

PENNSYLVANIA HOUSING RESEARCH CENTER MAGAZINE

PHRC.PSU.EDU



FALL 2023

FEATURES

- 2 RBDC CONFERENCE
- 3 PHRC HOUSING CONFERENCE
- 8 WELCOME ALAYNA & MINDY, STAFF HIGHLIGHTS
- 9 HANKIN CHAIR UPDATE
- 12 NEW POSITION CREATED

MEMBERSHIP

- 4 BECOME A MEMBER, 2023 MEMBERS

EDUCATION

- 5 ON-DEMAND COURSES, PHRC NEWS WEBSITE
- 6 2023-24 WEBINARS
- 7 SPEAKING ENGAGEMENTS

OUTREACH

- 10 HANKIN LECTURE, DOE SOLAR DECATHLON
- 11 NAHB STUDENT COMPETITION, CROWDFUNDING

Greetings from the Pennsylvania Housing Research Center (PHRC) team! We hope the past year has been rewarding for you. This year has been a dynamic and exciting one for the PHRC on several fronts. To summarize the past year in one word, it would be “change.” The PHRC team is experiencing a season of new faces, new spaces, and new opportunities. This magazine offers a glimpse into these changes and many activities as we prepare for the busy year ahead.

One area of excitement and increased activity is the expansion of the PHRC team through the creation of a new position, the housing affordability specialist. This position was created as part of a broader strategy to engage our team with the retrofit and weatherization aspects of the residential construction industry. The PHRC is looking to partner with key organizations and initiatives to bring more training and resources that will focus on the performance of existing homes. Fortunately, we didn't have to look far for the ideal candidate for the housing affordability specialist. Rachel Fawcett, previously serving as the financial & communications coordinator, will tap into her professional and educational experience in this new role moving forward.



Brian Wolfgang, associate director

Another important change that warrants some attention is the departure of long-time PHRC team member Tracy Dorman. Tracy made the decision to retire from the PHRC at Penn State on June 30 of this year. It is truly difficult to capture the impact that she has had on our team and our industry during her tenure. For many years, Tracy has been a consistent, engaging voice for the PHRC and was responsible for numerous successful events. We wish her well in her retirement.

With Rachel's pivot into the housing affordability specialist position and Tracy's retirement, the PHRC team focused on recruitment over the summer. There are two new team members who are highlighted on page 8: Alayna Kilic, meeting & events coordinator, and Mindy Boffemmyer, financial & communications coordinator.

Now that the PHRC team is back at full capacity, we are eager to tackle the current challenges facing our industry. We hope that you will join us for our online training opportunities, the 2024 PHRC Housing Conference, and more upcoming activities!



PHRC staff members at the 2023 PHRC Housing Conference on March 1, 2023



PHRC staff members past and present on July 11, 2023

RBDC CONFERENCE | 2024

The 2024 Residential Building Design & Construction Conference (RBDCC) is a paper submission-based research conference that provides a forum for researchers, architects, engineers, other design professionals, product manufacturers, builders, developers, and code officials to discuss opportunities for and challenges with sustainable, energy efficient, healthy, environmentally friendly, natural hazard-resistant, affordable, and innovative residential construction. The event promotes the dissemination of recent research findings, state-of-the-art technologies, advanced projects, and new approaches in the field. The RBDCC focuses on various types of residential buildings, including single-family dwellings, multi-family multi-story apartment buildings, mid-rise and high-rise residential building towers, factory-built and modular housing, dormitories, and hotels/motels. The RBDCC was previously held in 2013, 2014, 2016, 2018, 2020, and 2022. More information is available at <https://bit.ly/2024RBDCC>.

- Registration opens in late 2023. All presenters must register by January 10, 2024.
- A hotel discount is offered with code RBDC24A through February 24, 2024. Free parking and shuttles to the airport are available.

MARCH 27-28, 2024 | THE PENN STATER HOTEL AND CONFERENCE CENTER

KEYNOTE SPEAKERS



Vivian Loftness, FAIA, LEED AP, CPHC, Design Futures, NIBS Fellow
University Professor, Paul Mellon Chair
School of Architecture, Carnegie Mellon University
Environmental Surfing at Home for a Resilient Future

Lessons in the Development of Innovative Prefabricated Façades for Mass Timber Buildings

Graham Finch, Dipl.T, MASc, PEng
Principal, Senior Building Science Specialist
RDH Building Science Inc.



