

PENNSYLVANIA HOUSING RESEARCH CENTER NEWSLETTER

FALL 2013



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A MESSAGE FROM THE ASSOCIATE DIRECTOR



As Mike Turns described in last year's newsletter, the PHRC has entered an exciting new era of increased commitment to both meeting the needs of the housing industry and expanding the recognition of the PHRC globally, as well as locally. Over the last eight months, that excitement and commitment have led to some important changes in our organization. We've brought on two new well-known, experienced building professionals: Chris Hine as the Housing and Land Development Specialist, and Brian Wolfgang as the Housing Systems Specialist.

In addition, last April, I was offered the position of Associate Director, following Mike's resignation in order to accept a position with Performance Systems Development. I was delighted with this opportunity to broaden my responsibilities beyond our land development activities and to work more directly with Dr. Memari on

enhancing our training and research projects while strengthening the PHRC's profile within the industry.

As would be expected with half of our team being new in their positions, we've experienced a bit of a learning curve; but I believe we've achieved quite a bit already and have put together an ambitious program plan for the year. I'm quite excited about working with this talented PHRC team and the many industry-focused projects we're going to accomplish in the coming months and years.

As you flip through this newsletter, please check out the projects that we've recently completed and the training programs coming up soon. Please explore our webpage for more details about any of the projects, trainings, or webinars, and contact us if you have any questions or would like to schedule a training program for your organization. And of course, in your contacts with others within -- and related to -- the building industries, please be sure to mention the research, activities and resources supporting them, and available to them, at the PHRC.

*Katie Blansett, PhD, PE,
Associate Director, PHRC*



NEW FACES AT PHRC!



CHRIS HINE

Chris Hine joined the PHRC in May of this year as the Housing and Land Development Specialists. Some of Chris' responsibilities include serving as primary liaison with the housing industry and state government in regards to residential construction and residential building codes; developing and teaching training programs for builders, remodelers, code officials and design professionals; and specializing in projects related to residential building codes, HVAC design and installation, residential construction practices and the PA land development process. Prior to joining the PHRC team, Chris was with a central Pennsylvania-based home builder for over 10 years where he was the Tech Service Manager and oversaw the design/estimating process and responded to the field related construction concerns and building code related questions.



BRIAN WOLFGANG

Brian Wolfgang joined the PHRC in May of this year as the Housing Systems Specialist. Brian spent the last three years working as a structural designer and construction manager for a local civil engineering consulting firm. Prior to his work as a consultant, Brian worked under the PHRC throughout his graduate studies (2008-10) as both the Glunt Fellow and PHRC Fellow. He completed his Master's degree under former Hankin Chair, Dr. Bo Kasal. Brian's current responsibilities within the PHRC include building science research and program development, as well as coordination of graduate level research and PHRC activities.



HEATHER SUSTERSIC

Heather Sustersic began working with the PHRC in August, 2012, as a Research Associate on a joint appointment with the Department of Architectural Engineering. In addition to identifying funding resources for the PHRC, Heather assists in the writing and preparation of proposals for government- and industry-sponsored research, writing research reports and other publications, and maintaining the PHRC website. Heather also teaches structures courses and advises Architectural Engineering students on their capstone projects. Prior to joining the PHRC, Heather worked as a consulting structural engineer on a variety of projects with construction costs up to \$215M and ranging in size from 6,000 SF to 390,000 SF. She is a licensed Professional Engineer in the State of Maryland with Bachelor of Architectural Engineering and Master of Architectural Engineering degrees from Penn State.

22ND ANNUAL PHRC HOUSING AND LAND DEVELOPMENT CONFERENCE

The 22nd Annual Housing and Land Development Conference will be held February 19th & 20th at the Penn Stater Conference Center in State College. Planning for the conference is well underway. We have the agenda and speakers for both days of the conference finalized.

The Housing Day of the conference will kick-off with an opening plenary session by Brad Oberg of IBACOS on the Build American program. Following Mr. Oberg's presentation, the conference will split into three tracks focused on Design and Innovation, Construction, and Building Codes. Following the final technical session of the day, conference participants may choose to attend an optional tour of either the Sustainability Institute's MorningStar Solar Home or the PHRC Research and Testing Laboratory Facilities. The first day of the conference will conclude with a Mix and Mingle Reception at the Hintz Alumni Center on campus. Attendees of either the Housing day or the Land Development day of the conference can sign-up for the reception.

The keynote speaker for the Land Development Day of the conference will be nationally known economist Elliot Eisenberg, Ph.D. He will be talking about the Economic Impact of Government Regulation. Following the keynote, the conference will break out into two concurrent tracks. One track of the day will focus on the land development process while the other will focus on stormwater management.

See the insert in this newsletter or visit our website for more information.

2ND RESIDENTIAL BUILDING DESIGN AND CONSTRUCTION CONFERENCE

The 2nd Residential Building Design and Construction (RBDC) Conference has been organized to be held in conjunction with the 22nd Annual Housing & Land Development (H&LD) Conference February 19-20, 2014 in The Penn Stater Conference Hotel, State College, PA. The RBDC Conference is being held for the second time now as a new program by the PHRC to provide a forum for researchers, design professionals, manufacturers, builders, and code officials to keep up-to-date on the latest advancements and discuss their own findings, innovations and projects related to residential buildings. The RBDC Conference will consist of several technical paper sessions with presentations on the latest research and innovations related mainly to residential buildings. Full papers for the RBDC presentations will appear in the conference proceedings.

