. The initiatives that will be undertaken will increase the awareness of the standards and encourage the adoption by municipalities within the Commonwealth.

REPORT: The PHRC has been distributing the standards electronically and via CD. A proposal has been submitted to present a workshop on the Standards at the PSATS 2011 Conference. As opportunities arise, the Standards will continue to be publicized.

B. Land Development Strategic Plan

Description: Land development activities have been tabled for several years at the PHRC. To ensure that that the right direction is taken when restarted, a strategic plan is being developed to address needs in the development and design communities and establish short-term objectives and longer term goals. A land development-specific subcommittee of the IAC is being proposed to help set the priorities for land development related projects.

REPORT: A draft of the Land Development Strategic Plan will be presented to the OC and IAC at the October meetings for review and input.

C. PA Stormwater Technical Advisory Workgroup

Description: Following the release of the DEP Pennsylvania Stormwater Best Management Practices Manual, design professionals from across the state formed a group to address the technical deficiencies in the Manual. This group is comprised of only design professionals with technical backgrounds (i.e. engineers, soils scientists, landscape architects, geologists). The group is comprised of subject-related sub-groups that are revising the existing document and recommending changes to the DEP.

REPORT: Katie Blansett has joined the Workgroup and is working with the Methodologies and Water Quality subgroups. She is attending meetings/conference calls to facilitate the revisions process.

Applied Projects

These groups of projects are application oriented and have a direct need by the residential construction industry. This includes the development and support of standards, and longer term initiatives.

A. Enforcement Practices and Impact of the UCC on Municipalities

Description: This project, partially funded by the Center for Rural Pennsylvania, sought to provide a clearer picture of the UCC's impact on Pennsylvania municipalities. This included a determination of which municipalities are enforcing the UCC and how they are enforcing it. An analysis of building permit fees was performed to determine the average and range of building permit fees, as well as differences in fees between rural and urban municipalities.

REPORT: The final report entitled, *Impact of the Uniform Construction Code in Rural Pennsylvania*, was approved by the Center for Rural Pennsylvania on April 15, 2010. The findings of this report were summarized at the spring 2010 PHRC Industry Advisory Council meeting. The report was delivered to the legislature September 20, 2010, and is now available on the Center for Rural Pennsylvania website: <http://www.rural.palegislature.us/>.

For more information contact Mike Turns at 814-863-2366 or miketurns@psu.edu.

B. Development of Alternative Residential Deck Lateral Load Connections

Description: Deck failures usually have tragic consequences. The 2009 International Residential Code establishes prescriptive requirements for deck lateral attachment connections that are problematic to constructs and may not meet the loads imposed. This project will identify the best practice in deck construction and develop a set of details that will result in safe deck construction. Special emphasis will be on lateral connection of decks. This will be done through structural analyses of the deck systems and testing of connection details if necessary. The project deliverable will be guidelines for deck construction including typical details.

REPORT: The PHRC has identified several deck connections details which will be analyzed to determine if and how they will comply with the lateral loading attachment requirements of the 2009 IRC. Analyses have begun on several details.

C. MHTI & MHRC Support

Description: Two programs focusing on training for the factory-built housing industries have been developed. The first is the Modular Housing Training Institute (MHTI) and the second is the Manufactured Housing Resource Center (MHRC). The MHTI program currently provides a two-day training program that focuses on the on-site completion of modular houses. The program is intended for builders, installation crews, code officials, as well as industry representatives. The MHRC currently provides training for the on-site completion of manufactured or HUD Code housing. The program is intended for retailers, installers, manufacturers, as well as building code officials. In recognition of the importance of factory-built housing to PA, a Ben Franklin award has been made to enable employment of a full-time Director of MHTI and MHRC.

REPORT: No activity during this reporting period due to organization losing funding.

D. Support of Standards

Description: The PHRC has developed three standards to respond to industry demand. These include Pennsylvania's Alternative Residential Energy Provisions, Pennsylvania Standards for Residential Site Development Standards and Foundation Systems for Relocated Manufactured Housing. Each of these standards requires training and timely technical assistance for local governments, builders/developers, design professionals, contractors, etc. All of these standards are available electronically for free and hard copies are available for a fee.

1. Pennsylvania's Alternative Residential Energy Provisions - 2009: Education will be provided through various building code training programs and technical assistance will be provided through telephone and email support by the PHRC.
2. Pennsylvania Standards for Residential Site Development Standards: Please see the Land Development section.
3. Foundation Systems for Relocated Manufactured Housing: The PHRC will deliver a one-hour training program for building code officials and contractors. After this is held, it will be posted to the PHRC's Web site for open viewing.