PAPERS + PRESENTATION TOPICS

The only conference in the United States of its kind, the RBDCC is the premier research conference for the residential construction industry. Over 120 abstracts have been submitted. Accepted, peer-reviewed papers will be published in an online proceedings following the conference. At the 2024 RBDCC, check out presentations and posters on topics such as:

- Disaster-resilient design
- Building envelope
- Passive house design
- Prefabrication and modular construction
- 3D printing of residential buildings
- Innovations in design and delivery
- Affordable high-performance housing
- Building information modeling (BIM)
- Aging-in-Place and senior housing
- Advances in construction quality
- Deep energy retrofits
- HVAC and electrical systems
- Education in residential construction and building science

2024 RBDCC and PHRC Housing Conference attendees are welcome to check out sessions from either conference. On Wednesday evening, March 27, both conferences will enjoy the *Networking on the Exhibit Floor* event together!

PHRC HOUSING CONFERENCE | 2024

SAVE THE DATE | The 2024 PHRC Housing Conference highlights best practices, regulation, and innovation in the housing industry. This conference brings together all design and construction sectors of the housing industry, including builders, design professionals, remodelers, code officials, educators, factory-built housing manufacturers, and product manufacturers.

- Registration opens in late 2023!
- PHRC and Pennsylvania Builders Association (PBA) members, code officials, nonprofit staff members, and students receive a registration discount.
- Continuing education is available for sessions, which may include AIA, ICC, PA L&I, NARI, and PA PDHs for engineers.
- A hotel discount is offered with code HOUS24A through February 24, 2024.
- More information is available at <https://bit.ly/HOUSINGCONFERENCE>.

MARCH 27-28, 2024 | THE PENN STATER HOTEL AND CONFERENCE CENTER



Emily Mottram of Mottram Architecture gives the keynote "The Pretty Good House" on March 1, 2023.



"2020 National Green Building Standard (NGBS) Overview" by Cindy Wasser of Home Innovation Research Labs on March 21, 2023

SESSION TOPICS

Speakers present on a wide range of topics about regulation and best practices in the industry. If you are interested in speaking at future PHRC Housing Conferences, contact Chris Hine, chine@psu.edu. Session topics may include:

High-performance homes
Codes and construction
Weatherization and building science

Land development and planning
Offsite construction
Innovative technologies and materials



PHRC Housing Conference attendees chatting with various exhibitors throughout the event on March 1-2, 2023.

"The Heat, Air and Moisture House (H.A.M. House)" by Andrew Woodruff of Community Housing Partners on March 2, 2023

SPONSORSHIP OPPORTUNITIES

TO SPONSOR, CONTACT DARRIN WRIGHT, DTW153@PSU.EDU, FOR MORE INFORMATION.

BECOME A MEMBER

Join the PHRC as a member today! Members receive additional access to trainings, discounts, and advertisement opportunities. PHRC membership fees support the outreach activities of the PHRC, students involved in the National Association of Home Builders (NAHB) Student Chapter at Penn State, and more.

PLATINUM	\$5,000
GOLD	\$2,000
SILVER	\$1,000
BRONZE	\$500
ASSOCIATION	\$200
INDIVIDUAL	\$125

AS A PHRC MEMBER, YOUR BENEFITS INCLUDE:*

- **Additional speaking engagement**
- **Annual conference discounts**
- **Workshop discounts**
- **Advertising in annual magazine, conference program, and on PHRC website**

*Benefits vary between membership levels

CONTACT ALAYNA KILIC, AMK7662@PSU.EDU, TO BECOME A 2024 PHRC MEMBER.

2023 MEMBERS

GOLD



Hankin Group

SILVER

Berks Homes
PA Concrete Masonry Association
PA Manufactured Housing Association
S&A Homes
The Torron Group

BRONZE

Owens Corning
Sukonik Building Companies
UpStreet Architects

ASSOCIATION

Adams Township
BIA of Philadelphia
Builders Association of Central PA
Carbon Builders Association
Central Keystone COG
HBA of Bucks and Montgomery Counties
Home Builders Association of NEPA
Indiana-Armstrong Builders Association
Moon Township
Pocono Builders Association
West Branch Susquehanna Builders Association
York Builders Association

INDIVIDUAL

Karen Benner
Alan Hawman
Dean Hilliard
John Hudak
Sarita Marbella
Thomas McCosby
Dave Meinert
Timothy Palaski

JOIN TODAY!

<https://bit.ly/PHRCMembership>



ON-DEMAND COURSES

Do you have a busy schedule that makes the pursuit of continuing education difficult? You are able to receive continuing education credits from the PHRC at any time or day of the week! In addition to live webinars for continuing education, the PHRC offers on-demand courses to assist residential construction industry professionals in meeting ongoing continuing education requirements. Typical continuing education approvals include PA Department of Labor and Industry (L&I) contact hours, PA professional development hours (PDHs) for licensed professional engineers, American Institute of Architects (AIA) learning units, International Code Council (ICC) contact hours or continuing education units (CEUs), and National Association of the Remodeling Industry (NARI) CEUs. Upon completion of all course requirements, you can download your continuing education certificate. The on-demand courses are available through Penn State Extension. Course pricing varies upon the length of the course and applicable continuing education credits available. Check the specific course webpage for its cost.