The proceedings of the 1st RBDC Conference (February 20-21, 2013) can be found at: <http://www.engr.psu.edu/phrc/Conference/2013RDBCC-PROCEEDINGS.html>.

The PHRC offers a speaker service which provides short technical presentations to organizations or associations related to the residential construction industry. Over the past 10 years the PHRC has made hundreds of these presentations to over 20,000 individuals. Most of our presentations offered under this service are for local, regional or state groups or associations. These 30-60 minute programs are ideal for dinner meetings or other gatherings of your members. Our current topics being offered include:

- UCC OVERVIEW/UPDATE
- FLOOR FIRE PROTECTION
- PROPER FLASHING
- PA ALTERNATIVE RESIDENTIAL ENERGY PROVISIONS
- FOUNDATION SYSTEMS FOR RELOCATED MANUFACTURED HOUSING
- SUBDIVISION AND LAND DEVELOPMENT GUIDELINES
- INTRO TO STORMWATER
- INTRO TO WQ CALCULATIONS
- LAND DEVELOPMENT PROCESS

A detailed description of these presentation topics can be found on the PHRC website at www.engr.psu.edu/phrc under the training tab.

- **CUSTOM REQUESTS:** The PHRC will try to meet any custom requests for different topics based on staff expertise and availability, and financial resources.
- **HOW TO SCHEDULE:** To schedule a presentation please call (814) 865-2341. The PHRC provides this service on a first come first serve basis so the longer the lead time the better.



Over the past year, several new activities have been initiated as well as efforts made to maintain and carry out existing programs. For a better understanding of the overall efforts related to housing and residential construction at Penn State, one can consider activities carried out by the PHRC staff under PHRC responsibilities and those carried out mainly by the Hankin Chair. The PHRC activities are more well-known to the readers of this Newsletter. The major activities of PHRC include offering numerous training programs and webinars on different topics delivered by PHRC technical staff and/or affiliated instructors, carrying out research on Industry Advisory Council approved projects by the PHRC technical staff/researchers or Penn State faculty, organizing the annual Housing and Land Development conference, writing Builder Briefs, publishing research reports, and organizing various relevant meetings with sponsors. The responsibilities of the Hankin Chair, however, may be less known to the readers. Therefore, in this issue of the Newsletter, such responsibilities are

first listed and then the types of activities carried out as mentioned. As the Hankin Chair, my responsibilities include:

- Maintain instruction of at least two senior-level undergraduate courses related to residential construction.
- Advise and maintain an active NAHB Student Chapter.
- Provide a focal point for residential construction research at Penn State through fostering fundamental and applied research to benefit the industry.
- Actively participate in the National Consortium of Housing Research Centers and other relevant national and international organizations.
- Develop and maintain good relations with all sections of the residential construction industry and increase industries awareness of Penn State's commitment to the industry.
- Increase students' interest in the residential construction industry and administer the Glunt Fellowship Award and other related students awards.

With respect to undergraduate instruction, two courses have been offered over the years, AE 470 (Residential Building Design and Construction) and CE 410W (Sustainable Residential Subdivision Design). With a new instructor appointed to teach AE 470, the number of students taking this course has been increasing and is now at 50. Last year a new course was introduced, AE 496B (Construction Management of Residential Building Projects). These three courses now form the core residential construction courses. Two other courses that are also

relevant and available to students interested in residential construction are BE 462 (Design of Wood Structures) and AE 542 (Building Enclosure Science and Design).

The NAHB Student Chapter has come a long way over the past year with a group of enthusiastic students planning and leading the activities. The club has increased its efforts to attract new members, now at 32, has held several meetings, each enriched with an invited speaker that has led to significant increase in students' interest in residential construction. The club has also started fund-raising efforts and as in previous years is preparing to participate at the National NAHB Residential Construction Management Competition. Last year (2012-2013) Penn State sent two teams to the competition, one team ranked 6th place and the other 23rd out of 33 participating teams. Please see the article by the NAHB Student Chapter president for more details about the club's activities.

With respect to research, significant progress has been made in terms of attracting graduate students, submitting proposals for grants, and enhancing our laboratories that are equipped with advanced testing facilities (Building Components and Envelopes Research lab [BCERL] and Building Enclosures Research Lab [BeTL]). Currently, the Hankin Chair is advising several M.S. and Ph.D. students involved in research related to residential construction in general. Closely related to research is the publication of research results and exchange of information and knowledge to advance the state of understanding in the field. A new technical conference has been introduced through the PHRC with the first one held in February 2013. The 1st Residential Building Design and Construction conference was

held in conjunction with the 21st Annual Housing & Land Development conference. The second Residential Building Design and Construction conference is planned for February 2014.

There has been significant progress in activities at the national level as well. The Hankin Chair actively participates at the National Consortium of Housing Research Centers' Executive Committee and I participate in the national committees that promote Building Science education, e.g., NIBS BETEC and DOE Challenge Home Student Design Competition. I have also been very active in the American Society of Civil Engineers (ASCE) Architectural Engineering Institute (AEI). I served as the President of AEI 2012-2013, chaired the Curtain Wall Committee, co-chaired the AEI Conference 2013, and am involved in several other national level conference steering committees. I also initiated a Special Section in the ASCE Journal of Architectural Engineering on Housing and Residential Building Construction, and as the editor of the Special Section am actively inviting authors of original research to submit papers related to all aspects of residential construction.

