



The Pennsylvania Housing Research/Resource Center

Project Plan

July 2008 – June 2009

Pennsylvania Housing Research/Resource Center
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Preface

Each year, 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.

This PHRC work plan is the result of input and assistance from numerous groups and individuals. The PHRC Industry Advisory Council (IAC) and the Operations Committee, in particular, have responsibility for the final choice of activities. These housing industry-based bodies consist of manufacturers, suppliers, builders, remodelers, industry associations, as well as building code organizations and state agencies. On April 17, 2008 the IAC met to identify and discuss over 50 potential projects for the PHRC to pursue. After a thorough discourse, the members of the IAC voted on projects they felt were the highest priority for the industry.

This voting resulted in a prioritization of projects into three groups. The first group was high-priority projects that are included in this plan. The second group included medium-priority projects. Many of these are included in the contingency projects that may be pursued if resources become available. The third group was low-priority projects. These projects are not included in this plan. The projects are anticipated to start July 1, 2008 and be completed on or before June 30, 2009.

The list of projects that follows identifies only those projects that are to receive funds provided to the PHRC by the Commonwealth of Pennsylvania. In most cases, we have attempted to use state funding to leverage outside support; in other cases, the work is considered important enough to warrant full state support. It should also be recognized that the PHRC undertakes a wide area of additional projects that do not receive any of these funds and are therefore not listed in this plan.

Please note that with the collection of monies under Act 157 of 2006, there is not an accurate estimate of the exact amounts of funding available during this period. Because of this, this plan is somewhat conservative in that it only considers funds on hand. Any remaining funds will be carried over for future projects. If there is less funding collected than expected, the project plan will need to be abridged. We plan to continue with our previous initiatives in the areas of training and education, modular housing, manufactured housing, and applied research.

We plan projects and allocate 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.

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 projects that are described below are in response to the recommendations that flow out of the PHRC's Industry Advisory Council and reflect the current needs within the housing industry.

PHRC Training Provided Through Industry Partnerships

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

These programs are intended to be offered through our industry partners, which may include trade associations such as the Pennsylvania Builders Association or their 42 local associations, professional associations, building code associations, as well as the Pennsylvania Construction Code Academy (PCCA).

General Audience Programs

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|---|---------|
| 1. Comprehensive International Residential Code (IRC) Program | 2 day |
| 2. Pennsylvania's Residential Energy Code Requirements | 2 day |
| 3. Overview of the IRC's Plumbing Requirements | 2 day |
| 4. Overview of the IRC's Mechanical Requirements | 2 day |
| 5. Residential Mechanical Plan Reviews and Inspections | 1 day |
| 6. Commercial Building Provisions of the IECC | 2 day |
| 7. Performing Residential Building Inspections | 2 day |
| 8. Special Issues for 2-Family Dwellings and Townhouses | 1 day |
| 9. 2003 to 2006 IRC Update Program | 1 day |
| 10. Residential Deck Design Construction and Inspection | 1 day |
| 11. Design and Construction of Wood Frame Buildings | 2 day |
| 12. A new Era of Storm Water Management | 2.5 day |

Manager/PI: Fortney - Turns

Deliverable: The PHRC will deliver at least 15 workshops to be held through various industry partners across the Commonwealth. The PHRC will also deliver custom programs upon request.

New Program Development

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

1. Residential Mechanical Plan Reviews and Inspections – The need for this program is two-fold. The first is the need of new building code officials to have more in-depth knowledge of mechanical systems since, many of them come into code enforcement from other areas of the construction industry and are not familiar with mechanical requirements and proper installation issues. Additionally, a recent DOE funded study conducted by the PHRC found generally poor performing HVAC systems across the

Commonwealth. This was generally attributed to poorly constructed ducts. This program will provide new and experienced building code officials the background they need to effectively administer and enforce the mechanical requirements in the IRC.