REGISTER FOR ON-DEMAND COURSES

phrc.psu.edu/Industry-Education/PHRC-Training-Programs/On-Demand-Courses/index.aspx

Currently available on-demand courses (all one hour):

- Slab Insulation: Finding the Right Details
- It's More than "Just a Deck"
- Solar PV in PA: Intro to the Design of New Construction and Retrofit Residential Systems
- Reducing Thermal Bridging with Continuous Exterior Insulation
- High-Performance Walls in Pennsylvania
- Control Layers: Vapor Barriers, Vapor Retarders, & Air Barriers
- The Do's and Don'ts of Crawlspace Design and Construction Revisited
- Healthy Homes: Insights for Existing Construction
- Wall Bracing in the UCC
- Air Sealing Tips, Tricks, & Details
- PA UCC Residential Code Update: Part 1
- PA UCC Residential Code Update: Part 2
- All-Electric New Homes in PA
- Adapting to Tighter Enclosures through Scopes of Work
- 2021 PA Alternative Residential Energy Provisions Update
- Adapting Stucco & Stone Assemblies to Changing Codes
- Moisture Control Layers & Materials
- Comprehensive Deck Design from Footings to Guards: Learning from the Past
- Attic Ventilation: Understanding the Why
- The Cost of Airtight Homes
- Comfort in a Bonus Room? It's in the Details



NEW! PHRC NEWS WEBSITE

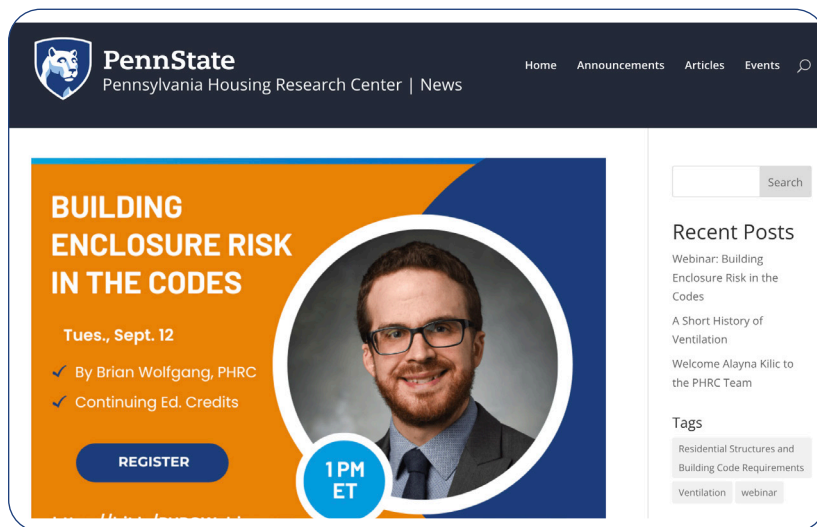
To bring you the latest content, the PHRC is debuting a new website called "PHRC News." It will feature articles on trending topics, announcements on code changes, upcoming events, and more.

This new database allows the PHRC team and guest authors to share time-sensitive information and technical content in a readable blog-style format. The mobile-friendly website allows you to stay up to date when you are on the go. You can search for content by relevant keywords, general categories, or an easy-to-use search bar.

Keep checking back to the website as we continue to develop and customize it to meet the education and training needs of the residential construction industry.

VISIT PHRC NEWS

<https://sites.psu.edu/phrcnews/>



Screenshot of the new PHRC News website

2023-24 | WEBINAR SCHEDULE

Tune in every second Tuesday of the month, 1:00-2:00 p.m. (E.T.), and occasionally on the last Thursday of the month, 11:00 a.m.-noon (E.T.), for free webinars! Live webinars are approved for American Institute of Architects (AIA) learning units, International Code Council (ICC) contact hours or continuing education units (CEUs), PA Department of Labor and Industry (L&I) contact hours, National Association of the Remodeling Industry (NARI) CEUs, and PA professional development hours (PDHs) for licensed professional engineers, which includes a certificate for \$20. Past webinars are available to view on our website under "Industry."

JOIN WEBINARS

phrc.psu.edu/Industry-Education/Webinar-Index.aspx



SEPTEMBER 12 | 1:00 P.M. (E.T.)