Efforts in reaching out to the residential construction industry is continuing and growing. One approach has been to send the testing laboratories brochure to product manufacturers and firms with interest in experimental studies/investigation or engineering evaluation of residential building systems. Through blast e-mails, the residential construction industry has been invited to attend the PHRC conferences or to freely access the proceedings of the Residential Building Design and Construction conference available on the PHRC website. As a new approach taken to establish relation with the industry, the PHRC participates at the Penn State Architectural Engineering Career Fair, where not only is the PHRC introduced to the building industry, but the Center

helps the students to connect to those in the residential construction industry not participating at the Career Fair for internships or jobs through the development of a resume book. Furthermore, participation at the International Builders Show has further helped establishing new relationships. The annual Hankin Distinguished Lecture is another important activity that attracts local firms and professionals, further strengthening goals of the residential construction program at Penn State.

The underlying effort that would most benefit the industry is to provide opportunities for students to become more interested to residential construction. This is a goal rather than a milestone. The means to offer opportunities for students, on the other hand, have been developed with significant progress over the past year and a half. Notably in this regard is the promotion of the NAHB Residential Construction Management competition, which has attracted a large number of students to a one-credit course designed to provide incentive for students to put a lot of their time and effort. Furthermore, building on the success of this program, we have initiated participation of Penn state students in the DOE's Challenge Home Student Design Competition that is being held for the first time. This competition has also created great excitement among students. More than a dozen students have joined the Penn State team called "Nittany Lion e-Den." To provide additional incentives or opportunities for students to take more than a single course related to residential construction or pursue the existing Housing Certificate currently available, an important milestone has been reached in creating a Residential Construction Minor. The proposal for the minor that requires 22 credits has now been approved by the host department, Architectural Engineering, and is going through the other steps in the process toward the final approval and adoption by the University. Finally, to further encourage and recognize student accomplishments, several awards that have been instituted in the past are

being maintained, including the Glunt Graduate Fellowship Award, as well as NHE and other scholarships, such as those that support the students who represent Penn State at the NAHB Residential Construction Management Competition.

As this rather lengthy report indicates, the residential construction program at Penn State is growing stronger and expanding. Certainly, without the generous support of the late Bernard Hankin and his family in providing a significant endowment, the residential construction program would not have thrived. The Hankin Chair and the PHRC will proudly continue the efforts to provide a World Class education opportunity for Penn State students in residential construction and to serve the industry through research, training and publications.

*Dr. Ali Memari, Hankin Chair
and Director of the PHRC*

HANKIN DISTINGUISHED LECTURE SERIES

"Framing the Future of Housing Finance: A Practical Guide for Reform" was the subject of the 2013 Hankin Distinguished Lecture Series. This year's lecture was presented by Dr. Kent Colton, Senior Fellow, Joint Center for Housing Studies, Harvard University and President, The Colton Housing Group on November 6th at the Nittany Lion Inn in State College. Dr. Colton discussed the buildup of the housing bubble and its inevitable collapse. He then followed up with the key aspects of housing finance reform needed to prevent a similar event from occurring again. The lecture was attended by students, faculty and industry professionals.



NAHB Student Chapter on a Tour of Winchester Homes' Poplar Run Development

AN UPDATE FROM THE NAHB STUDENT CHAPTER

The National Association of Home Builders Penn State Student Chapter has had a successful year so far. The president this year is Christopher Guyan; the Vice-President is Paige Donnell; the Secretary is Alayna Auerbach; the Treasurer is Alec Galanti; the Website Coordinator is Timothy Scheer; the Corporate Connection Rep is Drew Nicholas; the Civil Engineering Rep is Tyler LaPointe; the Architectural Engineering Rep is Brianna Castellanos; and the Habitat for Humanity Liaison is Joshua Jaskowiak.

The first goal at the beginning of this year was to increase club membership and get more people interested in NAHB PSU. Club leadership has also worked hard to connect NAHB PSU with companies in the building and housing industry. NAHB officers attended the HUB Involvement Fair, Engineering Activities Fair, Engineering Reverse Career Fair, and the Builders Association of

Central PA's Meet the Builders event. These initiatives have been successful to date and are ongoing.

One of the main functions of NAHB PSU is regular club meetings, held once or twice per month. To date, there have been four meetings, including presentations from Brian Wolfgang discussing 'Challenges of Building High End Green'; Bryan Heitzmann addressing 'PA Construction Codes'; and Andy Lau discussing 'Net Zero Energy Homes'. Another unique opportunity involved a trip to the Penn State MorningStar Solar Home. The MorningStar Solar Home is a net-zero home: it produces as much (and even more) energy as it consumes. This successful trip allowed club members to learn about advanced energy conservation and green design principles.

Another important aspect of NAHB PSU club membership includes community involvement. This year, NAHB PSU has teamed up with Penn State Habitat for Humanity and also plans to get involved with a local initiative called "Weatherization First" which aims to provide weatherization services to low income residents in the Centre Region.

Finally, one of the premier events of the NAHB PSU student chapter involves the participation of the Residential Construction Management Competition team at the International Builders Show in Las Vegas, NV. The team is hard at work preparing

this year's submission and looks forward to the opportunity to travel to the show in February, 2014.

