



The Pennsylvania Housing Research Center

Project Plan

July 2023 – June 2024

Pennsylvania Housing Research Center

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I. Preface

Annually, the Pennsylvania Housing Research Center (PHRC) seeks to identify and prioritize a series of projects that collectively satisfy the following criteria. Projects should:

- meet the residential construction industry needs and the needs of the housing consumer in Pennsylvania;
- be consistent with the mission and goals of the PHRC;
- be affordable and feasible, given the resources available and the prevailing constraints on time, expertise, and facilities; and
- be a balanced program of projects that address both the long- and the short-term needs of all sections of the industry.

The PHRC Industry Advisory Council (IAC) has the responsibility to prioritize activities and project topics. This housing industry-based body consists of builders, developers, manufacturers, suppliers, remodelers, design professionals, industry associations, building code organizations, and state agencies.

On April 20, 2023, the IAC met to discuss potential projects for the PHRC to pursue. After a thorough discourse, IAC representatives voted on projects that they felt were the highest priority for the industry. This voting resulted in a prioritization of projects. The high-priority projects are included in this plan.

The list of projects that follows identifies only those projects that are to receive funds provided to the PHRC by the Commonwealth of Pennsylvania through the Act 157 of 2006 permit fee (later amended by Act 36 of 2017). The PHRC attempts to use permit fee monies to leverage outside support. It should also be recognized that the PHRC undertakes additional projects that do not receive any of these funds and are therefore not listed in this plan.

The PHRC utilizes permit fee revenue on a one-year delay (funds collected during the fiscal year spanning July 2022-June 2023 will be budgeted for the July 2023-June 2024 fiscal year). These permit fee funds are distributed quarterly by the Department of Community and Economic Development (DCED).

The PHRC plans projects and allocates funds at the start of each year. However, there is a real need for the PHRC to be able to take on special projects during the year. These projects typically fall into two categories: the first includes short-term and limited scope projects that are time sensitive, while the second requires the ability to allocate some funds to leverage additional outside funds in response to requests for proposals.

Unless otherwise noted, the projects contained in this plan are anticipated to start July 1, 2023, and to be completed on or before June 30, 2024.

A. PHRC Staff Changes

The PHRC staff experienced substantial changes since the publication of the 2022-23 Project Plan. To summarize these changes:

- Darrin Wright was hired as the PHRC High-Performance Housing Specialist in July 2022.
- Tracy Dorman, longtime PHRC Meeting & Events Coordinator, retired from the PHRC effective June 30, 2023.
- Alayna Kilic was hired as the PHRC Meeting & Events Coordinator, effective July 1, 2023.
- A new position was created on the PHRC team in response to opportunities for externally funded weatherization training. This position is the PHRC Housing Affordability Specialist. Rachel Fawcett was hired into this position in June 2023.
- As a result of Rachel's transition into the PHRC Housing Affordability Specialist, the PHRC Financial & Communications Coordinator position will be posted and filled in summer 2023.

II. Training, Technical Assistance, & Outreach

The PHRC has a mandate to transfer knowledge by providing the necessary training and education to the wide variety of groups that make up the housing industry. The initiatives that are described below are in response to the recommendations from the PHRC's IAC and reflect the current needs within the industry.

A. Externally Hosted Training

Description: The PHRC has developed and maintains a wide array of training for many sectors of the construction industry with a focus on residential construction. These programs are intended to address technical issues facing the industry. The intended audience for these programs includes builders, remodelers, trade contractors, design professionals, educators, and building code officials. Additionally, the PHRC can customize programs to better meet the needs of an industry partner. As appropriate, AIA Learning Units (LUs) for architects, PA Labor & Industry contact hours and International Code Council (ICC) credit hours for code officials, NARI credits for remodelers, and PA Professional Development Hours (PDHs) for engineers are offered.

The PHRC seeks to partner with relevant outside organizations whenever possible. These industry partners may include trade associations such as the Pennsylvania Builders Association or their local associations, professional associations, building code associations, as well as the Pennsylvania Construction Codes Academy (PCCA). For externally hosted training, these partners groups and organizations request specific topics to be covered in a program that may vary in length from 30 minutes to full-day offerings.