BUILDING ENCLOSURE RISK IN THE CODES

The modern building enclosure is quite complex and must account for a combination of code compliance, best practices, constructability, and cost considerations. Often builders are focused on reducing risk of the enclosure not performing as expected and in some cases, failing. This session will dive into some of the overall concepts related to the risk of building enclosures not meeting expectations. The discussion will identify challenges within the code compliance process and identify strategies to navigate the codes in a manner that mitigates risk to the building and the builder.

OCTOBER 26 | 11:00 A.M. (E.T.)

DOUBLE-STUD WALL FRAMING

With the increasing push for more energy-efficient homes, one method for increasing the R-value is advanced framing of exterior wall assemblies. Double-stud framed walls are a low tech and relatively easy assembly to complete, but they can create a marked increase in the overall performance of an exterior wall assembly. Some potential benefits of a double-stud wall assembly are improved thermal performance, reduced sound transfer, and an increased R-value over using traditional insulation methods and products. However, while double-stud wall assemblies offer numerous benefits, they also require a few additional considerations during the construction process to ensure proper moisture management and overall structural integrity.

DECEMBER 12 | 1:00 P.M. (E.T.)

GETTING STICKY WITH IT: UNDERSTANDING TAPES AND SEALANTS

The building enclosure must address a variety of functions throughout the design and installation process. With modern airtightness goals requiring a more robust system, builders and design professionals must utilize a variety of material options for addressing joints between dissimilar materials. This session will dive into the world of modern enclosure tapes and sealants, including providing an overview of the general types of materials currently on the market. This overview will guide building professionals when considering alternative materials to meet performance expectations.



JANUARY 9 | 1:00 P.M. (E.T.)

CONFINED SPACES IN RESIDENTIAL CONSTRUCTION

Confined spaces present a unique hazard in the workplace. Environmental conditions can change unexpectedly, and the consequences can be dire and immediate. Residential construction sites routinely have small crews and inadequate resources to rescue an affected worker. In this session, learn how to identify and protect workers from the hazards presented by working in confined spaces.

OCTOBER 10 | 1:00 P.M. (E.T.)

CATHEDRAL CEILING ASSEMBLIES

Cathedral ceiling assemblies or ceilings without attics are not new concepts in residential designs. However, with the increased need for energy efficiency and tighter tolerance for moisture and air infiltration, the dedicated design for these assemblies cannot be overlooked. In this session, learn about prescriptive designs for ceilings without attic spaces and break down some of the critical details that may help achieve an energy-efficient assembly.

NOVEMBER 14 | 1:00 P.M. (E.T.)

PENNSYLVANIA POST CONSTRUCTION STORMWATER MANAGEMENT MANUAL

NTM Engineering and Villanova University have completed the Post Construction Stormwater Management Manual (PCSM Manual) for the Pennsylvania Department of Environmental Protection (PA DEP). The manual has been reviewed, public comments are being addressed, and the manual will be released early 2024. The PCSM Manual contains new policy, new guidance, new ways to design and build SCMs, addresses climate adaptation, promotes natural landscapes as stormwater mitigation, and proposes changes to how infiltration is sited, constructed, and protected. In this session, learn about the major innovations included in the new manual, have questions answered, and understand examples.

FEBRUARY 13 | 1:00 P.M. (E.T.)

CONSIDERATIONS FOR A SLAB-ON-GRADE FOUNDATION

In this session, learn the fundamental principles, benefits, and considerations associated with using a slab-on-grade foundation for residential construction to confidently evaluate its suitability for specific construction projects. Some benefits that will be discussed when comparing slab-on-grade foundations to traditional foundations are the cost-effectiveness, ease of construction, accessibility benefits, and energy efficiency. Attendees will also be able to

2023-24 | WEBINAR SCHEDULE, CONT.

understand some drawbacks for slab-on-grade foundations such as limited access for utilities, moisture and radon issues, and insulation challenges.

MARCH 12 | 1:00 P.M. (E.T.)

ZERO ENERGY READY MODULAR HOUSING FOR 'MISSING TEETH' INFILL PROJECTS

As cities look to fill their affordable housing gaps, "missing teeth" or "infill" housing is gathering a lot of attention. Communities look for solutions that can be replicated over scattered sites in the neighborhood. Some best practices for infill housing projects include fitting the fabric of the neighborhood but also being a safe and healthy environment for its occupants. This session is focused on challenges of design and building urban infill housing using modular construction methods. Insights will also be drawn from experience building single family, energy efficient, modular housing in rust belt cities like Pittsburgh.

APRIL 25 | 11:00 A.M. (E.T.)