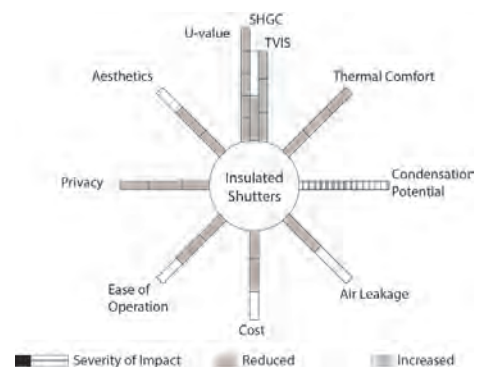
Christopher Guyan, NAHB Student Chapter President

RESEARCH & APPLIED PROJECT UPDATE

RECENTLY COMPLETED PROJECTS:

EVALUATION OF RESIDENTIAL WINDOW RETROFIT SOLUTIONS FOR ENERGY EFFICIENCY

In this project that was recently completed, various methods of reducing the energy loss through windows were studied. In particular, methods involving window retrofit solutions were identified and evaluated. Building owners have several options of retrofit solutions, including curtains, drapes, blinds, screens, and shutters.



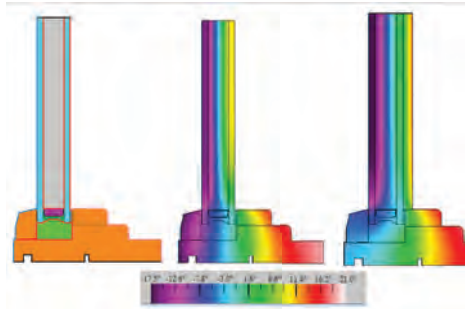
At-a-glance performance diagram for interior shutters.

While some products are often selected for aesthetic or privacy concerns, they can also provide an effective means of limiting heat transfer. The study report describes the performance criteria for each retrofit solution that building owners should be aware of when selecting from various options. As part of the results of this study, a simple, "At-a-Glance Performance Diagram" has been developed for each retrofit solution. The study investigates investigation of a



2013 Residential Construction Management Competition Teams at the International Builders' Show

broad range of window retrofit attributes, and including geometric characteristics and material properties, on the performance indices (U-value, SHGC) of double glazed window systems. The thermal analysis evaluations were carried out using the publically available software WINDOW and THERM. The results of the study will be useful for building owners to better understand the attributes that are most important for energy efficiency.



Infrared analysis results of different Insulated Glass Unit (IGU) and glazing systems using the THERM model. The temperatures are given in Celsius.

ON-GOING PHRC PROJECTS:

LEARNING FROM THE EXPERIENCE OF SOLAR DECATHLON

The goal of this research is to develop a collection of learning materials from the significant investment and effort that has so far gone into the Solar Decathlon program. The study is reviewing the designs of past solar decathlon projects to identify special features that will have impact on energy performance considering various criteria. The study intends to develop an array of suggested features for different performance expectations by the homeowners or developers and also suggest guidelines for appropriate use of various features in NE climates.

MOISTURE MANAGEMENT IN HOMES

Moisture damage to a home incurs unwanted repair costs to homeowners and potential health hazards if left untreated. In particular, water damage to basement walls due to rain effect on basement windows (without proper and reliable well cover protection), water damage to above grade walls due to window failure/malfunction, water damage to floors and ceiling drywall due to overflows in bathrooms are common occurrences. In this study, sources of water damage are identified, and where needed, new concepts such as basement window solutions or innovative waterproofing ideas are introduced. In particular, the study intends to identify and introduce monitoring and sensor technologies and their potential applications for homes to detect intruding moisture and alarming the homeowner of potential problems

RESUSPENSION & TRANSPORT OF ALLERGEN CARRIER PARTICLES IN RESIDENTIAL HVAC SYSTEMS

HVAC systems play an important role in transporting allergen carrier particles that trigger asthma episodes in residential indoor environments. Unfiltered particles deposited on interior duct surfaces resuspend and transport when disturbed under mechanical vibration and varying air flow conditions in the system. However, experimental data is needed to characterize the behaviors of individual allergen-carrier particles in response to HVAC system disturbances and to inform modeling work that will lead to better design and performance guidance for builders seeking to improve indoor air quality in residential settings. A combination of experimental work in residential settings and in a more controlled laboratory resuspension chamber setup is proposed to characterize the resuspension of allergen-carrier particles deposited in residential HVAC ductwork and to obtain resuspension rate data for individual allergen-carrier particles in various HVAC system environments. The results of this

research investigation are expected to provide a better understanding of the behavior of allergen sources in residential homes that would benefit the Pennsylvania housing industry and its residents.

This research project is being conducted by Dr. James Freihaut, Penn State Department of Architectural Engineering

PERFORMANCE OPTIMIZATION AND DEVELOPMENT OF A HOME MODULAR DELIVERY SYSTEM

The objective of this research is to expand affordable home energy performance by developing an optimized modular delivery system, a Kit-of-Parts (KoP), applicable for infill development of new homes and for retrofitting existing homes. This innovative system of components will result in homes that surpass Energy-Star performance for energy-efficiency, have improved indoor air quality, and provide realistic options for aging-in-place. Most notably it will provide a way to deliver high quality, well-designed, small affordable housing projects on a broad scale.

This research project is being conducted by Prof. Lisa Iulo, Penn State Department of Architecture.