To further differentiate between the types of externally hosted training that the PHRC offers, each program is classified as either a speaking engagement or a workshop. Both types of programs may be delivered in-person or online. These program categories are defined below:

1. **Speaking Engagements:** The PHRC defines speaking engagements as externally hosted training programs that are two hours or less in length. These programs are generally based on existing content that can be modified slightly to meet the needs of the host organization. The PHRC will continue to offer one speaking engagement at no cost to groups and organizations within Pennsylvania during each calendar year. Subsequent speaking engagements typically involve an additional negotiated fee.

Occasionally, the PHRC team is invited to speak at conferences and symposia throughout the Commonwealth. These types of presentations are still considered speaking engagements, although they may involve additional content creation based on the specific event.

2. **Workshops:** The PHRC defines workshops as externally hosted training programs that are greater than two hours in length, up to a full day. These programs may be based on existing training content but often involve extensive content creation. Workshops typically involve a negotiated fee based on travel, accommodations, and the extent of content creation needed to prepare for the program.

B. PHRC Hosted Training

Description: The PHRC hosts a variety of training activities, including online webinars, on-demand platforms for education, and in-person conferences. The scope of effort for these programs varies depending on the year as some programs are only offered every other year. In addition, external factors, such as changes to the Pennsylvania Uniform Construction Code, may increase activity in specific areas.

- 1. PHRC Webinar Series:** The PHRC will continue its successful webinar series. Webinars are delivered live for continuing education credit, and they are archived for on-demand viewing without continuing education credit. Proposed topics are listed below. One PA Labor & Industry contact hour is offered for each webinar for PA code officials. As appropriate, AIA LUs for architects, ICC credit hours for code officials, NARI credits for remodelers, and PA PDHs for engineers are offered.

The webinar topics for the 2023-2024 series, while subject to change based on speaker availability, may include:

- Understanding tapes & sealants
 - OSHA confined spaces
 - Cathedral ceiling assemblies
 - Double-stud walls
 - Economics of slab-on-grade
 - Integrated sheathing systems
 - Stormwater “BMP”
 - Building enclosure risk in the codes
 - Evolution of modular homes
 - Understanding beyond prescriptive
- 2. PHRC On-Demand Courses for Continuing Education:** The PHRC continues to partner with Penn State Extension to offer recorded webinars in an on-demand format. This format utilizes knowledge checks and a final quiz to satisfy continuing education requirements and provides a certificate of continuing education upon completion for a fee. The PHRC team will continue to deploy webinars that are developed and delivered internally through this on-demand platform.
 - 3. Annual PHRC Housing Conference:** The PHRC will continue to organize, promote, and hold the industry-focused conference. This conference has been held annually since 1992 and has established a reputation of being the premier program focusing on technical issues of housing and land development in Pennsylvania. The conference brings together the building community (builders, remodelers, design professionals, educators), regulators (planners, building code officials, township engineers, DEP and conservation district staff, etc.), and others involved in the residential construction industry.

The process to prepare for the annual PHRC Housing Conference is a year-long effort by the entire PHRC team. This process includes, but is not limited to, the following tasks:

- Coordinating and negotiating event space

- Engaging with the PHRC IAC through a conference steering committee to identify relevant topics
- Developing a pool of speakers to invite based on identified topics
- Coordinating sessions with speakers and obtaining continuing education approvals
- General event logistics and planning

- 4. Residential Building Design & Construction Conference (RBDCC):** The PHRC will organize, promote, and hold the research-focused RBDCC in even numbered years. The RBDCC provides a unique forum for researchers, design professionals, manufacturers, and builders to keep up to date on the latest advancements and discuss their own findings, innovations, and projects related to residential buildings. RBDCC sessions will consist of technical paper or poster presentations on recent research and innovations related to residential buildings. The RBDCC is focused on various types of residential buildings including single- and multi-family dwellings, mid-rise and high-rise structures, factory-built housing, dormitories, and hotels/motels. Full papers will be published in a conference proceedings.