2. Multi-Family Program – There are specific requirements for multi-family structures built under the IRC that require special attention by the building code official. The program will highlight such issues as fire separation requirements and accessibility. This program will focus on effective plan review and inspection practices and provide an understanding of fire-rated assemblies.
3. Residential Green Building - The interest in green building has increased at an impressive rate. However, the industry is finding it challenging to find a good source of unbiased information on innovative construction technologies and methodologies. This program, or series of programs, will help builders understand how to build green and how to have their development and homes certified by major voluntary green building programs.
4. IRC Update Program - Every three years the UCC updates its building code to the most recent version of the ICC's International Residential Code (IRC). This program will highlight the most significant changes between the 2006 and 2009 IRC, and identify potential impacts to builders, designers and building code officials. The result of this will be a new training program to be offered to builders and code official organizations.

Manager/PI: Fortney - Turns

Deliverables: The first three new programs will be developed and made ready for deployment. In addition, pilot programs will be held and instructors will be trained. The PHRC will include PCCA and other interested parties in the development process to assure the finished products meet the needs of building code officials and the construction industry.

The PHRC will start developing the IRC Update Program during this fiscal year, but the program will not be finalized until the third quarter of 2009.

Web-Based Training

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

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

- Residential Ducts- Part 1- Making the Connections
- Residential Ducts- Part 2 - Obtaining Adequate Airflow
- Solar Technologies for Builders
- Frost Protected Shallow Foundations

- Ledger Board Flashing for Decks
- Foundation Systems for Relocated Manufactured Housing
- Building No-step Entrances For Single Family Homes
- Basement Insulation Strategies
- Introduction to Green Building

Manager/PI: Fortney/Turns

Deliverable: The PHRC will work with the PBA, PMHA PCCA and other industry and trade organizations to identify the most relevant topic(s) and develop and deliver at least 6 programs.

Builder Briefs

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

1. Energy Code Enforcement – Lessons from the Field
2. Design Pressures for Windows and Doors
3. In-floor Radiant Heat
4. Basement Wall Insulation Strategies
5. Wind Loads and Wall Bracing in PA

Manager/PI: Turns, Fortney, Kasal, etc.

Deliverable: At least one builder brief will be researched, written, printed and distributed.

Technology Transfer & Outreach

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

Manager/PI: Fortney

Deliverable: The PHRC will work with the PBA and other industry and trade organizations by means of the following activities:

1. **Annual Pennsylvania Housing and Land Development Conference:** For over 15 years this conference has been the premier technical conference for housing and land development issues in Pennsylvania. This 2-day conference provides the latest information on emerging technologies and how to resolve problems facing the housing industry. The conference is intended for all sections of the housing industry including builders, remodelers, code officials, educators, design professionals and modular and HUD-code builders. The second day of the conference serves as an annual forum that addresses emerging planning, design, and regulatory issues affecting the land development industry in Pennsylvania. This day is intended for anyone involved in land development activities including builders, developers, design professionals, planners and regulatory officials.

2. **Speaker Service:** The PHRC will hold and/or participate in talks and seminars directed at the housing industry. This may include trade and professional association functions and regional meetings, local association meetings, or state or national conferences.
3. **Outreach Activities:** This includes activities to let builders know about the PHRC and the services and publications it provides. These activities may include the PHRC newsletters, mailings, promotional pamphlets, advertisements in trade journals, phone calls, and the PHRC's Web site.

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

**Wall Bracing Standards
for Pennsylvania**

Description: The residential structures all over the United States are exposed to high winds year round. We propose to look at the historic wind data for Pennsylvania available through the National Weather Service, and establish critical regions/counties. The assessment of wind loading with these local wind data is possible by using the existing design guidelines.

This is an initial feasibility phase of this ambitious multi-year project.

Phase 1: Feasibility Study

Phase 2: Regional Wind Mapping

Phase 3: Developing of Bracing Standards

Phase 1, feasibility study, that was completed in the previous fiscal year included the analysis of historical wind data in PA and determining if the development of a wind load map for sub-regions of the state is warranted.

Manager/PI: Kasal

Deliverable: In the Phase 2, a map of design wind speeds will be developed for PA. This map will use regional wind data collected in the Phase. The map will allow determination of wind velocities for Pennsylvania either regionally or for the entire state.