DETAILS THAT WORK

New construction practices create a need for new and innovative details for contractors and sub-contractors to ensure proper installation. These necessary details encompass a wide range of scenarios starting from the footing level through shingles. This project will review critical details, which include controlling bulk water through proper flashing, moisture control, proper insulation, and controlling air infiltration, particularly at problem areas like penetrations. These details will help ensure code compliance as well as increase the durability and sustainability of the structure. This will be an ongoing project to develop details for programs such as speaker services and other training programs.

The PHRC will also compile all details into one PHRC detail book. This detail book will be available in PDF form on the PHRC website. During the 2013-2014 project year details will focus on the topics of bulk water, moisture and air management. This scope will include flashing details, ventilation solution details, wall assembly details and air sealing details.

LOCATION AND LAND AREAS FOR BUFFERS ON HIGH QUALITY AND EXCEPTIONAL VALUE STREAMS

Recent and proposed regulation and policy updates are relying heavily on stream buffers as a major tool in protecting water quality, particularly in High Quality (HQ) and Exceptional Value (EV) watersheds. Some areas of the Commonwealth have a much higher density of HQ and EV streams than other areas. In addition to affecting many traditional land development projects, the new regulations and policies can affect single-lot home builders. Single-lot builders have not traditionally needed to be concerned with knowing in which watershed they are building, obtaining storm-water permits, or designating and planting stream buffers. This project will use GIS data to map the location of HQ and EV streams in Pennsylvania to assist in determining if a location is within an HQ or EV watershed. The location and amount of area needed for a 150 foot stream buffer will also be determined for all HQ and EV streams.

NEW PHRC PUBLICATIONS

OBTAINING PROPER VENTILATION: A CASE STUDY IN RESIDENTIAL EXHAUST FAN PERFORMANCE BUILDER BRIEF

Exhaust fans do not always perform at their labeled exhaust rate. This may be the result of poor duct design and installation or high levels of house tightness with inadequate

makeup air. This reduced performance becomes a significant issue when exhaust fans are used as part of a mechanical ventilation strategy per IRC or ASHRAE requirements. To analyze this issue further, the PHRC conducted a case study of homes with exhaust only ventilation systems installed and completed a builder brief summarizing the results. A total of 88 exhaust fans in 30 different homes were analyzed. In general, the measured performance of each fan varied greatly with respect to their rated flow. These results could not be statistically related to any specific installation method, as the methods to install each fan and duct system varied significantly. A general set of recommendations for installing exhaust fans and duct systems were assembled, as well as the recommendation for further study of residential mechanical ventilation strategies.

This brief can be downloaded for free at the PHRC website. Select the "Publications" tab, then "Builder Briefs."

A QUICK GUIDE TO THE RESIDENTIAL PROVISIONS OF PENNSYLVANIA'S UNIFORM CONSTRUCTION CODE AND LOCAL AMENDMENTS.

This new report focuses on the residential provisions of the Uniform Construction Code, which defines residential structures as one- and two-family dwellings and townhouses that are three stories or less in height above grade, and accessory structures to these types of buildings. The first part of the report contains a brief summary of the UCC as it relates to residential construction. Part 2 of the report is a series of county-by-county maps and tables indicating which Pennsylvania municipalities have amendments and the details of what those amendments pertain to if available.

This report can be downloaded for free at the PHRC website. Select the "Publications" tab, then "Research Reports."

NEW PHRC WORKSHOPS

EXTERIOR WATER MANAGEMENT

Be proactive instead of reactive and learn before you get burned. Many callbacks and costly repairs result from water leakage resulting from incorrectly installed flashing. Learn about flashing trouble spots, flashing details, and exterior water management strategies through the use of interactive models. Eliminate unnecessary service calls and save money by learning quick solutions that work.

1-DAY IRC CODE REFRESHERS

Keep your foundation of workplace knowledge strong! The PHRC has developed a series of one-day courses covering the 2009 IRC. This series of programs consists of five code specific courses, based on material from the building, plumbing, electrical, mechanical, or energy sections of the code. Individuals who attend four of the five classes and pass a short exam will receive a PHRC "Residential Building Scholar" or "Residential Code Scholar" certificate to display in your office or sales room! Builders and Code Officials are encouraged to attend!

INTRODUCTION TO BUILDING SCIENCE

Single-family homes are relatively simple structures, but the interactions between building materials, HVAC and exhaust equipment, appliances, occupants, climate and the movement of air, moisture, and heat can be surprisingly complex. In response to this, the PHRC has developed both a half day and full day training program. These programs begin by explaining the basic physical principles that dictate the magnitude and direction of the flows of air, moisture, and heat. After gaining an

22ND ANNUAL PA HOUSING & LAND DEVELOPMENT CONFERENCE

FEBRUARY 19-20, 2014 | STATE COLLEGE, PA

REGISTER ONLINE AT WWW.ENGR.PSU.EDU/PHRC



WEDNESDAY 2/19 HOUSING DAY

The Housing Day of the PHRC

Conference focuses on housing structures and their systems bringing together all sectors of the housing industry including builders, remodelers, code officials, design professionals, educators, and factory-built housing manufacturers.