The process to prepare for the biennial RBDC Conference is a two-year effort that is led by Ali Memari. This process includes, but is not limited to, the following tasks:

- Coordinating and negotiating event space
 - Announcing, promoting, and accepting abstract submissions along with subsequent review
 - Communicating reviews and deadlines to RBDCC authors
 - Accepting paper, presentation, and poster submissions
 - Coordinating sessions with speakers and moderators
 - General event logistics and planning
- 5. PHRC Construction Summit:** The PHRC will organize, promote, and hold the student-focused PHRC Construction Summit or similar events at a frequency to be determined. This event is an effort to support secondary career and technology education programs through live in-person training, online training, and on-demand training. In past iterations, this event was hosted as a synchronous online offering with short technical presentations from external speakers and PHRC staff.

C. Publications & Content Creation

Description: The PHRC will leverage the technical expertise of staff members along with the expertise of strategic external partners to continue to produce content for publication and future PHRC training programs. This initiative also includes the development and maintenance of online delivery platforms for article and video publication.

- 1. Written Content:** The PHRC will produce written publications as appropriate, including both internally and externally published work. Examples of internal publications include Builder Briefs, research reports, technical flyers, and future online articles. Examples of external publications include scholarly journal articles, conference proceedings, magazine and trade publication articles, and other general interest articles upon request.

This initiative includes the ongoing development and maintenance of the PHRC online article database that can be accessed through the PHRC website. This database allows for the PHRC team to publish a range of types of written work, including general industry announcements and technical articles.

- 2. Video Content:** The PHRC will continue to increase internal capacity to develop video content from demonstrations, site visits, and other live events. This content will be captured, edited, and published in a manner that supports broader PHRC initiatives and future training programs. Example deliverables related to video creation include the publication of short “toolbox talks” for the building community, recording of presentations for secondary programs, and capturing construction processes through live demonstration.

This initiative includes the future development and maintenance of a PHRC YouTube channel. This platform will allow for greater engagement and sharing of PHRC video content.

D. Technical Assistance, Technology Transfer, & Outreach

Description: The PHRC continues to work to get technical information, resources, and publications to builders, remodelers, design professionals, building code officials, and others involved in the residential construction industry in new and innovative ways. This often involves leveraging existing and developing new relationships with other organizations in the residential construction industry.

- 1. General Outreach Activities:** Through our general outreach initiatives, the PHRC pursues activities to keep industry professionals up to date on technical issues, as well as informed on the services and publications the PHRC provides. These activities may include email and social media campaigns, phone calls, and the PHRC's website. Our general outreach also involves attending relevant industry meetings and serving as a technical resource to legislative committees as needed.
- 2. PCCA Symposium & Other Events:** The PHRC will work upon request with the PCCA to plan, develop, and deliver online and in-person events in support of PCCA initiatives.
- 3. Annual Magazine:** The PHRC annual magazine will be sent electronically to PHRC members and stakeholders to keep them up to date on recent PHRC activities and to promote upcoming events. Additionally, it is archived on the PHRC website for public viewing. For the 2023-2024 project year, the PHRC intends to continue to have it delivered in the early fall to provide timely updating of the audience with the outcome of the previous year's projects and with what to expect in the coming year.
- 4. Support of Secondary Career & Technology Education (CTE) Programs:** The PHRC will continue to support secondary education and CTE programs through a variety of outreach initiatives. Outreach activities are intentionally flexible based on the needs of these secondary programs but may include participation on occupational advisory committees, guest lectures in secondary program classrooms, development and promotion of video content for secondary students, and other activities as needed.
- 5. Professional Women in Building (PWB):** The PHRC, in alignment with its current strategic plan, prioritizes gender equity in the residential construction industry through involvement with the NAHB Professional Women in Building (PWB) activities and initiatives. This effort includes relationship building, sharing of resources, speaking at school events, leveraging resources and contacts to bring opportunities to students, and soliciting feedback from instructors and administrators to better address their needs.
- 6. Support of the UCC RAC:** The PHRC will continue to support the Uniform Construction Code Review & Advisory Council and the public by serving as a general technical resource upon request.
- 7. Support of Standards:** The PHRC has developed standards to respond to industry demand. Each of these standards requires training and timely technical assistance for local governments, builders/developers, design professionals, and contractors. All these standards are available electronically for free. Education on these standards will continue to be provided through various training programs as requested and technical assistance will be provided through telephone and email support by the PHRC. The current PHRC standards include:

- 2021 Pennsylvania Alternative Residential Energy Provisions
 - Compliance Worksheet for the 2021 Pennsylvania Alternative Residential Energy Provisions
 - Foundation Systems for Relocated Manufactured Housing
- 8. Strategic Partnerships:** The PHRC will continue to seek out new relationships and partnerships with peer organizations with activity in the residential construction industry. These partnerships are leveraged for the benefit of the PHRC audience and stakeholders. PHRC staff time will continue to be allocated in support of this overall initiative.

III. Applied Research

An important function of the PHRC is to undertake or stimulate research and development on materials, products, procedures, and processes. These efforts may have a longer-term or a more fundamental focus than other projects, and they are typically completed under the supervision of the PHRC director Ali Memari. Projects in this category foster partnerships and draw on the expertise and strengths of the people and facilities available at Penn State.

1. Feasibility Study of Designing Homes Using Hemp Wood and Hempcrete

Description: Considering the strong desire to reduce carbon footprint of buildings, whether from building operation, e.g., HVAC system, or as it relates to the embodied energy associated with materials and their fabrication and construction, this research will explore various new materials, components, and construction techniques toward more sustainable home building. One of the emerging construction materials is based on hemp fiber and hurd. As a mixture of hemp fiber, hemp hurd, lime, and water, hempcrete has been shown to have potential in residential construction applications to improve the thermal insulation properties of walls, reduce the consumption of carbon-intensive concrete, and reduce the weight of cement-based structures. For wood-frame home building, hempcrete can be cast, sprayed, or used as prefabricated blocks. However, given that industrial hemp is relatively newly reinstated, there are not readily available design and construction guidelines for hempcrete homes. PHRC was involved in the retrofit design and construction of the first PA hempcrete home in New Castle by performing thermal resistance measurements and energy performance evaluation of the house using in-situ testing and energy simulation. Involvement in the project from beginning to end provided the team with valuable experience and understanding of the shortcomings of constructing using hempcrete. This proposed project will develop a state-of-the-art review of designing home using hemp wood and hempcrete. More specifically, this project will evaluate the feasibility of using different forms of hempcrete, such as cast in place, spray in place, prefabricated blocks and other components, and incorporation of hemp wood for sheathing and framing, as appropriate. The feasibility study will provide some guidelines for design and construction of hemp-based homes relying on the currently available technologies.

Deliverables: The result of this work will include a PHRC report.

IV. Projected Budget

The budget for 2023-24 project year is based on the Act 157 Funds collected during the 2022-23 fiscal year. Table 1 shows the quarterly check values. The Act 157 Funds available for the 2023-24 year are approximately \$523,671.18.

Located in the Department of Civil and Environmental Engineering at Penn State, the PHRC receives the added benefit of Penn State waiving their F&A (facilities & administrative) rate for this research contract. As a result, this means that PHRC retains approximately \$316,297.39 more than it normally would for a research contract. This allows PHRC to maximize any received monies in service of its mission to serve the home building industry and the residents of Pennsylvania by improving the quality and affordability of housing.

Table 1. Quarterly check values from the 2022-23 FY (2023-24 Project Year)

Quarter	Check Value
Q1: July 2022 - Sept 2022	\$161,221.19
Q2: Oct 2022 - Dec 2022	\$128,516.68
Q3: Jan 2023 - Mar 2023	\$122,706.44
Q4: April 2023 - June 2023	\$111,226.87
Total	\$523,671.18