BEYOND PRESCRIPTIVE: EVALUATING ENERGY CODE COMPLIANCE PATHS

Energy code requirements continue to introduce challenges and complexity to the residential construction industry. As building professionals continue to weigh options to achieve code compliance, the various energy code compliance paths that are written into the PA Uniform Construction Code (UCC) should be considered. This session will focus on the varying levels of "performance" paths that are available to permit applicants in the UCC. The scope of this session will range from simulated performance to Energy Rating Index (ERI) pathways while using case studies to illustrate the options available within these pathways.

MAY 14 | 1:00 P.M. (E.T.)

INTEGRATED SHEATHING SYSTEMS

With the extensive types of sheathing now available, typical installation methods may need to be revisited. In this session, we will review different types of integrated sheathing systems, their installation methods and how they may deviate from the installation of standard wood structural panels, and the critical installation details that must be followed to reduce the risk of building enclosure failure.

Register for webinars with the QR code!



SPEAKING ENGAGEMENTS

The PHRC offers a speaker service that provides short technical presentations to organizations or associations related to the residential construction industry. Over the past ten years, the PHRC has made hundreds of these presentations to over 20,000 individuals. Most of our presentations offered under this service are best suited for local, regional, or state associations and companies working in Pennsylvania or cold weather climates. These thirty-to-sixty-minute programs are ideal for dinner meetings or other gatherings of your members or employees.

These speaking engagements are also available for virtual delivery. Our team can create a virtual meeting space where your team, audience, or members can log in to participate in an online session delivered by the PHRC staff.

One free speaking engagement will be provided to all Pennsylvania associations/companies each year, independent of PHRC membership, which does not include overnight travel. Additional speaking engagements may be subject to a negotiated fee in order to cover travel and development costs.

CONTACT ALAYNA KILIC, AMK7662@PSU.EDU, TO SCHEDULE A SPEAKING ENGAGEMENT.

AVAILABLE SPEAKING ENGAGEMENTS

phrc.psu.edu/Industry-Education/PHRC-Training-Programs/Speaking-Engagements/index.aspx

- PA UCC code updates
- Building enclosure control layers
- Air sealing
- Blower door testing
- Mechanical ventilation
- Moisture management
- Basement insulation
- Crawlspace
- Slab insulation
- Energy code compliance
- Exterior wall insulation
- Adhered masonry veneer
- Residential decks
- Wall bracing
- Visitability



WELCOME ALAYNA & MINDY



Alayna Kilic

Starting on July 3, 2023, the PHRC welcomed Alayna Kilic as the new meeting & events coordinator. In this role, she supports the mission of the PHRC by maintaining and developing relationships with PHRC stakeholders, including internal and external organizations and industry partners. Kilic coordinates logistics for the annual PHRC Housing Conference, Industry Advisory Council meetings, Hankin Lecture, and other meetings and events throughout the year. The meeting & events coordinator also assists with scheduling training programs with builders' associations and other organizations in the residential construction industry.

Kilic has been with Penn State since February 2022. Prior to joining the PHRC, she was an administrative support assistant within the Department of Civil and Environmental Engineering. Kilic received her associate degree in liberal arts from Iowa Central Community College. Prior to working at Penn State, she worked for United Airlines as a flight attendant supervisor.



Mindy Boffemmyer

Beginning September 14, 2023, the PHRC welcomed Mindy Boffemmyer as the new financial & communications coordinator. In this role, she supports both the outreach components of the PHRC and the academic side with the Residential Construction program at Penn State. On the financial side, Boffemmyer maintains PHRC's annual budgets and monitors all financial accounts while also serving as a resource for grant proposals. In addition, she directly supports the Bernard and Henrietta Hankin Chair in Residential Building Construction with meeting preparation, administrative support for student organizations, proposal preparation, and managing fundraising initiatives. Boffemmyer communicates to all internal and external PHRC stakeholders through digital and print media. Additionally, she edits and formats research reports to support ongoing research initiatives.

Boffemmyer studied English at Pitt and Duquesne University. Before joining the PHRC, she worked as administrative assistant for communications at St. Paul's United Methodist Church in State College and as undergraduate director in Women's, Gender & Sexuality Studies at Penn State.

STAFF HIGHLIGHTS

The PHRC team celebrates career milestones, achievements, and our local community together. We work to better ourselves and the world around us through our jobs and volunteer opportunities.



Brian Wolfgang and Chris Hine celebrated ten years with the PHRC in May 2023.



Rachel Fawcett was recognized for five years with the College of Engineering and her commitment to Inclusive Leadership in Equity, Allyship, and Diversity (ILEAD) by the Staff Advisory Committee on November 18, 2022.