OPTIONAL TOURS

New this year! At the end of technical sessions on Day 1, conference attendees can choose to tour one of Penn State's innovative research facilities. Choose between:

- Sustainability Institute's MorningStar Solar Home

or

- Building Component and Enclosure Research Lab

HOUSING KEYNOTE

- Building America: High Performance and Technology that Works | Brad Oberg

TRACK 1 DESIGN & INNOVATION

- Passive House: Making Better Buildings and Using Less Energy | Michael Whartnaby & Laura Nettleton
- Innovations in Swedish Factory-Built Housing | Gregory La Vardera
- Infill - Urban Renewal: Challenges for Both Structure and Site Design | Elizabeth Baldwin

TRACK 2 CONSTRUCTION

- Stormwater 101 | Katie Blansett, PhD, PE
- Super Efficient Remodel Design and Construction | Michael Merck
- Wood Design for Builders "Lessons from the Field" | Brennan Glantz, PE

TRACK 3 BUILDING CODE

- Installation and Habitability Guidelines for Relocated Manufactured Housing | Mark Conte
- Visit-ability, Aging in Place & Accessibility: What is the Difference? | Amy Martino, AIA, CAASH
- UCC Q&A Panel Discussion | Bob Buddenbohn, BCO & Matt Light, BCO

THURSDAY 2/20 LAND DEVELOPMENT & TRAINING

The Land Development Day of the conference focuses on emerging, planning, design, and regulatory issues affecting the land development industry. The day's programs are intended for anyone involved in land development activities, including engineers, builders, developers, design professionals, planners and regulatory officials.

TRAINING PROGRAMS

Two training programs programs will also be offered for builders, design professionals, code officials and others on Thursday, February 20th from 8:30-4:30.

- Building Science
- Detailed Residential Energy Plan Reviews and Inspections

LAND DEVELOPMENT KEYNOTE

- The Economic Impact of Government Regulation | Elliot F. Eisenberg, PhD

TRACK 1 THE LAND DEVELOPMENT PROCESS

- Land Development Process | Katie Blansett, PhD, PE
- Online Resources of Conducting Due Diligence | Bob Fisher, PE
- Critical Issues in Traffic Planning & Engineering | Casey Moore, PE & Francis Hanney
- More Efficient Product Management | Thomas Skibinski, PE

TRACK 2 STORMWATER MANAGEMENT

- Soil Mixes for Stormwater Management | Andrea Welker, PhD, PE
- Stormwater Offset Policy & DEP's Expectations for Long-term Obligation | Jennifer Orr
- DEP's Evaluation Process for New BMP's | Darl Rosenquest, PE, PG
- Calculation of Evapotranspiration | Mark Bowen, PE

ACCOMMODATIONS

THE PENN STATER CONFERENCE CENTER HOTEL

State College, PA

www.thepennstatehotel.psu.edu

The room rate for conference participants is \$90, effective until January 18, 2014.

All reservations made after this date will not receive the discounted price. Room reservations can be made by calling 814 863 5000 (Toll-free 1 800 233 7505), or Online.

Mention the PHRC Housing and Land Development Conference Code (PAHB14A) when registering to receive the discount.

RECEPTION (WED 2/19)

MIX & MINGLE

Join us for a fun evening of food, networking, and camaraderie at the Hintz Alumni Center! Anyone who attends either day of the conference is welcome to attend. This is a great opportunity to network with other professionals as well as to have some fun.

FEE INCLUDES 2 DRINKS AND HEAVY HORS D'OEUVRES

Non-member | \$40

PBA Member/PCCA | \$30

A TOUR OF THE HISTORIC ALUMNI CENTER IS BEING ORGANIZED!

CONCURRENT RBDCC

The PHRC Housing and Land Development Conference runs concurrently with the Residential building design and construction conference. Check out www.engr.psu.edu/phrc for more details



ALL MAJOR CREDIT CARDS ACCEPTED

REGISTRATION INFO

The registration fee covers all instruction, notes, program materials, lunch and breaks.

Registrants are responsible for all other meals and for lodging. This fee may be paid by any major credit card (VISA, MasterCard, Discover, or American Express). We encourage you to register online.

If paying by check, please make checks payable to Penn State University. Note: A \$10 per person processing fee applies to all registrants paid by check or not made Online.

Registrations after February 12th and walk-ins will be charged an additional \$20.

Groups of 8 or more can receive a special rate. Contact Tracy Dorman at tsd5@psu.edu or 814 865 2341 to receive this discount.

Upon registering, you will receive confirmation by email. Your registration will NOT be complete until you receive your email confirmation.

PRICING

HOUSING CONFERENCE (WED)

Standard Rate | \$180

PBA Member/PCCA | \$145

LAND DEVELOPMENT (THURS)

Standard Rate | \$180

PBA Member | \$145

TRAINING PROGRAMS (THURS)

Building Science | \$125

Detailed Residential Energy Plan Reviews and Inspections | \$40

REGISTER ONLINE AT: WWW.ENGR.PSU.EDU/PHRC

REGISTRATION OPENS AT 7:30AM

CONTINUING EDUCATION

	PA DEPT OF L&I HOURS	PA & NY ENGINEERS PHDS	ARCHITECTS LU HSW	LANDSCAPE ARCHITECTS PDHS	NARI CEUS
HOUSING (DAY 1)	7 ¹	6.5 ¹²	6.5 ¹²	—	3.75
LAND DEVELOPMENT (DAY 2)	6.25	6.25 ²	—	6.25	—
TRAINING PROGRAM (DAY 2)	6.5	6.5 ²	6.5 ²	—	—

¹includes attendance to 1 tour

²maximum number of hours/units available, check approved sessions

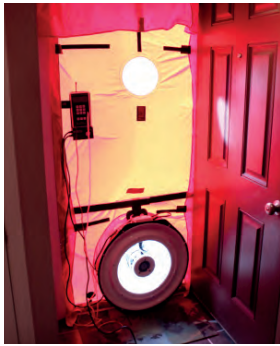
A SPECIAL THANKS TO



understanding of those principles, attendees learn about how construction and occupant decisions affect building performance in terms of comfort, indoor air quality, durability, and energy efficiency.