Phase 3, will use the results from the Phase 2 and determine the amount of lateral wall bracing required for reduced wind speeds in PA. Typical one- and two-story residential dwellings will be analyzed and results will be presented in forms and tables and/or charts.

The finding and data will be presented in a PHRC research report and a builder's brief will be authored for broader distribution to the general public.

Land Development: The land development process is a key component of providing affordable homes. However, there is no single group looking at land development practices in Pennsylvania. These initiatives are part of the PHRC's long-term effort to provide technical input and guidance and leadership to these issues. The following program and tasks have been identified by builders and the PHRC Operations Committee as a high priority project for Pennsylvania's home building industry. It should be noted that the Land Development Specialist position at the PHRC is currently vacant. Once this position is filled, additional activities will be included as contingency projects. The following tasks will be undertaken:

**Pennsylvania Standards
for Residential Site
Development:**

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

Manager / PI: Fortney

Deliverable: Presentations will be made to land development design professionals and local government groups. These efforts will be coordinated with PSATS, Local Chapters of ASCE, PBA's Developers Council and other professional associations.

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

MHTI & MHRC

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

Manager/PI: Pennsylvania College of Technology

Deliverable: Promotion of the programs by providing presentations at trade association meetings, direct marketing to manufacturers, community owners and retailers, etc.

Support of Standards

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

Manager/PI: Fortney, Turns

Deliverable:

1. Pennsylvania's Alternative Residential Energy Provisions - 2006: Education will be provided through various building code training programs and technical assistance will be provided through telephone and email support by the PHRC.
2. Pennsylvania Standards for Residential Site Development Standards: Please see the Land Development section.
3. Foundation Systems for Relocated Manufactured Housing: The PHRC will develop a one-hour training program for building code officials and contractors. After this is held, it will be posted to the PHRC's Web site for open viewing.

Flood Preparedness of Pennsylvania's Housing Stock

Description: Pennsylvania has more miles of waterways than any other state and is one of the most flood-prone states. This project will review the current state of the art for flood resistive construction and proper procedures for flood recovery. This project will also identify key areas for future efforts to help Pennsylvania prepare for the recovery of future floods. This project will include involvement from FEMA, PEMA, and others involved in emergency response in the Commonwealth.

Manager/PI: Fortney, Kasal

Deliverable: The PHRC will deliver a brief report highlighting the existing resources available within the Commonwealth and suggestions for improvements in the recovery following a flood.

Analysis of Zero Energy Homes – Technical, Constructability, and Public Policy Challenges

Description: Politicians are paying increasing attention to issues of global warming, rising fuel prices, and our country's dependence on foreign oil, making the possibility of far-reaching energy legislation in the near future very real. If deep cuts in energy consumption were mandated, how would home builders respond? Could builders take advantage of a greenhouse gas cap-and-trade system? With economic feasibility in mind, this project would look at how far modified designs and off-the-shelf technologies could take a home in cloudy Pennsylvania toward the goal of producing as much energy as it consumes. Cost mitigating factors and relevant policy issues will also be discussed in this research report.

Manager/PI: Turns - Lau

Deliverable: This project will result in a policy level report that will identify what the shelf technologies are that could be used to significantly improve housing toward this goal and the component performance that will be required to meet this goal. This will be summarized in a technical report used by builders, design professionals, and state and federal policymakers.

Prioritizing Energy Efficiency in Remodeling Projects

Description: Pennsylvania is blessed with a very old housing stock; over 80% was built before the Commonwealth established an Energy Code. The potential for reducing energy use and improving comfort of our existing homes is great. Consumers, and many remodeling contractors, usually do not consider energy improvements as part of remodeling project, but when they do, energy savings can be as high as 50%. Many times this is a lost opportunity for the remodeling contractor. This project will develop a guide for remodeling contractors that will: review available technologies, identify effective approaches, and prioritize them by energy saving potential and relative cost.