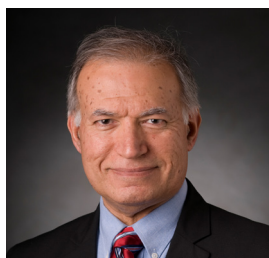


Volunteering at an event to support the local Habitat for Humanity and builders association on August 4, 2023. L-R: Darrin Wright, Brian Wolfgang, Alayna Kilic, Rachel Fawcett



Chris Hine teaching on blueprint reading in AE 470: Residential Building Design and Construction on August 30, 2023.

HANKIN CHAIR UPDATE



Ali Memari, Hankin Chair

As always, it is a pleasure to have the opportunity to share a brief report on the progress of our activities in support of the residential construction

(RC) program at Penn State. Some of the main activities of this program include offering residential-related courses, coaching students to participate in two national competitions, carrying out research projects with the help of graduate and undergraduate students toward advancing the state of the art in the residential construction field, and organizing the biennial academic conference, Residential Building Design & Construction Conference (RBDCC).

With a critical mass of residential-related courses, the RC program offers a twelve-credit housing certificate and a twenty-two-credit residential construction minor. We are excited that over sixty-nine students have been awarded the residential construction minor and over twenty students are currently enrolled. Some courses offered under the RC program include AE 470: Residential Building Design and Construction, AE 471: Construction Management of Residential Building Projects, AE 497: Ultra-High-Performance Buildings: Passive House Principles & Design, Arch 412: Integrative Energy and Environmental Design, CE 410: Sustainable Residential Subdivision Design, and AE-CE 542: Building Enclosure Science and Design.

At the graduate level, our RC program continues to attract highly motivated architectural engineering and civil engineering students to earn master's and doctoral degrees. The students are guided and advised to conduct sponsored as well as non-funded research for advancing building materials and structural systems used in the design and construction of homes. One focus area is on innovative materials and methods, including the design and construction of 3D-printed homes using concrete- and clay-based mixtures, advancing hempcrete as a new material for home building, and the development of concrete construction based on alternatives to Portland cement or use of recycled plastics to reduce carbon footprint. Another focus

area is on natural hazard resistance, including evaluation of hurricane loading and effects on coastal homes and the use of cross-laminated timber (CLT) for home building and shelters, especially under tornado effects. A third focus area combines sustainability and resiliency by evaluating air barrier tapes and sealants for passive house design under earthquake-induced drift conditions and the development of retrofit methods for energy-deficient homes to upgrade to near-Passive House standard. Beyond laboratory testing, we also work on developing reports showing practical design of homes using different framing or wall systems, such as conventional wood framing, cold-form steel framing, CLT home design, panelized home systems, and hempcrete home design.

Annually, we host the Hankin Distinguished Lecture in honor of the late Bernard Hankin and his family. Last year, Jack Hébert, founder of the Cold Climate Housing Research Center (CCHRC) and senior research adviser at the National Renewable Energy Laboratory, delivered the 2022 Hankin Distinguished Lecture. His talk, "Indigenous Wisdom and 21st Century Technology: Building Science from the Far North," featured project highlights from the CCHRC's twenty-two years of applied research and close collaboration with the North's First People. View the lecture on the PHRC website.

Finally, we are excited for the upcoming seventh biennial Residential Building Design and Construction Conference (RBDCC) to be held March 27-28, 2024. The event will host two keynote speakers, Vivian Loftness, Paul Mellon Chair and professor in the School of Architecture at Carnegie Mellon University, and Graham Finch, principal and senior building science specialist at RDH Building Science Inc. Loftness will speak on "Environmental Surfing at Home for a Resilient Future," and Finch will present on "Lessons in the Development of Innovative Prefabricated Façades for Mass Timber Buildings." Presentations and posters are based on abstract submission and peer review of papers. Papers are published in an online proceedings that is freely accessible to the public. As in previous conferences, it will provide unique opportunities for the attendees to benefit from presentations on a wide variety of R&D topics related to residential buildings. We are proud to hold it concurrently with our PHRC

Housing Conference, which is geared more toward the residential construction industry, so that both conference attendees can network together. More details about the conferences are available on pages 2 and 3.



Cross section of a concrete beam cast using mortar and EPS plastic beads as aggregate (EPS Concrete). The mixture is developed for a more insulated concrete.