NEW ONLINE COURSE: ACHIEVING COMPLIANCE WITH THE INTERNATIONAL ENERGY CONSERVATION CODE IN RESIDENTIAL OCCUPANCIES

Learn about energy efficiency from the comfort of your home or office. This new online course covers Chapters 1-4 of the International Energy Conservation Code. The online program consists of a series of videos



Blower Door Setup to Determine Overall Envelope Air Leakage

and quiz questions covering the main topics of the IECC for residential applications. You can complete the course all in one sitting or get started and then return to it later. Once all of the online

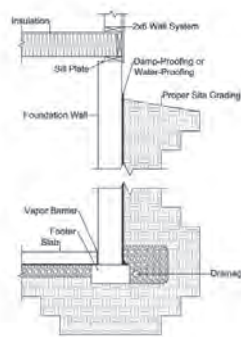
modules are complete, you can register for a certificate of completion for 4 PA Department of L&I credit hours. The cost is only \$50 and through a DEP grant the first 100 registrants to complete the program will receive the certificate for free. As of our newsletter printing, over 50 free registrations were still available. Registration information is on the PHRC homepage or go to: <http://goo.gl/6seUf>

To find out more about our other training programs or to schedule a program check out the "Trainings" tab of our website or contact the PHRC at (814) 865-2341.

TRAINING PROGRAMS IN DEVELOPMENT - COMING SOON!

BASEMENT ESSENTIALS 101

Basements in residential construction today are different than in the past, and in many cases they are constructed with the intentions of becoming living space. Incorporating basements into the overall building enclosure can be a difficult task. The PHRC is currently developing a program that will address both the code requirements and



Typical Foundation Wall Cross Section

recommended practices for basement construction, including structural design, moisture and heat management, ventilation design, containment of pollutants, and finish options. This new half day training program will incorporate a mixture of hands on analysis, state of the art review, and peer to peer discussion of best practices, past failures, and current market factors that shape the way we build basements today.

BUILDING CODE PLAN REVIEW & INSPECTIONS

Building off of the success of our "Energy Plan Review and Inspections" course, this program will provide a general understanding of residential building code requirements (IRC chapters 1 through 10) for plan reviews and field inspections. Participants will learn code concepts and applications through guided plan reviews and interactive inspection video presentations. Topics will include fireblocking and draft-stopping, window and door requirements, means of egress, wall bracing, and roof /ceiling construction requirements among others.

THE LAND DEVELOPMENT PROCESS

The land development process is a long and complicated process. Many of the entities involved in the process do not know what other steps are involved in getting a project from conceptual idea to construction. The PHRC published a Land Development Brief, Summary of the Typical Residential Land Development Process in Pennsylvania, in 2012 to help educate those involved with the process about the many steps. This short training program will expand upon that Brief to provide municipal officials, code officials, and sewage enforcement officers (SEOs) with an overview of the land development process through a focused training program. Content in the program will focus on the land development flow chart included in the Brief. The program will highlight the various approvals needed and where additional information on steps in the process can be found.

STORMWATER 101

Recent regulatory and policy changes have now made stormwater management an issue for some single-family homebuilders. Regulatory and permit updates and increased public awareness of flooding and water quality are bringing the issues of stormwater management to other professions, such as municipal officials and code officials who may not be well versed in the topic. This session will teach builders, code and municipal officials, and other non-stormwater professionals on the basic issues of stormwater, the management of runoff, and the new rules that affect a larger percentage of the development community. It will help builders with the basics of site specific stormwater design and why the designs are implemented the way they are.

2013-2014 PHRC WEBINAR SERIES

IN CASE YOU MISSED IT, RECORDINGS FOR THE AUGUST SPECIAL TOPIC, SEPTEMBER, OCTOBER, NOVEMBER AND DECEMBER WEBINARS ARE POSTED ON OUR WEBPAGE AT [HTTP://WWW.ENGR.PSU.EDU/PHRC/TRAINING/WEBINARS.HTM](http://www.engr.psu.edu/phrc/training/webinars.htm).

AUGUST - SPECIAL WEBINAR ON **ACT 54 - DEVELOPMENT PERMIT EXTENSION ACT OF 2013**

On July 9th, 2013, Governor Corbett signed Act 54 (HB 784), the Development Permit Extension Act, which suspends and extends permits and approvals pertaining to zoning, land planning, land development, building, construction and related activities until at least July 2, 2016. This webinar explained the scope of what is regulated by this Act 54 and compared it to the previous permit extension acts, Act 87 of 2012, and Act 46 of 2010.

SEPTEMBER - THE QUICK **GUIDE TO THE UCC**

This webinar reviewed the contents of the new PHRC document titled "A Quick Guide to the Residential Provisions of Pennsylvania's Uniform Construction Code." The webinar summarized the new document by discussing types of UCC Amendments, differences between opt-in & opt-out municipalities, projects that require permits, as well as using the maps and tables within the guide.