Manager/PI: Turns

Deliverable: This project will result in a guide for remodelers and energy efficiency program managers.

Contingency Projects

Projects in this group have a high level of interest, but because of limited resources (financial, staff, etc.) the PHRC is not able to undertake them during this period. Other projects in this group are projects in which the PHRC has solicited financial support, but are awaiting response from funding agencies. Additionally, the PHRC may take on high priority, short-term projects mid-cycle, at the request of the Industry Advisory Council or the Operation Committee.

Development of the 2009 Alternative Residential Energy Provisions

Description: In November 1999, the Pennsylvania Legislature passed ACT 45, known as the Uniform Construction Code (UCC), into law mandating a statewide building code across Pennsylvania. Act 45 requires the Pennsylvania Department of Labor and Industry (DLI) to promulgate regulations to implement the requirements of the legislation and, in addition, to consider the development of alternative prescriptive methods for energy conservation that account for the various climatic regions within the Commonwealth. In deriving these energy standards, the DLI was to seek to balance energy savings with initial construction costs.

The PHRC developed *Pennsylvania Alternative Residential Energy Provisions* (PA-Alt) for consideration by DLI to meet their legislated mandated. The PA-Alt was developed with the intent of being:

- simpler to build to and easier to enforce;
- more rational and flexible;
- focused on Pennsylvania in terms of climatic and other conditions; and,
- equivalent to the provisions of the International Energy Conservation Code (IECC).

The initial version of the PA-Alt was developed in 2000 and was based on the 2000 IECC and IRC. The second version was updated to the 2003 IECC. The third iteration of the PA-Alt is equivalent to the 2006 IECC.

In 2009, the PHRC may need to update this document to be aligned with the new 2009 International Energy Conservation Code (IECC). This typically involves detailed computer analysis to document equivalence of the code and evaluate potential tradeoffs.

Manager/PI: Fortney - Lau

Deliverable: The development and publication of the 2009 provisions.

Enforcement Practices and Impact of the UCC on Municipalities

Description: This project, if funded by the Center for Rural Pennsylvania, will seek to provide a clearer picture of the UCC's impact on rural municipalities. This will include a determination of which municipalities are enforcing the UCC, and more importantly, how they are enforcing it. Analyses of building permit fees will be performed to determine whether there is a correlation between fee amounts and enforcement approach, as well as differences in fees between rural and non-rural municipalities. This will be accomplished by the integration of several pre-existing data sets; one maintained by the Department of Labor and Industry (DLI), two maintained by the Department of Community and Economic Development (DCED), and an archived data set maintained by the PHRC. The PHRC will augment these data by conducting a mail survey of all designated Building Code Officials (BCOs) in Pennsylvania.

Manager/PI: Turns - Fortney

Deliverable: A public report highlighting the current code enforcement practices and building permit fees.

IBC Transition Program

Description: Every three years the UCC updates its building code to the most recent version of the ICC's codes. This program will highlight the most significant changes between the 2006 and 2009 International Building Code (IBC) and identify potential impacts to designers and building code officials. The result of this will be a new training program to be offered to commercial construction industry which may include: architects; engineers; building code plan reviewers, building code inspectors.

This program will be developed jointly by the PHRC and Penn State Outreach.

Manager/PI: Fortney - Schneider

Deliverable: If this project moves forward, only minor work will be conducted during this fiscal year. The full program would not be completed until late 2009. The PHRC and Penn State Outreach will provide the development of a new training program, the development and training of a team of qualified presenters, and the development and printing of applicable handouts.

Attachment 1
Projected Budget by Project Categories

Project	State	Outside^{1,2}	Total
Training, Technical Assistance and Outreach	308,585	440,706	749,290
Applied Research	54,163	24,373	78,537
Land Development	3,758	1,691	5,449
Applied Projects	70,594	31,767	102,361
	437,101	498,536	935,637

Notes:

- 1 Outside funding is received from a variety of sources including fees for services, in-kind contributions, industry contributions, grants and contracts.
- 2 These funds are contingent upon industry commitments.