Testing of the EPS Concrete for flowability



Testing of the EPS Concrete for compressive strength



Testing of the EPS Concrete for flexural strength

2023 HANKIN DISTINGUISHED LECTURE

RESIDENTIAL INNOVATION CHALLENGES AND OPPORTUNITIES | THERESA WESTON

LECTURE DESCRIPTION: “The amelioration of global climate change through energy efficiency improvements and decarbonization and the response to it through the resilience of our built environment and communities will impact our life in the coming years. These aspects of climate change, along with managing the effects of diminishing housing affordability, and enhanced interest in health and well-being are expected to drive the residential construction industry. While these areas often appear to be in opposition with each other, when they intersect or overlap, the challenges created provide unique opportunities for innovation. This presentation will highlight these trends and their intersections through examples of industry research and innovations.”

Theresa Weston is a building science research professional specializing in the durability and energy efficiency of buildings. In November 2020, Weston started The Holt Weston Consultancy. Prior to starting her company, she was a DuPont Laureate with DuPont Safety and Construction, where she was active in product and market development. Weston is an inventor on four United States patents and is an American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Distinguished Lecturer. Weston remains active in industry standard and code development. At ASHRAE, she has served on the Technical Activities Committee, the Standards Committee, and as the chair of the Residential Buildings Committee, as well as serving on several Technical and Standards Project Committees. Weston has been awarded the DuPont Lavoisier Medal for Lifetime Technical Achievement, the ASHRAE Distinguished Service, Exceptional Service and Residential Service Awards, the Wagdy Anis Award from the Air Barrier Association of America, and the E. George Stern Award of Excellence from the ASTM International Committee E06. Weston received her bachelor's degree in chemical engineering from the Massachusetts Institute of Technology and her master's and doctoral degrees in chemical engineering, both from the California Institute of Technology.



Theresa Weston

The Hankin Distinguished Lecture Series invites world-class speakers to address Penn State students, faculty, staff, and industry professionals. The lecture is free and open to the public. The lecture series was established in 2006 in honor of the late Bernard Hankin and his family for their continuous and dedicated support of the residential construction program at Penn State.

WEDNESDAY, NOV. 1, 2023 @ 4:00 P.M. (E.T.) | [HTTP://BIT.LY/2023HANKIN](http://bit.ly/2023hankin)

2023 DOE SOLAR DECATHLON

The PHRC supported the Solarchase Team in the US Department of Energy Solar Decathlon Design Challenge. For this year's competition, Penn State partnered with S&A Homes, Inc., a home builder in Centre County, Pennsylvania, which produces approximately 140 residential units annually. S&A and the student team worked together to create a design that implements emerging technologies and building science best practices into high-volume attached housing. The Solarchase design is a five-unit building with each unit having three floors, 1,430 square feet, and a single-car garage. Designed to meet the Zero Energy Ready Homes standard



Solarchase townhome exterior rendering

Rev. 07 and exceed 2021 International Energy Conservation Code and ENERGY STAR V3.1 standards in climate zone 5A, the units are highly efficient and reduce occupants' utility bills. The goal of the project was to make healthy, net-zero housing highly constructible and attainable for middle-income buyers.

The Solarchase units provided a realistic and scalable design framework that can be applied to future projects and produced in large volume. The design is scalable by maintaining the nominal wall thickness standard throughout and using readily available materials. Performance metrics are determined by the competition rules, and the baseline is exceeded when it is possible to do so without drastically increasing cost. Building science best practices were used for envelope design and HVAC.

The project team consisted of students representing multiple colleges and departments at Penn State, as producing a successful design required an interdisciplinary group. The team was led by Jake Spinelli, mechanical

engineering. Additional team members included students in architectural engineering: Eric Cheng and Paris Pavelchik and students in architecture: Nina Ferrante, Ella Pedersen, Jackie Zheng, and Luke Ciocca.

The competition features a one-credit course in the spring semester, CE 411: Residential Construction Design Project, to help align student skills. This year's course was taught by Brian Wolfgang, associate director of the PHRC. Ali Memari, Bernard and Henrietta Hankin Chair of Residential Construction and director of the PHRC, served as the head competition adviser. Additional advisers included Lisa Domenica Iulo, associate professor of architecture and director of the Hamer Center for Community Design in the Stuckeman School; Rahman Azari, associate professor of architecture; and Sarah Klinetob Lowe, solar program manager with the Clean Energy Center.

Students, faculty, or industry interested in participating in the 2024 competition as a member or adviser should contact Wolfgang at bwolfgang@psu.edu.

2023 NAHB STUDENT COMPETITION



Penn State NAHB Student Competition team presenting at IBS

The National Association of Home Builders (NAHB) Student Chapter at Penn State participated in the production homes category of the NAHB Student Competition held at the 2023 NAHB International Builders' Show (IBS) in Las Vegas. There were twenty-four universities from across the United States who participated in this annual competition.