OCTOBER - ENERGY EFFICIENT **LIGHTING**

Watt you need to know! Residential lighting affects many aspects of a homeowners daily activities but "effective" lighting goes largely unnoticed. Lighting provides the setting or mood for various everyday tasks around the home, increases outdoor security, and affects visibility and productivity in home offices. This webinar provided

listeners with a basic understanding of lighting principles, terminologies, and practices, along with an overview of residential lighting code requirements, best practice for reducing energy use, and information to allow listeners to make educated lighting selections in regards to residential projects.

NOVEMBER - OSHA **RESIDENTIAL CONSTRUCTION FALL PROTECTION**

Don't fall without protection! This program reviewed the OSHA Fall Protection regulations and provide options to protect against falls on the jobsite. We look at areas of concern for fall protection, but also look at how to comply with specific areas. Check out the OSHA Residential Regulations "Residential Construction Fall Protection" webinar recording to review how you can protect your company, jobsite and most importantly, your employees by reviewing and implementing the fall protection regulations.

DECEMBER - SOIL **CONSIDERATIONS FOR BUILDERS**

The PHRC has been fielding more and more questions recently about the soils related topics in the IRC. We brought in a local expert, Shad E. Hoover, Ph.D., P.E. of CMT Laboratories, Inc., to help us provide a basic overview of soils issues as they relate to residential construction.

Mark your calendar so you don't miss the rest of the great topics to be covered during our webinar series.

JANUARY 14, 2014 - NATIONAL **GREEN BUILDING STANDARD UPDATE**

We saw an update to the ICC 700 National Green Building Standard (NGBS) in 2012. The NGBS covers both new construction and remodels. It includes all major areas of construction from site selection and preparation, materials, and resource efficiency through to operation, maintenance and home owner education. This webinar will provide an overview of the NGBS for

building professionals as well as a summary of the 2012 changes.

MARCH 11, 2014 - RENOVATION **REQUIREMENTS IN FLOODPLAINS**

FEMA regulations require certain flood protection or mitigation measures be taken for some renovation projects if the structure is located within a 100-year floodplain boundary. Tune into this program to learn about the FEMA regulations from the perspective of both the remodeler and the code inspector.

APRIL 8, 2014 - STORMWATER 101

Professionals in the land development field have been dealing with the issues of stormwater management for years. Regulatory and permit updates have brought stormwater management to the home builder and increased public awareness of flooding and water quality are bringing the issues of stormwater management to others professions, such as municipal officials and code officials. If you're a municipal official, code official, builder, or other non-stormwater professionals, tune in to this webinar to learn the basic issues of stormwater, the management of runoff, and the new rules that affect a larger percentage of the development community.

MAY 13, 2014 - AGING IN PLACE

"Aging in Place" refers to the ability to live in one's own home safely, independently, and comfortably. The generation known as "Baby Boomers" – born from 1946 to 1964 – represents over 25% of the US population. This large portion of the population has created a need for converting living spaces to suit their needs in their latter years. Most adults would prefer to remain in their home as long as possible. However, there are many risks for injury to older adults in the common household, which impacts their capability to successfully age in place. This webinar will enable participants to identify, recommend, and offer design solutions that create a safe environment for individuals who wish to age in place. Techniques for modifying home designs in new construction and remodels will be explored.

UPCOMING TRAINING PROGRAMS

JANUARY

RA 501: RESIDENTIAL PLUMBING ACADEMY

1/13-16/2014 | Enola | PSATS
Educational Center

RESIDENTIAL SPRINKLERS TOWNHOUSES

1/21/2014 | Lancaster | Best Western Eden
Resort & Suites

IRC PLUMBING CODE UPDATE

1/29/2014 | Wyndham Garden Exton
Valley Forge

FEBRUARY

RA 401: RESIDENTIAL MECHANICAL ACADEMY

2/10-13/2014 | Enola | PSATS
Educational Center

BUILDING SCIENCE

2/20/2014 | State College | The Penn Stater
Conference Center

ENERGY PLAN REVIEW/INSPECTIONS

2/20/2014 | State College | The Penn Stater
Conference Center

RESIDENTIAL SPRINKLERS TOWNHOUSES

2/26/2014 | Doubletree by Hilton
Pittsburgh-Monroeville Convention Center

MARCH

PCCA SYMPOSIUM EAST

3/5/2014 | Best Western Concordville Hotel

ENERGY PLAN REVIEW INSPECTIONS

3/6/2014 | Best Western Concordville Hotel

IRC PLUMBING CODE UPDATE

3/11/2014 / Nichols Village Hotel & Spa

PCCA SYMPOSIUM WEST

3/19/2014 | Doubletree by Hilton
Pittsburgh-Monroeville Convention Center

ENERGY PLAN REVIEW/INSPECTION

3/20/2014 | Doubletree by Hilton
Pittsburgh-Monroeville Convention Center

RA 301: RESIDENTIAL ENERGY ACADEMY

3/25-26/2014 | Enola | PSATS
Educational Center

APRIL

IRC ELECTRICAL CODE UPDATE

4/8/2014 | Clarion Hotel & Conference
Center Harrisburg West

BUILDING SCIENCE

4/22/2014 | Greensburg | Ramada Hotel &
Conference Center

MAY

BASIC BLUEPRINT READING

5/6/2014 | Lancaster | Best Western Eden
Resort & Suites

BASIC BLUEPRINT READING

5/13/2014 | Greensburg | Ramada Hotel &
Conference Center



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FALL 2013