The competition challenges student teams to solve a real-life construction management problem and develop a proposal for a residential subdivision. The provided competition site was a 200-acre site in La Plata, Maryland. The team developed a fifty-page proposal for a 342 single-family unit and 228 duplex

unit subdivision that included five single-family floor plans ranging in square footage from 2,153 up to 3,167 square feet and two duplex floor plans ranging from 1,955 up to 2,157 square feet. All floor plans were designed with the goal of efficiency, fostering family bonding and relationships, and meeting the silver rating from the National Green Building Standard. Additionally, the proposal included thoroughly vetted market, financial and risk analyses, and a land development plan.

The 2023 presentation team included: John Mann, architectural engineering, as project manager; Stefano Maiuri, civil engineering; Connor Ferrari, architectural engineering; Alexander Smith, architectural engineering; Emily Yarnall, architecture; and Gavin Burdette, architectural engineering.

The student team was coached by staff of the PHRC: Brian Wolfgang, associate director; Chris Hine, residential design & construction specialist; Darrin Wright, high-performance housing specialist; and Carl Bankert, an RC program instructor.

"In a classroom setting, this competition puts our students through realistic land acquisition, land development, product development, and sales strategy situations," said Hine. "Our goal as coaches is to provide the atmosphere of a lifelike corporate board room and construction meeting room experience. We remain in contact with several of our previous competition students, and they continue to highlight that this competition provided them with a great foundation to begin their careers."

Team travel support was generously provided by the National Housing Endowment IBS Travel Award, the University Park Allocation Committee, and the PHRC.



The Scarlett home design exterior rendering

CROWDFUNDING CAMPAIGN

Join in for the second crowdfunding campaign to support the Residential Construction program at Penn State! Funds raised benefit student activities, competitions, scholarships, and courses related to residential construction. The campaign ends on Monday, October 23, so don't miss out on this opportunity. Some specific items that you're supporting:

- Scholarships for NAHB Student Chapter members
- NAHB Student Chapter annual registration (\$400)
- Site visits to construction sites and finished projects
- NAHB Student Competition: Registration fee (\$400) and travel funds to the International Builders Show
- DOE Solar Decathlon Design Challenge: Registration fee (\$100) and travel funds to the competition in Golden, Colorado
- Volunteer opportunities with Habitat for Humanity and other local organizations
- Community building activities for students

Don't forget to ask your employer if they would match your donation. Involvement in this program offers students the opportunity to grow in their understanding of residential construction and prepare them for their careers.

Thank you for investing in the next generation of residential construction industry professionals!

DONATE BY OCT. 23

<https://bit.ly/GiveResCon2023>



Support the Future of the Residential Construction Industry



\$100 of \$10,000 Goal

1 Gifts

Give Now

Screenshot of the crowdfunding campaign from the Let's Grow State platform

NEW POSITION CREATED

As of June 5, 2023, Rachel Fawcett transitioned to a newly created position titled the PHRC housing affordability specialist. This new position was created as a demonstration of the PHRC's strategic investment in supporting areas of the residential construction industry with critical needs and with engagement opportunities. With broader national, state, and regional investments in housing affordability programs, weatherization, and home performance, the addition of the housing affordability specialist will position the PHRC well to participate in these programs through training, content creation, and research.

Fawcett brings a wealth of professional experience in housing affordability and a comprehensive educational background with her bachelor's degree in architecture and master's degree in community and economic development, both from Penn State. She has been an integral member of the PHRC team since 2017 as the center has taken on new initiatives through online and on-demand learning. Her combination of education and experience along with her passion for housing affordability issues will lead the PHRC team into exciting new directions and opportunities.



Rachel Fawcett, housing affordability specialist

SNAPSHOTS FROM 2022-23



Chris Hine and Brian Wolfgang of the PHRC talk with Kaylen Handy of Benjamin Obdyke at the International Builders Show on January 31, 2023.



Meeting of the PHRC Industry Advisory Council at Graduate State College on April 21, 2023



PHRC staff members visit a State College Community Land Trust duplex retrofit as Envinity, Inc. partners with Healthy Energy Pros to apply Aerobarrier on April 27, 2023.

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The PHRC collaboratively engages with the residential construction industry to catalyze advancements in homebuilding through education, training, innovation, research, and dissemination. The PHRC envisions a residential construction industry equipped with the knowledge, skills, and technology to build better homes.

Director | **Ali Memari**
Associate Director | **Brian Wolfgang**
Meeting & Events Coordinator | **Alayna Kilic**
Financial & Communications Coordinator | **Mindy Boffemmyer**
Residential Design & Construction Specialist | **Chris Hine**
High-Performance Housing Specialist | **Darrin Wright**
Housing Affordability Specialist | **Rachel Fawcett**



PENNSYLVANIA HOUSING
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